

# UCSF

## UC San Francisco Previously Published Works

### Title

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

### Permalink

<https://escholarship.org/uc/item/3dc5562b>

### Journal

Oncology nursing forum, 42(5)

### ISSN

0190-535X

### Authors

West, Claudia  
Paul, Steven M  
Dunn, Laura  
[et al.](#)

### Publication Date

2015-09-01

### DOI

10.1188/15.onf.507-516

Peer reviewed



# HHS Public Access

Author manuscript

*Oncol Nurs Forum*. Author manuscript; available in PMC 2017 June 15.

Published in final edited form as:

*Oncol Nurs Forum*. 2015 September ; 42(5): 507–516. doi:10.1188/15.ONF.507-516.

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

**Claudia West, RN, MS,**

Clinical Professor, Emerita, School of Nursing, University of California, San Francisco

**Steven M. Paul, PhD,**

Principal Statistician, School of Nursing, University of California, San Francisco

**Laura Dunn, MD,**

Associate Professor of Psychiatry, School of Medicine, University of California, San Francisco

**Anand Dhruva, MD,**

Associate Professor of Medicine, School of Medicine, University of California, San Francisco

**John Merriman, RN, PhD, and**

Postdoctoral Scholar, University of Pittsburgh, School of Nursing

**Christine Miaskowski, RN, PhD, FAAN**

Professor, School of Nursing, University of California, San Francisco

### Abstract

**Purpose/objectives**—Evaluate for 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 oncology 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. Backwards elimination regression analyses were done 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 non-white, 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.

---

Address correspondence to: Christine Miaskowski, RN, PhD, FAAN, Professor, Department of Physiological Nursing, University of California, San Francisco, 2 Koret Way, room N631Y, San Francisco, CA 94143-0610, 415-476-9407 (phone), 415-476-8899 (fax), [chris.miaskowski@ucsf.edu](mailto:chris.miaskowski@ucsf.edu).

**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.

### Keywords

quality of life; gender differences; cancer patients; depression; anxiety; radiation therapy

---

### Introduction

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 et al., 2009). Many demographic and clinical characteristics can impact 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, or spiritual) (Brix et al., 2008; Buchholz et al., 2014; Cherepanov, Palta, Fryback, & Robert, 2010; Hagelin, Seiger, & Fürst, 2006; Heo, Lennie, Moser, & Kennedy, 2014; Juul et al., 2014; Krouse et al., 2009; Lee, et al., 2011; Lopez-Espuela et al., 2014; Luncheon & Zack, 2012; Mielck, Vogelmann, & Leidl, 2014; Mor, Allen, & Malin, 1994; Osann et al., 2014; Parker, Baile, de Moor, & Cohen, 2003; Pashos et al., 2013; Paxton et al., 2012; Popovic et al., 2013; Powe et al., 2007; Quittner et al., 2010; Roland, Rodriguez, Patterson, & Trivers, 2013; M. Smith, Cho, Salazar, & Ory, 2013; Wan, Counte, & Cella, 1997; Wong et al., 2013; Zimmerman et al., 2011), 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; Jordhey 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; Dodd et al., 2011; Heller, Dogan, Schulz, & Reetz, 2014; Hjermstad, Fayers, Bjordal, & Kaasa, 1998; Heo et al., 2014; Hopman et al., 2009; Krouse et al., 2009; Lisspers, Ställberg, Janson, Johansson, & Svärdsudd, 2013; Hagelin et al., 2006; Miaskowski et al., 2014; Osann et al., 2014; Pashos et al., 2013; Pud, 2011; M. Smith et al., 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, 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 to identify patients at greater risk for a poorer QOL and implement gender-specific interventions to maintain or improve the patient's QOL.

Only one study was identified that evaluated for gender differences in the predictors of QOL in cancer patients (Pud, 2011). In that study of 114 adult outpatients (n=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. Although it is the only previous study to explore gender differences in the predictors of QOL, the study is 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 purposes of this study, in a sample of male (n=96) and female (n=89) oncology patients who were assessed prior to the initiation of radiation therapy (RT), were to evaluate for gender differences in subscale and total QOL scores as well as in the demographic, clinical, and symptom characteristics that predicted total QOL scores.

## Methods

### Conceptual Framework

The UCSF Symptom Management model was used as the conceptual framework for the entire study. An evaluation of QOL is a major outcome in this framework (Dodd et al., 2001).

### Patients and Settings

This 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. Patients were eligible to participate if they were 18 years of age; were scheduled to receive primary or adjuvant RT for one of four cancer diagnoses (i.e., breast, prostate, lung, brain); were able to read, write, and understand English; gave written informed consent; and had a Karnofsky Performance Status (KPS) score of ≥60. Patients were excluded if they had: metastatic disease; more than one cancer diagnosis; or a diagnosed sleep disorder.

### Instruments

The demographic questionnaire obtained information on age, gender, marital status, education, ethnicity, and employment status. Patients 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, Abelmann, Craver, & Burchenal, 1948; Karnofsky, 1977). Patients indicated the presence of comorbidities from a list of 26 common medical conditions.

Patients 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 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, Hivks, & Nino-Murcia, 1991). Each item was rated on a 0 to 10 NRS. Total fatigue and energy scores were calculated as the mean of the 13 fatigue items and the 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, morning energy) and prior to going to bed (i.e., evening fatigue, 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 et al., 2006; Miaskowski and Lee, 1999; Miaskowski et al., 2008). Cutoff scores of 3.2 and 5.6 indicated high levels of morning and evening fatigue, respectively (Fletcher et al., 2008). Cutoff scores of 6.0 and 3.5 indicate low levels of morning and evening energy, respectively (Lee et al., 1999; Miaskowski et al., 2006; Miaskowski and Lee, 1999; Miaskowski et al., 2008). In this study, Cronbach's alphas for evening and morning fatigue scales at enrollment were 0.96 and 0.95, respectively. Cronbach's alphas for evening and morning energy scales were .95 and .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 to 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 (i.e., patients who score <5.0), moderate (i.e., patients who score 5.0 to 7.5), and high (i.e., patients who score >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's 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 (everyday) NRS. The GSDS total score can range from 0 (no disturbance) to 147 (extreme sleep disturbance). A total score of 43 indicates a significant level of sleep disturbance (Fletcher et al., 2008). The GSDS has well-established validity and reliability in shift workers, pregnant women, cancer, and HIV patients (Lee, 1992; Lee & DeJosphe, 1992; Miaskowski and Lee, 1999). In the current study, the Cronbach's 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 to 4. The scores for each scale are summed and can range from 20 to 80. A higher score indicates greater anxiety. The STAI-T measures an individual's predisposition to anxiety determined by his/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 and 32.2 indicate high levels of trait and state anxiety, respectively. The STAI-T and STAI-S inventories have well established validity and reliability (Bieling, Antony, & Swinson, 1998; Kennedy, Schwab, Morris, & Beldia, 2001; Spielberger, Grosch, Lushene, Vagg, & Jacobs, 1983) the current study, the Cronbach's alphas 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 over the past week. Scores can range from 0 to 60, with scores of 16 indicating the need for individuals to seek clinical evaluation for major depression. The CES-D has well established concurrent and construct validity (Carpenter, Andrykowski, & Wilson, 1998; Radloff, 1977; Sheehan, Fifiield, & Reisine, 1995). In the current study, the Cronbach's alpha for the CES-D was 0.88.

Quality of life was measured using the Multidimensional Quality of Life 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 (i.e., physical well-being, psychological well-being, social well-being, spiritual well-being) experienced at the present time in cancer patients as well as a total QOL score. Each item is rated on a 0 to 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; Padilla, Ferrell, Grant, & Rhiner, 1990). In the current study, the Cronbach's alpha for the MQOLS-PV total score was 0.94. In this study, the total QOL score, which is a mean of the 41 items, was used in subsequent analyses.

## Study Procedures

The 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 (i.e., approximately 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 treatment information. Of 472 patients approached, 185 consented to participate (39.2% response rate). The major reasons for refusal were being too overwhelmed with their cancer experience or 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 analysed using SPSS Version 22 (IBM Corp., New York). Descriptive statistics and frequency distributions were generated on the sample characteristics. Independent

samples t-tests and Fisher's exact analyses were done 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 white as the referent), lives 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 QOL 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 QOL

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 both 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 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-white, had more co-morbidities, higher state anxiety scores, and 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 8.9%, followed by state anxiety at 7%.

## Discussion

To our knowledge, this study is the first to examine gender differences in the predictors of QOL of oncology patients 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 et al., 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. While 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 (i.e., 20%), but contributed only 8.9% to the men's total QOL scores. Our 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 our study, she found that the CES-D score explained a greater percentage of the total variance in QOL in men (i.e., 39%) than women (33%). This difference may be explained partially by the fact that her sample of men was relatively small (n=34), her CES-D scores were considerably higher in both gender groups than ours, and she entered only two predictors into her regression models. Our group 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, Alcala, & Reyes del Paso, 2013; Roland et al., 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-Johanssen, Ohly, Fall-Dickson, Nanda, & Kennedy, 1999; Huang, Chen, Liang, & Miaskowski, 2014). Our findings reinforce the need for clinicians to assess for and treat depressive symptoms in cancer patients at the beginning RT.

Age accounted for over twice the explained variance in the QOL in women as compared with men in our 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.

Interestingly, in our 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 cancer patients (Hagelin et al., 2006; Mor et al., 1994; Pashos et al., 2013; Popovic et al., 2013; Roland et al., 2013; Wan et al., 1997; Wong et al., 2013; Zimmerman et al., 2011). The explanation for this finding is unclear, but could be due to the fact that older people are less likely than younger people to have family and job responsibilities, which may partially lessen the trauma and burden of a potentially life-threatening illness (Mor et al., 1994). Other possible explanations for the higher QOL in older people are that older people 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 a better QOL in the women, contributing 3.8% of the total variance. Caring for children may help buffer some of the QOL impact of coping with cancer and its treatment, possibly by providing a sense of purpose. It is also possible that having children at home is a marker of social support more broadly. However, in an earlier analysis (Dhruva et al., 2010) of the breast cancer subset of this sample, we found that caring for children at home predicted higher levels of evening fatigue at the initiation of RT in the subset of women with breast cancer in this sample. It is clear that the relationship of caring for children at home with women's QOL and fatigue is a complex one and further studies are needed to clarify it.

The unique predictors of poorer total QOL scores in the men were being non-white, having a higher number of comorbidities, and higher state anxiety. The association of non-white race with 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; M. 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 behaviours; and differences in perceptions of chronic illness (Powe et al., 2007; Quittner et al., 2010; M. 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; M. Smith et al., 2013), a higher number of comorbidities was associated with poorer QOL in the male patients in this study. Surprisingly, the number of comorbidities in the women in our sample was not significantly different from the men, but this characteristic was not associated with QOL in the women. Since the men's functional status was in the highly functional range (i.e., KPS score >90) and significantly higher than the women's in this 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  $-.69$ , 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, yet 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 it is possible that 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 either the men or women, though 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 our study experience 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 we 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 ( $8.4 \pm 2.1$  vs.  $9.0 \pm 1.6$ , respectively;  $p=0.030$ ), 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 future studies.

When compared with men, the women's symptom profile was significantly worse, though 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 we 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 we evaluated fatigue severity upon awakening and before going to bed. The reason fatigue did not predict QOL in this study may be due to the relatively low levels of morning and evening fatigue reported by our 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 ( $12.4 \pm 9.4$ ) 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-Munchi et al., 2008; Forsell, 2007; Judd, Paulus, Wells, & Rapaport, 1996). Interestingly, while the men's mean CES-D score ( $7.1 \pm 7.2$ ) 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  $\geq 16$ .

Both groups reported a moderate level of attentional function. 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 reported 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 this study include that the primary reasons for patients' refusal to participate were being overwhelmed with their cancer experience or too busy. While 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 in this study.

Because 88% of the women in this sample had breast cancer and 85% of the men had prostate cancer, this study could not determine whether the differences in the predictors of QOL were due to gender and not cancer diagnosis. Future research will need to determine the answer to this question using cancer diagnoses that occur in both men and women. Since the sample was primarily white 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; M. Smith et al., 2013), future studies need to examine gender differences in the predictors of QOL in larger, more racially and educationally diverse samples. In addition, we did not collect data on the medications patients were taking for their symptoms. Therefore, it is possible that symptom severity scores were affected by medications, and may have diminished their effect on QOL. Although a large amount of the total variances in QOL were explained in this study, 36% of the variance in women and 30% of the variance in men remained unexplained. Future studies need to explore additional variables that could impact QOL differentially across the 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.

## Conclusions and Implications for Nursing Practice

Despite these limitations, this 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 both 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-white, had more co-morbidities, higher state anxiety, and 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 noted above 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 the patient to rate their sense of well-being using a 0-10 scale where zero indicates “best ‘feeling of well-being’” (Bush et al., p.566) and 10 represents “the worst possible ‘feeling of well-being’” (Bush et al., p.566).

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

## Acknowledgments

**Funding Support:** This research was supported by grants from the National Institute of Nursing Research (NINR; NR04835) and the National Cancer Institute (K05 CA168960). Dr. Miaskowski is funded by the American Cancer Society (ACS) as a Clinical Research Professor. Dr. Merriman was supported by a National Institute of Nursing Research T32, Interdisciplinary Training of Nurse Scientists in Cancer Survivorship Research (TNR011972A).

## References

- Bieling PJ, Antony MM, Swinson RP. The State-Trait Anxiety Inventory, trait version: Structure and content re-examined. *Behaviour Research and Therapy*. 1998; 36:777–788. [PubMed: 9682533]
- Bower JE. Behavioral symptoms in patients with breast cancer and survivors. *Journal of Clinical Oncology*. 2008; 26(5):768–777. DOI: 10.1200/JCO.2007.14.3248 [PubMed: 18258985]
- Brix C, Schleussner C, Fuller J, Roehrig B, Wendt TG, Strauss B. The need for psychosocial support and its determinants in a sample of patients undergoing radiooncological treatment of cancer. *Journal of Psychosomatic Research*. 2008; 65:541–548. DOI: 10.1016/j.jpsychores.2008.05.010 [PubMed: 19027442]
- Brown PJ, Roose SP. Age and anxiety and depressive symptoms: The effect on domains of quality of life. *International Journal of Geriatric Psychiatry*. 2011; 26:1260–1266. DOI: 10.1002/gps.2675 [PubMed: 21351152]
- Bucholz EM, Strait KM, Dreyer RP, Geda M, Spatz ES, Bueno H, Krumholz HM. Effect of low perceived social support on health outcomes in young patients with acute myocardial infarction: Results from the VIRGO (Variation in Recovery: Role of Gender on Outcomes of Young AMI Patients) Study. *Journal of American Heart Association*. 2014; 3 e00 1252. doi: 10.1161/JAHA.114.001252
- Bush SH, Parsons HA, Palmer JL, Li Z, Chacko R, Bruera E. Single- vs. multiple-item instruments in the assessment of quality of life in patients with advanced cancer. *Journal of Pain and Symptom Management*. 2010; 39:564–571. DOI: 10.1016/j.jpainsymman.2009.08.006 [PubMed: 20303030]
- Bushnell CD, Reeves MJ, Zhao X, Pan W, Prvu-Bettger J, Zimmer L, Peterson E. Sex differences in quality of life after ischemic stroke. *Neurology*. 2014; 82(11):922–931. DOI: 10.1212/WNL.000000000000208 [PubMed: 24510493]
- Carpenter JS, Andrykowski MA, Wilson J. Psychometrics for two short forms of the Center for Epidemiologic Studies-Depression Scale. *Issues in Mental Health Nursing*. 1998; 19:481–494. [PubMed: 9782864]
- Chambers SK, Meng X, Youl P, Aitken J, Dunn J, Baede P. A five-year prospective study of quality of life after colorectal cancer. *Quality of Life Research*. 2011; 21(9):1551–64. DOI: 10.1007/s11136-011-0067-5 [PubMed: 22200938]

- Cherepanov D, Palta M, Fryback DG, Robert SA. 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*. 2010; 19:1115–1124. DOI: 10.1007/s1136-010-9673-x [PubMed: 20496168]
- Cimprich B. Attentional fatigue following breast cancer surgery. *Research in Nursing and Health*. 1992; 15:199–207. [PubMed: 1354883]
- Cimprich B, So H, Ronis DL, Trask C. Pre-treatment factors related to cognitive functioning in women newly diagnosed with breast cancer. *Psycho-Oncology*. 2005; 14:70–78. DOI: 10.1002/pon.821 [PubMed: 15386786]
- Cimprich B, Visovatti M, Ronis DL. The Attentional Function Index: A self-report cognitive measure. *Psycho-Oncology*. 2011; 20:194–202. DOI: 10.1002/pon.1729 [PubMed: 20213858]
- Das-Munshi J, Goldberg D, Bebbington PE, Bhugra DK, Brugha TS, Dewey ME, Prince M. Public health significance of mixed anxiety and depression: Beyond current classification. *British Journal of Psychiatry*. 2008; 192(3):171–177. [PubMed: 18310574]
- Dhruva A, Dodd M, Paul SM, Cooper BA, Lee K, West C, Miaskowski C. Trajectories of fatigue in patients with breast cancer before, during, and after radiation therapy. *Cancer Nursing*. 2010; 33(3):201–212. DOI: 10.1097/NCC.0b013e3181c75f2a [PubMed: 20357659]
- DiMatteo MR, Lepper HS, Croghan TW. 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*. 2000; 160(14):2101–2107. [PubMed: 10904452]
- Dodd M, Janson S, Facione N, Faucett J, Froelicher ES, Humphries J, Lee K, Miaskowski c, Puntillo K, Rankin S, Taylor D. Advancing the science of symptom management. *Journal of Advanced Nursing*. 2001; 33(5):668–676. [PubMed: 11298204]
- Dodd MJ, Cho MH, Cooper BA, Petersen J, Bank KA, Lee KA, Miaskowski C. 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*. 2011; 38(1):33–42. [PubMed: 21186158]
- Dunn LB, Cooper BA, Neuhaus J, West C, Paul S, Aouizerat B, Miaskowski C. Identification of distinct depressive symptom trajectories in women following surgery for breast cancer. *Health Psychology*. 2011; 30(6):683–692. doi:10/1037/a0024366. [PubMed: 21728421]
- Dunn LB, Aouizerat BE, Langford DJ, Cooper BA, Dhruva A, Cataldo JK, Miaskowski C. Cytokine gene variation is associated with depressive symptom trajectories in oncology patients and family caregivers. *European Journal of Oncology Nursing*. 2013; 17:346–353. <http://dx.doi.org/10.1016/j.ejon.2012.10.004>. [PubMed: 23187335]
- Efficace F, Bottomley A, Coens C, Van Steen K, Conroy T, Schöffski P, Köhne CH. Does a patient's self-reported health-related quality of life predict survival beyond key biomedical data in advanced colorectal cancer? *European Journal of Cancer*. 2006; 42(1):42–49. [PubMed: 16298522]
- Egloff B, Schmukle SC. Gender differences in implicit and explicit anxiety measures. *Personality and Individual Differences*. 2004; 36:1807–1815. DOI: 10.1016/j.paid.2003.07.002
- Fann JR, Thomas-Rich AM, Katon WJ, Cowley D, Pepping M, McGregor BA, Gralow J. Major depression after breast cancer: A review of epidemiology and treatment. *General Hospital Psychiatry*. 2008; 30(2):112–126. [PubMed: 18291293]
- Feingold A. Gender differences in personality: A meta-analysis. *Psychological Bulletin*. 1994; 116(3):429–456. [PubMed: 7809307]
- Ferrell BR. The impact of pain on quality of life. A decade of research. *The Nursing Clinics of North America*. 1995; 30(4):609–624. [PubMed: 7501531]
- Ferrell BR, Dow KH, Grant MM. Measurement of the quality of life in cancer survivors. *Quality of Life Research*. 1995; 4(6):523–531. [PubMed: 8556012]
- Fletcher BS, Paul SM, Dodd MJ, Schumacher K, West C, Cooper B, Miaskowski CA. 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*. 2008; 26(4):599–605. DOI: 10.1200/JCO.2007.12.2838 [PubMed: 18235118]
- Forsell Y. A three-year follow-up of major depression, dysthymia, minor depression and subsyndromal depression: Results from a population-based study. *Depression and Anxiety*. 2007; 23(2):62–65.

- Gaston-Johansson F, Ohly KV, Fall-Dickson JM, Nanda JP, Kennedy MJ. Pain, psychological distress, health status, and coping in patients with breast cancer scheduled for autotransplantation. *Oncology Nursing Forum*. 1999; 26(8):1337–1345. [PubMed: 10497773]
- Gay CL, Lee KA, Lee SY. Sleep patterns and fatigue in new mothers and fathers. *Biological Research for Nursing*. 2004; 5:311–318. DOI: 10.1177/1099800403262142 [PubMed: 15068660]
- Gotay CC, Kawamoto CT, Bottomley A, Efficace F. The prognostic significance of patient-reported outcomes in cancer clinical trials. *Journal of Clinical Oncology*. 2008; 26(8):1355–1363. DOI: 10.1200/JCO.2007.13.3439 [PubMed: 18227528]
- Grant M, McMullen CK, Altshuler A, Mohler MJ, Hornbrook MC, Herrinton LJ, Krouse RS. Gender differences in quality of life among long-term colorectal cancer survivors with ostomies. *Oncology Nursing Forum*. 2011; 38(5):587–596. [PubMed: 21875846]
- Hagelin CL, Seiger A, Fürst CJ. Quality of life in terminal care—with special reference to age, gender and marital status. *Supportive Care in Cancer*. 2006; 14:320–328. DOI: 10.1007/s00520-005-0886-4 [PubMed: 16189646]
- Heller J, Dogan I, Schulz JB, Reetz K. Evidence for gender differences in cognition, emotion and quality of life in Parkinson's disease? *Aging and Disease*. 2014; 5(1):63–75. [PubMed: 24490118]
- Heo S, Lennie TA, Moser DK, Kennedy RL. Types of social support and their relationships to physical and depressive symptoms and health-related quality of life in patients with heart failure. *Heart Lung*. 2014; 43(4):299–305. DOI: 10.1016/j.hrtlng.2014.04.015 [PubMed: 24856222]
- Hinz A, Singer S, Brähler E. 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*. 2014; doi: 10.3109/0284186X.2013.879998
- Hjermstad MJ, Fayers PM, Bjordal K, Kaasa S. 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*. 1998; 16(3):1188–1196. [PubMed: 9508207]
- Hopman WM, Harrison MB, Coe H, Friedberg E, Buchanan M, VanDenKerkhof EG. Associations between chronic disease, age, and physical and mental health status. *Chronic Diseases in Canada*. 2009; 29(2):108–116. [PubMed: 19527569]
- Huang HP, Chen ML, Liang J, Miaskowski C. Changes in and predictors of severity of fatigue in women with breast cancer: A longitudinal study. *International Journal of Nursing Studies*. 2014; 51:582–592. [PubMed: 24094610]
- IBM Corp. IBM SPSS for Windows, Version 22.0. Armonk, NY: IBM Corp; 2014. Released
- Izadnegahdar M, Norris C, Kaul P, Pilote L, Humphries KH. Basis for sex-dependent outcomes in acute coronary syndrome. *Canadian Journal of Cardiology*. 2014; 30(7):713–720. DOI: 10.1016/j.cjca.2013.08.020 [PubMed: 24468419]
- Jansen CE, Dodd MJ, Miaskowski CA, Dowling GA, Kramer J. Preliminary results of a longitudinal study of changes in cognitive function in breast cancer patients undergoing chemotherapy with doxorubicin and cyclophosphamide. *Psycho-Oncology*. 2008; 17:1189–1195. DOI: 10.1002/pon.1342 [PubMed: 18506671]
- Jensen MP. The validity and reliability of pain measures in adults with cancer. *Journal of Pain*. 2003; 4:2–21. DOI: 10.1054/jpai.2003.1 [PubMed: 14622723]
- Jiao J, Vincent A, Cha SS, Luedtke CA, Oh TH. Relation of age with symptom severity and quality of life in patients with fibromyalgia. *Mayo Clinic Proceedings*. 2014; 89(2):199–206. <http://dx.doi.org/10.1016/j.mayocp.2013.09.021>. [PubMed: 24485133]
- Jordhey MS, Fayers P, Loge JH, Saltnes T, Ahiner-Elmqvist M, Kaasa S. Quality of life in advanced cancer patients: The impact of sociodemographic and medical characteristics. *British Journal of Cancer*. 2001; 88(10):1478–1485. DOI: 10.1054/bjoc.2001.2116
- Judd LL, Paulus MP, Wells KB, Rapaport MH. Socioeconomic burden of subsyndromal depressive symptoms and major depression in a sample of the general population. *American Journal of Psychiatry*. 1996; 153(11):1411–1417. [PubMed: 8890673]
- Juul T, Petersen MA, Holzner B, Laurberg S, Christensen P, Grønvold M. Danish population-based reference data for the EORTC QLQ-C30: Association with gender, age and morbidity. *Quality of Life Research*. 2014; doi: 10.1007/s11136-014-0675-y

- Karnofsky D, Abelmann WH, Craver LV, Burchenal JH. The use of nitrogen mustards in the palliative treatment of carcinoma. *Cancer*. 1948; 1(194811):634–656. DOI: 10.1002/1097-0142
- Karnofsky, D. Performance scale. In: Kennealey, GT., Mitchell, MS., editors. *Factors that influence the therapeutic response in cancer: A comprehensive treatise*. New York: Plenum Press; 1977.
- Kennedy BL, Schwab JJ, Morris RL, Beldia G. Assessment of state and trait anxiety in subjects with anxiety and depressive disorders. *The Psychiatric Quarterly*. 2001; 72:263–276. DOI: 10.1023/A:1010305200087 [PubMed: 11467160]
- Krouse RS, Herrinton LJ, Grant M, Wendel CS, Green SB, Mohler MJ, Hornbrook MC. Health-related quality of life among long-term rectal cancer survivors with an ostomy: Manifestations by sex. *Journal of Clinical Oncology*. 2009; 27(28):4664–4670. DOI: 10.1200/JCO.2008.20.9502 [PubMed: 19720920]
- Leak A, Smith SK, Crandell J, Jenerette C, Bailey DE, Zimmerman S, Mayer DK. Demographic and disease characteristics associated with non-hodgkin lymphoma survivors' quality of life: Does age matter? *Oncology Nursing Forum*. 2013; 40(2):157–162. DOI: 10.1188/13.ONF.157-162 [PubMed: 23448740]
- Lee ES, Lee MK, Kim SH, Ro JS, Kang HS, Kim SW, Yun YH. Health-related quality of life in survivors with breast cancer 1 year after diagnosis compared with the general population: A prospective cohort study. *Annals of Surgery* 253. 2011; :101–108. DOI: 10.1097/SLA.0b013e3181f662ce
- Lee KA, Hicks G, Nino-Murcia G. Validity and reliability of a scale to assess fatigue. *Psychiatry Research*. 1991; 36:291–298. DOI: 10.1007/978-1-4419-9893-4\_100 [PubMed: 2062970]
- Lee KA. Self-reported sleep disturbances in employed women. *Sleep*. 1992; 15:493–498. [PubMed: 1475563]
- Lee KA, DeJoseph JF. Sleep disturbances, vitality, and fatigue among a select group of employed childbearing women. *Birth*. 1992; 19:208–213. DOI: 10.1111/j.1523-536X.1992.tb00404.x [PubMed: 1472269]
- Lee KA, Portillo CJ, Miramontes H. The fatigue experience for women with human immunodeficiency virus. *Journal of Obstetric, Gynecologic & Neonatal Nursing*. 1999; 28:193–200. DOI: 10.1111/j.1552-6909.1999.tb01984x
- Lisspers K, Ställberg B, Janson C, Johansson G, Svärdsudd K. Sex-differences in quality of life and asthma control in Swedish asthma patients. *Journal of Asthma*. 2013; 50(10):1090–1095. DOI: 10.3109/02770903.2013.834502 [PubMed: 23947390]
- Lopez-Espuela F, Zamorano JD, Ramírez-Moreno JM, Jiménez-Caballero PE, Portilla-Cuenca JC, Lavado-García JM, Casado-Naranjo I. Determinants of quality of life in stroke survivors after 6 months, from a comprehensive stroke unit: A longitudinal study. *Biological Research for Nursing*. 2014 Oct 6. pii: 1099800 414553658. [Epub ahead of print]. doi: 10.1177/1099800414553658
- Luncheon C, Zack M. Health-related quality of life among US veterans and civilians by race and ethnicity: Centers for Disease Control and Prevention. *Preventing Chronic Disease*. 2012; 9:110138. <http://dx.doi.org/10.5888/pcd9.110138>.
- McNaughton Collins M, Pontari MA, O'Leary MP, Calhoun EA, Santanna J, Landis R, Litwin MS. Quality of life is impaired in men with chronic prostatitis: The Chronic Prostatitis Collaborative Research Network. *Journal of General Internal Medicine*. 2001; 16:656–662. [PubMed: 11679032]
- Miaskowski C, Lee KA. Pain, fatigue, and sleep disturbances in oncology outpatients receiving radiation therapy for bone metastasis: A pilot study. *Journal of Pain Symptom Management*. 1999; 17:320–332. DOI: 10.1016/S0885-3924(99)00008-1 [PubMed: 10355211]
- Miaskowski C, Cooper BA, Paul SM, Dodd M, Lee K, Aouizerat BE, Bank A. Subgroups of patients with cancer with different symptom experiences and quality-of-life outcomes: A cluster analysis. *Oncology Nursing Forum*. 2006; 2006; 33:E79–89. DOI: 10.1188/06.ONF.E79-E89 [PubMed: 16955115]
- Miaskowski C, Paul SM, Cooper BA, Lee K, Dodd M, West C, Wara W. Trajectories of fatigue in men with prostate cancer before, during, and after radiation therapy. *Journal of Pain Symptom Management*. 2008; 35:632–643. DOI: 10.1016/j.painsymman.2007.07.007 [PubMed: 18358683]
- Miaskowski C, Lee K, Dunn L, Dodd M, Aouizerat BE, West C, Swift P. Sleep-wake circadian activity rhythm parameters and fatigue in oncology patients before the initiation of radiation therapy.

Cancer Nursing. 2011; 34(4):255–268. DOI: 10.1097/NCC.0b013e3181f65d9b [PubMed: 21252646]

- Miaskowski C, Cooper BA, Melisko M, Chen LM, Mastick J, West C, Aouizerat BE. Disease and treatment characteristics do not predict symptom occurrence profiles in oncology outpatients receiving chemotherapy. *Cancer*. 2014; doi: 10.1002/cncr.28699
- Mielck A, Vogelmann M, Leidl R. Health-related quality of life and socioeconomic status: Inequalities among adults with a chronic disease. *Health and Quality of Life Outcomes*. 2014; doi: 10.1186/1477-7525-12-58
- Mor V, Allen S, Malin M. The psychosocial impact of cancer on older versus younger patients and their families. *Cancer*. 1994; 74:2118–2127. [PubMed: 8087779]
- Norris CM, Murray JW, Triplett LS, Hegadoren KM. Gender roles in persistent sex differences in health-related quality-of-life outcomes of patients with coronary artery disease. *Gender Medicine*. 2010; 7(4):330–339. DOI: 10.1016/j.genm.2010.07.005 [PubMed: 20869633]
- Osann K, Hsieh S, Nelson EL, Monk BJ, Chase D, Cella D, Wenzel L. Factors associated with poor quality of life among cervical cancer survivors: Implications for clinical care and clinical trials. *Gynecological Oncology*. 2014; xxx:xxx–xxx. [3 September 2014] <http://dx.doi.org/10.1016/j.ygyno.2014.08.036>.
- Padilla GV, Presant C, Grant MM, Metter G, Lipsett J, Heide F. Quality of life index for patients with cancer. *Research in Nursing & Health*. 1983; 6(3):117–126. DOI: 10.1002/nur.4770060305 [PubMed: 6556698]
- Padilla GV, Ferrell B, Grant MM, Rhiner M. Defining the content domain of quality of life for cancer patients with pain. *Cancer Nursing*. 1990; 13(2):108–115. [PubMed: 2331691]
- Parker PA, Baile WF, de Moor CD, Cohen L. Psychosocial and demographic predictors of quality of life in a large sample of cancer patients. *Psycho-Oncology*. 2003; 12(2):183–193. DOI: 10.1002/pon.635 [PubMed: 12619150]
- Pashos CL, Flowers CR, Kay NE, Weiss M, Lamanna N, Farber C, Khan ZM. Association of health-related quality of life with gender in patients with B-cell chronic lymphocytic leukemia. *Supportive Care in Cancer*. 2013; 21:2853–2860. DOI: 10.1007/s00520-013-1854-z [PubMed: 23748484]
- Paxton RJ, Phillips KL, Jones LA, Chang S, Taylor WC, Courneya KS, Pierce JP. 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*. 2012; 118:4024–4031. DOI: 10.1002/cncr.27389 [PubMed: 22252966]
- Popovic M, Lao N, Zeng L, Zhang L, Cella D, Beaumont JL, Chow E. 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*. 2013; 21:2267–2277. DOI: 10.1007/s00520-013-1789-4 [PubMed: 23519569]
- Powe BD, Hamilton J, Hancock N, Johnson N, Finnie R, Ko J, Boggan M. Quality of life of African American cancer survivors: A review of the literature. *Cancer*. 2007; 109(2 Suppl):435–445. DOI: 10.1002/cncr.22358 [PubMed: 17149759]
- Pud D. Gender differences in predicting quality of life in cancer patients with pain. *European Journal of Oncology Nursing*. 2011; 15(5):486491. doi: 10.1016/j.ejon.2010.12.005
- Pulgar A, Alcalá A, Reyes del Paso GA. Psychosocial predictors of quality of life in hematological cancer. *Behavioral Medicine*. 2013; doi: 10.1080/08964289.2013.833083
- Quittner AL, Schechter MS, Rasouliyan L, Haselkorn T, Pasta DJ, Jeffrey S, Wagener JS. Impact of socioeconomic status, race, and ethnicity on quality of life in patients with cystic fibrosis in the United States. *Chest*. 2010; 137(3):642–650. DOI: 10.1378/chest.09-0345 [PubMed: 19820076]
- Radloff LS. The CES-D Scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*. 1977; 1:385–401. DOI: 10.1177/014662167700100306
- Roland KB, Rodriguez JL, Patterson JR, Trivers KF. A literature review of the social and psychological needs of ovarian cancer survivors. *Psycho-Oncology*. 2013; 22:2408–2418. DOI: 10.1002/pon.3322 [PubMed: 23760742]



- Sheehan TJ, Fifield J, Reisine S. The measurement structure of the Center for Epidemiologic Studies-Depression Scale. *Journal of Personality Assessment*. 1995; 64:507–521. DOI: 10.1207/s15327752jpa6403\_9 [PubMed: 7760258]
- Smith ML, Cho J, Salazar CI, Ory MG. Changes in quality of life indicators among chronic disease self-management program participants: An examination by race and ethnicity. *Ethnicity & Disease*. 2013; 23:182–188. [PubMed: 23530299]
- Spielberger, CD., Gorsuch, RL., Lushene, PR., Vagg, PR., Jacobs, AG. *Manual for the State-Anxiety (Form Y): Self evaluation questionnaire*. Palo Alto, CA: Consulting Psychologists Press, Inc; 1983.
- Strauss B, Brix C, Fischer S, Leppert K, Fuller J, Roehrig B, Wendt TG. The influence of resilience on fatigue in cancer patients undergoing radiation therapy (RT). *Journal of Cancer Research and Clinical Oncology*. 2007; 133:511–518. DOI: 10.1007/s00432-007-0195-z [PubMed: 17576595]
- Trask PC, Hsu MA, McQuellon R. Other paradigms: Health-related quality of life as a measure in cancer treatment: Its importance and relevance. *Cancer Journal*. 2009; 15(5):435–440. DOI: 10.1097/PPO.0b013e3181b9c5b9
- Wan GJ, Counte MA, Cella DF. The influence of personal expectations on cancer patients' reports of health-related quality of life. *Psycho-Oncology*. 1997; 6:1–11. [PubMed: 9126711]
- Wenzel LB, Fairclough DL, Brady MJ, Cella D, Garrett KM, Kluhsman BC, Marcus AC. Age-related differences in the quality of life of breast carcinoma patients after treatment. *Cancer*. 1999; 86:1768–1774. [PubMed: 10547550]
- Wong E, Chow E, Zhang L, Bedard G, Lam K, Fairchild A, Bottomley A. Factors influencing health related quality of life in cancer patients with bone metastases. *Journal of Palliative Medicine*. 2013; 16(8):915–921. doi:10.1089/jpm.2012.0623. [PubMed: 23819731]
- Zimmermann C, Burman D, Swami N, Krzyzanowska MK, Leighl N, Moore M, Tannock I. Determinants of quality of life in patients with advanced cancer. *Supportive Care in Cancer*. 2011; 19:621–629. DOI: 10.1007/s00520-010-0866-1 [PubMed: 20349353]

### **Knowledge Translation**

- All patients need to be evaluated for depression at the initiation of 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 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.

**Table 1**  
**Gender Differences in Demographics and Clinical Characteristics at the Initiation of Radiation Therapy**

Characteristic	Females (n= 89)	Males (n=96)	P value
Age (Years)	<u>mean (SD)</u> 54.7 (11.9)	<u>mean (SD)</u> 66.0 (9.4)	<0.001
Education (years)	16.2 (2.7)	15.9 (3.2)	0.434
Karnofsky Performance Status	87.4 (12.6)	93.8 (9.8)	<0.001
Number of comorbidities	5.0 (2.5)	4.6 (2.5)	0.298
Marital status	<u>n (%)</u>	<u>n (%)</u>	<0.001
Married/partnered	35 (40.7)	68 (70.8)	
Not married/partnered	51 (59.3)	28 (29.2)	
Lives alone			0.026
Yes	34 (38.2)	22 (22.9)	
No	55 (61.8)	74 (77.1)	
Race			0.622
White	61 (70.1)	71 (74.0)	
Non-white	26 (29.9)	25 (26.0)	
Currently employed			1.00
Yes	38 (43.7)	41 (44.6)	
No	49 (56.3)	51 (55.4)	
Children at home			0.025
Yes	20 (24.7)	9 (11.0)	
No	61 (75.3)	73 (89.0)	
Parent at home			0.117
Yes	6 (7.3)	1 (1.2)	
No	76 (92.7)	79 (98.8)	
Cancer Diagnosis			<0.001
Breast	78 (87.6)	0 (0)	
Prostate	0 (0)	82 (85.4)	
Brain	9 (10.1)	4 (4.2)	
Lung	2 (2.2)	10 (10.4)	

**Table 2**  
**Gender Differences in Symptom Characteristics and Quality of Life Prior to the Initiation of Radiation Therapy**

Symptom and Quality of Life scores	Females (n= 89)	Males (n= 96)	P value
	mean (SD)	mean (SD)	
Average daily pain *	n=39 3.5 (2.1)	n=22 3.3 (1.5)	0.667
Pain interference with activity	n=39 2.8 (2.2)	n=25 3.6 (2.3)	0.150
Trait anxiety	36.3 (11.3)	32.4 (8.7)	0.011
State anxiety	34.3 (13.0)	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 (2.0)	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)	0.001
Attentional function	6.6 (1.9)	7.4 (1.6)	0.001
Quality of Life – Total **	6.2 (1.6)	7.2 (1.3)	<0.001
Quality of Life – Physical well-being **	7.5 (1.9)	8.7 (1.4)	<0.001
Quality of Life - Psychological well-being **	5.7 (2.1)	7.2 (1.7)	<0.001
Quality of Life – Social well-being **	6.4 (2.5)	7.7 (1.9)	<0.001
Quality of Life – Spiritual well-being **	5.5 (2.1)	5.1 (2.1)	0.252

\* Pain was reported in 42 (48.3%) women and 27 (28.4%) men (p=0.006)

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

**Table 3**  
**Effect of Selected Characteristics on Females' (n=89) Total Quality of Life Scores Prior to Initiation of Radiation Therapy Females**

Source	R <sup>2</sup>	r	beta	R <sup>2</sup> -change (sr <sup>2</sup> )	P value
Overall	.64				<0.001
Age (years)		.40	.279	.068	0.001
Karnofsky Performance Status		.55	.313	.085	<0.001
Children at home		.40	.208	.038	0.009
Center for Epidemiological Studies -Depression score		-.58	-.469	.198	<0.001

**Table 4**  
**Effect of Selected Characteristics on Males' (n=96) Total Quality of Life Scores Prior to the Initiation of Radiation Therapy**

Source	R <sup>2</sup>	r	beta	R <sup>2</sup> -change (sr <sup>2</sup> )	P
Overall	.70				<0.001
Age (years)		.31	.183	.031	0.004
White		.13	.183	.033	0.003
Number of comorbidities		-.30	-.210	.041	0.001
State anxiety score		-.69	-.363	.070	<0.001
Center for Epidemiological Studies-Depression score		-.73	-.414	.089	<0.001