

Examining the Impact of Socioeconomic Status and Socioecologic Stress on Physical and Mental Health Quality of Life Among Breast Cancer Survivors

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Socioeconomic status and its influence on healthcare delivery and outcomes relevant to cancer control are well documented (Cornelius, Smith, & Simpson, 2002). Several studies have shown that low income, education, and job status negatively affect access to care and health outcomes (Singh, Miller, Hankey, & Edwards, 2004; Ward, Jemal, & Cokkinides, 2004). In addition, ethnic minority patients with cancer disproportionately experience lower socioeconomic status and greater socioecologic stress (e.g., living situation, financial status, employment) (Freeman, 1991; Weissman & Schneider, 2005). Additionally, survivors with low socioeconomic status report more stressful life events than individuals with high socioeconomic status (McLeod, 1990).

Research has found that survivors' job types contribute to health-related quality of life (QOL), indicating a significant association between better employment and more favorable health-related QOL (Engel et al., 2003; Mellon, Northouse, & Weiss, 2006). Several studies also demonstrated that financial difficulties and educational status significantly influenced health-related QOL among multiethnic breast cancer survivors (Ahles et al., 2005; Ganz et al., 2002). The literature also reports that African American (Ashing-Giwa, 2000) and Latina American (Ashing-Giwa et al., 2006) breast cancer survivors showed moderate to severe socioeconomic status difficulties, including unstable employment and financial hardship.

Cancer survivors with low socioeconomic status are likely to experience more episodes of psychosocial and socioecologic instability; therefore, socioeconomic status and socioecologic stress may influence the physical and emotional health of breast cancer survivors. Despite increasing interest in disparities in health outcomes and their relationship to socioeconomic status, little empirical research examines the associations of socioeconomic status, socioecologic stress, and health-related QOL among multiethnic breast cancer survivors.

Purpose/Objectives: To examine how physical and mental health quality of life (QOL) varies in relation to the socioeconomic status and ethnicity among breast cancer survivors; to determine key socioecologic factors influencing outcomes.

Design: Cross-sectional.

Setting: Participants were recruited from the California Cancer Surveillance Program, from hospital registries, and from community agencies in southern California.

Sample: 703 multiethnic population-based breast cancer survivors, including European, African, Latina, and Asian Americans.

Methods: Participants completed a mailed questionnaire or answered a telephone survey. To identify socioeconomic status and socioecologic stress, four measures were used: household income, education, job type, and the Life Stress Scale.

Main Research Variables: Physical and mental health QOL, socioeconomic status (income, education, and job type), and socioecologic stress.

Findings: After controlling for the demographic and medical information, health-related QOL was significantly correlated to socioeconomic status, such that higher socioeconomic status groups expressed better QOL. Ethnic variations existed in QOL according to socioeconomic status. Socioecologic stress was the most important factor influencing physical and mental health QOL.

Conclusions: The findings provide additional evidence that low socioeconomic status and high socioecologic stress exacerbate negative QOL sequelae.

Implications for Nursing: Practice and research implications include the need for greater attention to QOL outcomes among at-risk lower socioeconomic status survivors and the recognition of the unique contributions of socioeconomic status, socioecologic stress, and ethnicity on physical and mental health QOL.

Health-Related Quality of Life

Health-related QOL is a major outcome variable (Pilkington & Mitchell, 2004) in the assessment of cancer survivorship outcomes. Health-related QOL entails not only the extension of life as an objective state but also the

perceived quality of overall survival with a particular emphasis on individual physical and emotional well-being (Levine, 1987; Pedro, 2001). Many investigators, therefore, agree that health-related QOL is a multifarious framework that appraises physical, functional, emotional, social, and spiritual well-being after cancer and its treatment (Cella & Tulskey, 1993; Ferrell, Hassey, & Grant, 1995).

Health-related QOL concerns among breast cancer survivors are well documented (Bloom, Stewart, Johnston, & Banks, 2001; Ganz et al., 2002). Studies report persistent challenges, including physical (e.g., fatigue, pain), psychological (e.g., uncertainty, depression), social (e.g., marital stress), functional (e.g., discrimination in employment), and spiritual (e.g., life outlook) aspects (Ashing-Giwa, 2000; Ganz et al., 2002). Additional studies also investigated the differences of health-related QOL according to ethnicity as ethnic and cultural disparity issues emerge in the healthcare arena. However, regardless of the number of studies, the overall findings have been inconsistent. Some researchers have reported ethnic or cultural origin to be factors that substantially contribute to health-related QOL variations (Ashing-Giwa, Tejero, Kim, Padilla, & Hellemann, 2007; Tchen et al., 2003), whereas other researchers have found no significant health-related QOL differences based on ethnicity (Ganz et al., 2004; Gotay, Holup, & Pagano, 2002), implying that factors other than ethnicity may influence survivorship outcomes. In addition, very few studies investigate predictors of physical and mental health QOL; these domains reveal some of the greatest ethnic differences (Ashing-Giwa et al., 2007; Ell et al., 2005). Therefore, this study focuses on the interaction of socioeconomic status and ethnicity in predicting physical and mental health outcomes.

Assessment of Socioeconomic Status and Socioecologic Stress

Socioeconomic status is associated with breast cancer survivors' health-related QOL (Baker, Denniston, Smith, & West, 2005; Mols, Vingerhoets, Coebergh, & Van de Poll-Franse, 2005). However, the difficulty in operationalizing socioeconomic status makes the analysis complicated. Two factors may directly and indirectly explain the relationship between socioeconomic status and health outcomes (Committee on Pediatric Research, 2000): resources (e.g., education, income, employment status, wealth) and social status or rank (a function of relative positions in a hierarchy) (Krieger et al., 2002). In addition, some investigators proposed ways to incorporate a variety of the measures into health surveillance and research (Newmann & Garner, 2005; Robert et al., 2004). The use of a multifarious approach may be useful to comprehensively understand the effect of socioeconomic status. Therefore, the current study uses resources such as income, education, and job type, as well as the

Table 1. Demographic and Medical Information of Study Participants

Characteristic	\bar{X}	SD	Range
Age (years)	55.03	—	29–62
Years since diagnosis	2.98	1.67	0–21
Number of comorbidities	1.87	1.58	0–7
Standardized income	53.83	37.76	0–100
Standardized education	49.26	27.13	0–100
Socioecologic stress	4.60	0.52	2–5
Characteristic	n	%	
Income (\$ (N = 703))			
< 25,000	205	29.2	
25,000–75,000	312	44.4	
> 75,000	186	26.4	
Education (N = 701)			
< High school diploma	101	14.4	
Graduated high school or received an associate degree	319	45.5	
Graduated college and above	281	40.1	
Employment category (N = 685)			
Managerial or professional	244	35.6	
Technical, sales, or administrative	162	23.6	
Service	81	11.8	
Homemaker	178	26.0	
Operator or laborer	20	3.0	
Ethnicity (N = 703)			
European American	179	25.5	
African American	135	19.2	
Latina American	183	26.0	
Asian American	206	29.3	
Living situation (N = 569)			
Alone	117	20.6	
With partner (no children)	197	34.6	
With partner and children	255	44.8	
Cancer stage (N = 694)			
I	332	47.8	
II	267	38.5	
III	95	13.7	

joint effects of income and education, as proxies for socioeconomic status.

In addition, a growing body of research suggests that socioecologic stress does affect survivorship outcomes and contributes to about 10% of the variance in predicting health-related QOL (Ashing-Giwa & Kagawa-Singer, 2006; Robert et al., 2004). However, the measurement for socioecologic stress is not well understood in health outcomes research. The current study operationalizes the neighborhood or environmental aspects surrounding cancer survivors as contributing to socioecologic stress.

Purpose

This study investigated the effect of socioeconomic status indicators and socioecologic stress on physical and mental health QOL in a multiethnic sample of breast cancer survivors. The authors hypothesized that

- Breast cancer survivors with higher levels of socioeconomic status will report better physical and mental health QOL.

- Physical and mental health QOL will differ according to the interaction between income and education.
- Interaction between socioeconomic status and ethnicity will influence physical and mental health QOL.
- Socioeconomic status indicators and socioecologic stress will predict physical and mental health QOL after controlling for demographic and medical information.

Methods

Study Design and Participants

The current study used secondary data sets derived from European Americans (n = 179), African Americans (n = 135), Latina Americans (n = 183), and Asian Americans (n = 206) who had participated in a project examining the QOL of breast cancer survivors from 2001–2003. A cross-sectional design was employed with a population-based socioeconomically diverse sample drawn from the California Cancer Surveillance Program, Los Angeles area hospitals, and community agencies. Institutional review board approval was obtained from the University of California, Los Angeles.

Eligible participants were within one to five years of a breast cancer diagnosis and were cancer free at the time of the study, diagnosed with stage 0–III breast cancer, had not been diagnosed with another type of cancer, did not have any other major disabling medical condition (e.g., stroke, degenerative illness) or psychiatric condition (e.g., schizophrenia, major depression), and were aged 18 years or older. Of the 2,852 recruitment letters mailed, 1,219 (43%) were accessible. Of those, 703 (58%) comprised the final sample. Potential partici-

pants were randomized to a telephone or mailed survey to assess whether outcomes differed by survey mode. The English-language version of the questionnaires was translated into Spanish, Chinese, or Korean and then translated back into English to check for accuracy. Internal consistency of the scales by language was assessed by the reliability coefficient Cronbach alpha (0.65–0.93). A detailed account of the methodology employed for the study was presented in Ashing-Giwa, Padilla, Tejero, and Kim (2004).

Measures

Health-related QOL was measured using the SF-36®, an internally consistent and reliable self-report tool (Ware, Snow, Kosinski, & Gandek, 1993). The current study focused on the physical and mental health QOL summary scores. This measure, including eight multi-item scales, provided the basis for calculating two summary measures: physical health QOL and mental health QOL. Scale scores were computed by summing across items in the same scale and then transforming raw scale scores to a range from 0 (worst possible function) to 100 (best possible function).

Socioeconomic status was defined by three measures: household income, education, and job type (Gyppy, 2003). First, household income was collected categorically as one of seven self-reported income ranges (from 1 [less than \$15,000] to 7 [greater than \$75,000]). For group comparison analysis, the categories were collapsed according to: low (less than \$25,000), medium (\$25,000–\$75,000), and high (greater than \$75,000). Also, standardized income score ([individual score minus lowest score] divided by

Table 2. Health-Related Quality-of-Life Differences by Socioeconomic Status

Socioeconomic Status	Physical Health Quality of Life ^a			Mental Health Quality of Life ^a		
	\bar{X}	SD	F ^b	\bar{X}	SD	F ^b
Income (\$)			25.02**			19.50**
< 25,000 (n = 200)	61.83	25.53		64.12	24.31	
25,000–75,000 (n = 307)	73.40	21.65		73.22	20.55	
> 75,000 (n = 183)	82.25	16.72		80.97	16.13	
Education			14.57**			6.94*
< High school diploma (n = 96)	60.69	25.56		65.20	24.42	
High school graduate or associate degree (n = 315)	69.59	23.60		70.08	22.28	
College graduate or higher (n = 277)	79.54	18.25		78.04	18.35	
Type of job			6.21**			5.15**
Homemaker or housewife (n = 171)	67.12	25.60		68.79	23.70	
Managerial or professional (n = 241)	76.22	20.86		75.10	19.76	
Technical, sales, or administrative (n = 160)	75.02	21.67		73.82	21.98	
Service (n = 80)	72.75	21.98		75.24	19.80	
Operator or laborer (n = 20)	56.86	23.57		57.44	21.23	

* p < 0.01

** p < 0.001

^a Higher score indicates better quality of life.

^b The univariate general linear model

Note. Covariates include years since diagnosis, cancer stage, number of comorbidities, ethnicity, age, and living situation.

[highest score minus lowest score] and multiplied by 100) was calculated based on seven categories to examine the effect of interval-level household income on health-related QOL and to create the interval-level interaction scores with education (Dever, 1991).

Education was assessed categorically as one of 10 self-reported education ranges (1 [grade school] to 10 [completed doctoral degree]). For group comparison analysis, the categories were collapsed according to: low (less than a high school degree), medium (high school graduate or associate's degree), and high (college graduate or higher) based on the International Standard Classification of Education (Organization for Economic Co-Operation and Development, 1999). Standardized education scores also were calculated with the same formula indicated for standardized income.

Two methods were used to examine the interaction effects of income and education. First, nine groups were newly categorized by the three groups from income and education ([low, medium, and high income] multiplied by [low, medium, and high education]). However, the

high-income and low-education groups were deleted because of the small sample size ($n = 2$). Next, each standardized score from income and education was multiplied to provide the interaction scores from income and education. However, crossproduct interaction terms were highly correlated with the corresponding simple independent variables in the regression analyses, so they were transformed to centered variables (where the mean from each datum has been subtracted) for creating interaction scores.

Job type was self-categorized as: homemaker or housewife; managerial or professional specialty; technical, sales, or administrative support; service; and operator or laborer. The effect of job type on health-related QOL was examined through four dummy codes.

Socioecologic stress was measured by the Life Stress Scale (Ashing-Giwa et al., 2004; Sanders-Phillips & Harrell, 1996), which assesses levels of stress associated with various socioecologic contextual aspects of life. Five items were used in the current study to consider neighborhood or environmental stress (housing situation, neighborhood environment, using public services, crime and violence, and relations with police). Items were rated from 1 (extreme stress) to 5 (no stress) and were averaged into a mean life stress score.

Other demographic and medical information, including ethnicity, age, living situation, years since diagnosis, cancer stage, and number of comorbidities, were included to be considered as control variables. In this case, the number of comorbidities was obtained by summing the self-reported medical conditions from a list of 15 chronic medical conditions. Reliability and validity tests are presented in Ashing-Giwa et al. (2004).

Data Analysis

Exploratory descriptive and correlation analyses were conducted to examine the characteristics of and relationships among variables. Bivariate analysis of covariance (ANCOVA) was then used to assess differences in outcomes according to education and income levels and the interaction between income, education, and job type with the several covariates. In addition, the differences in physical and mental health QOL by socioeconomic status (income and education specifically) and ethnicity were explored through bivariate ANCOVA plots.

A hierarchical regression analysis was performed to determine the influence of socioeconomic status and socioecologic stress on physical and mental health QOL, controlling for covariates. Physical and mental health QOL scores were entered as the dependent variables. Covariates were entered in step 1; standardized income, standardized education, and job type were entered in step 2; socioecologic stress was entered in step 3; and interaction scores between income and education were entered in step 4. For the statistical techniques, data

Table 3. Health-Related Quality-of-Life Differences by Interaction of Income and Education

Interaction	Physical Health Quality of Life ^a		Mental Health Quality of Life ^a	
	\bar{X}	SD	\bar{X}	SD
Low income and low education (n = 72)	57.71	27.00	62.51	25.59
Low income and medium education (n = 109)	63.07	24.46	65.15	23.09
Low income and high education (n = 18)	69.13	23.92	62.75	27.01
Medium income and low education (n = 22)	70.79	23.89	73.68	19.54
Medium income and medium education (n = 157)	70.89	23.17	70.91	21.72
Medium income and high education (n = 127)	76.82	18.90	75.92	19.06
High income and medium education (n = 49)	79.73	18.64	78.23	19.77
High income and high education (n = 132)	83.60	15.67	82.19	14.52
F ^b	8.20*		5.83*	

* $p < 0.001$

^a Higher score indicates better health-related quality of life.

^b The univariate general linear model

Note. Higher score indicates better health-related quality of life. Covariates include years since diagnosis, cancer stage, number of comorbidities, ethnicity, age, and living situation.

Note. Low education indicates less than a high school diploma; medium education indicates high school graduate or associate's degree; and high education indicates college degree or higher.

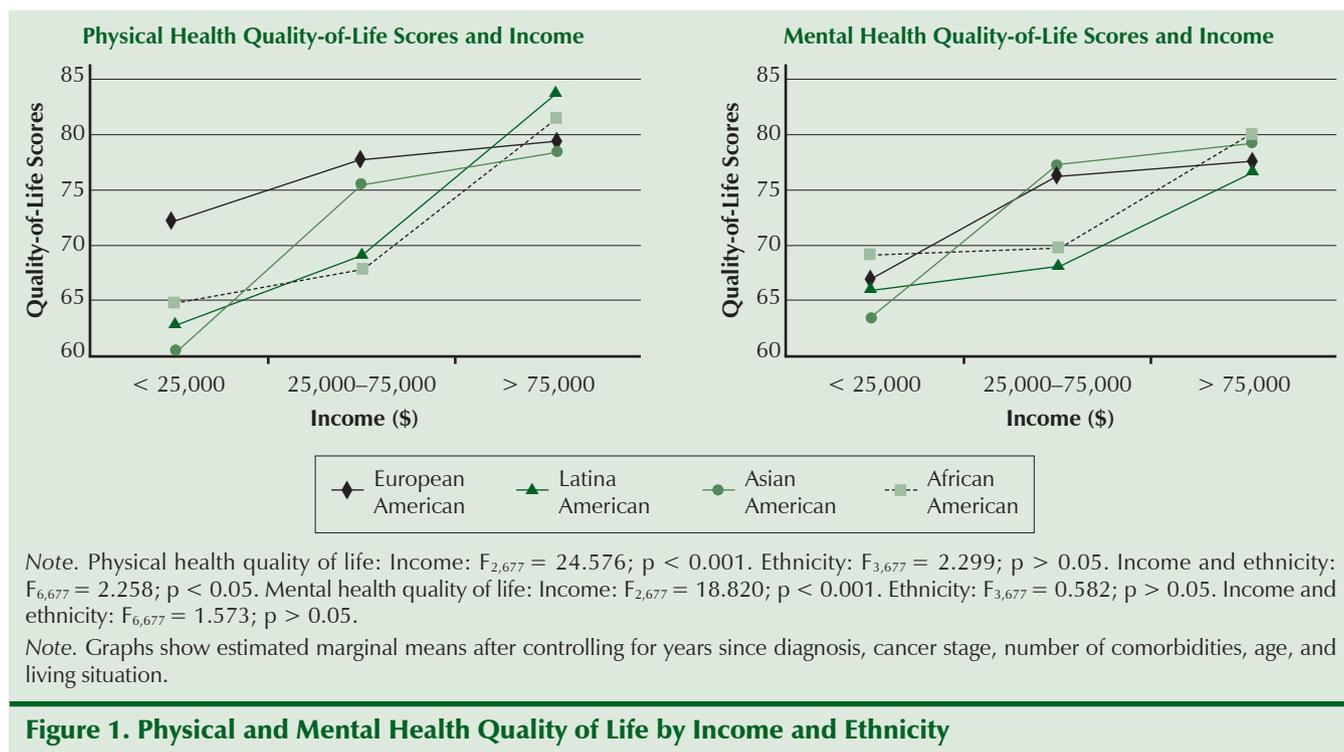


Figure 1. Physical and Mental Health Quality of Life by Income and Ethnicity

were analyzed with SPSS® 15.0. All hypotheses were tested with a $p < 0.05$ criterion for significance under a two-sided test.

Results

Table 1 shows the study sample characteristics. More details about the characteristics are described in Ashing-Giwa et al. (2004, 2007). As compared to norm scores¹ ($\bar{X} = 50$; $SD = 10$), physical health QOL ($\bar{X} = 72.36$; $SD = 22.97$), and mental health QOL ($\bar{X} = 72.53$; $SD = 21.68$), scores were moderately high.

Differences in Physical and Mental Health Quality of Life by Socioeconomic Status

The difference in physical and mental health QOL across socioeconomic status classifications in the current study was notable. After adjusting for several covariates, the mean scores of physical and mental health QOL significantly differed according to income level. The physical and mental health QOL scores for the group with low income were lower than the scores for the group with high income. In addition, physical and mental health QOL varied significantly according to education, indicating that the group with higher education expressed better health-related QOL scores. Lastly, physical and mental health QOL scores significantly

differed according to job type. Overall, managerial or professional; technical, sales, or administrative; and services showed similar health-related QOL scores, and their health-related QOL scores were higher than homemaker or housewife and operator or laborer. Operator or laborer exhibited the lowest scores of all the job classifications. Therefore, the findings support the hypothesis that breast cancer survivors with higher levels of socioeconomic status will show better physical and mental health QOL (see Table 2).

In terms of interaction effects by income and education, Table 3 presents the differences in physical and mental health QOL scores according to eight groups. Physical and mental health scores significantly differed according to combined groups by income and education. Overall, the high-income and high-education group expressed the highest physical health QOL score. Groups reporting higher levels in income rather than education (e.g., medium income and low education, high income and medium education) also reported higher physical health QOL scores. For mental health QOL, the low-income and high-education group expressed a lower score than the low-income and medium-education group. Overall, the high-income and high-education group showed better mental health QOL, confirming the authors' hypothesis.

Differences in Physical and Mental Health Quality of Life by Socioeconomic Status and Ethnicity

Figure 1 shows the differences in physical and mental health QOL according to income and ethnicity after

¹ For the norm-based scoring, linear transformations were performed to transform scores to a mean of 50 and standard deviations of 10, in the general U.S. population (Ware et al., 1993).

controlling for covariates. QOL scores were similar according to ethnicity; however, they were different by income level. Interaction between income and ethnicity was only significant for physical health QOL. In particular, European Americans with low income showed better physical health QOL than other ethnic groups with low incomes.

Education revealed different physical and mental health QOL scores; however, ethnicity did not have an effect on scores. Interaction effects between education and ethnicity only appeared in physical health QOL. African Americans in the medium-education group expressed the lowest physical health QOL scores. At the same time, mental health QOL scores for the low-education African American group was, although not significant, the highest (see Figure 2). Therefore, the hypotheses regarding the relation between socioeconomic status and ethnicity were partially confirmed.

Influences of Socioeconomic Status and Socioecologic Stress on Physical and Mental Health Quality of Life

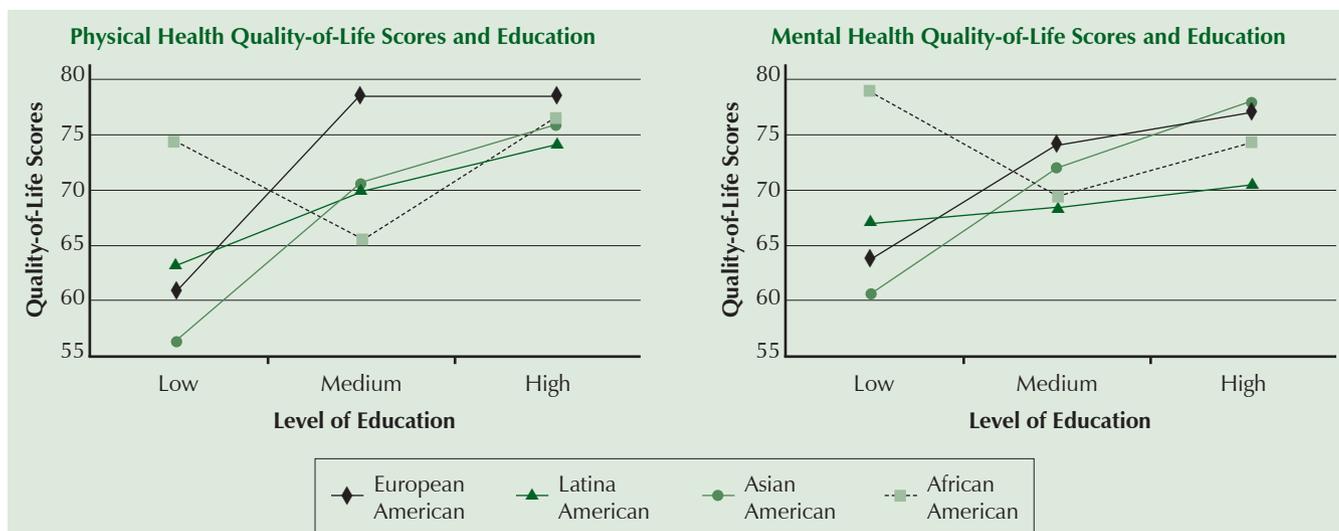
Two hierarchical regression analyses evaluated the influence of socioeconomic status and socioecologic stress on physical and mental health QOL. Six covariates, including demographic and medical information, explained a significant amount of the variance in physical ($F = 21.61$; $p < 0.001$) and mental health QOL ($F = 17.04$; $p < 0.001$) (Model 1). Income, education, and job type factors, added in Model 2, contributed unique explanation of 6.2% and 5.6% of the variance in physical

($F = 9.563$; $p < 0.001$) and mental health QOL ($F = 7.951$; $p < 0.001$). Adding the socioecologic stress significantly improves the physical (R^2 change = 0.03) and mental health model (R^2 change = 0.05) (Model 3). However, including an interaction term between income and education did not improve models by a statistically significant amount (Model 4). Therefore, Model 3 is a better descriptor of the effect of socioeconomic status and socioecologic stress on outcomes. Model 3 explained 35% and 32% of the total variance in physical (see Table 4) and mental health QOL (see Table 5).

Years since diagnosis, cancer stage, number of comorbidities, income, education, job type, and socioecologic stress were significant predictors in the final physical health QOL model (Model 3). Years since diagnosis, cancer stage, number of comorbidities, age, income, job type, and socioecologic stress were significant predictors of mental health QOL. Therefore, socioeconomic status and socioecologic stress remained important predictors for physical and mental health QOL after controlling for covariates.

Discussion

The current study focused on documenting the role of socioeconomic status indicators and ethnicity in physical and mental health QOL among a population-based multiethnic sample of breast cancer survivors, and investigating the effect of socioeconomic status indicators and socioecologic stress on QOL outcomes. Study results confirmed most of the research hypotheses. Overall,



Note. Physical health quality of life: Education: $F_{2,675} = 9.740$; $p < 0.001$. Ethnicity: $F_{3,675} = 0.959$; $p > 0.05$. Education and ethnicity: $F_{6,675} = 2.189$; $p < 0.05$. Mental health quality of life: Education: $F_{2,675} = 3.419$; $p < 0.05$. Ethnicity: $F_{3,675} = 1.097$; $p > 0.05$. Education and ethnicity: $F_{6,675} = 1.306$; $p > 0.05$.

Note. Graphs show estimated marginal means after controlling for years since diagnosis, cancer stage, number of comorbidities, age, and living situation.

Figure 2. Physical and Mental Health Quality of Life by Education and Ethnicity

Table 4. Hierarchical Regression Model on Physical Health Quality of Life

Physical Health Quality of Life	Model 1		Model 2		Model 3		Model 4	
	b	t	b	t	b	t	b	t
Intercept	84.58	15.21	58.49	8.23	25.53	2.73	25.20	2.48
Ethnicity								
European	5.80	2.64**	3.93	1.83	3.70	1.76	3.69	1.75
African	-1.82	-0.76	-1.68	-0.72	-1.45	-0.63	-1.46	-0.64
Latina	-4.01	-1.85	0.96	0.43	0.68	0.31	0.69	0.31
Number of comorbidities	-6.58	-2.48***	-6.16	-12.00***	-5.61	-10.92***	-5.61	-10.90***
Cancer stage	-3.62	-3.13**	-3.54	-3.19**	-3.20	-2.93**	-3.20	-2.93**
Years since diagnosis	1.61	3.31**	1.44	3.05**	1.35	2.92**	1.34	2.90**
Age	-0.01	-0.16	0.08	0.91	0.04	0.49	0.04	0.50
Living situation								
Alone	1.74	0.65	2.01	0.77	1.82	0.71	1.83	0.72
Partner	1.94	1.42	0.51	0.21	0.35	0.15	0.36	0.15
Partner and children	3.37	0.85	0.72	0.31	0.78	0.34	0.80	0.35
Income	-	-	0.11	3.72***	0.08	2.94**	0.09	1.76
Education	-	-	0.10	2.36*	0.09	2.29*	0.10	1.58
Job type								
Homemaker	-	-	10.20	2.15*	8.49	1.82	8.48	1.82
Manager	-	-	9.79	1.97*	8.47	1.74	8.46	1.73
Technician	-	-	12.49	2.57*	11.07	2.32*	11.02	2.29*
Service	-	-	13.13	2.61**	12.33	2.50*	12.30	2.49*
Socioecologic stress	-	-	-	-	7.95	5.28***	7.95	5.26***
Interaction of income and education	-	-	-	-	-	-	-	-0.09
R²	0.25 (F _{10,635} = 21.61***)		0.32 (F _{16,629} = 18.19***)		0.35 (F _{17,628} = 19.48***)		0.35 (F _{18,627} = 18.37***)	

* p < 0.05
 ** p < 0.01
 *** p < 0.001

contextual dimensions, including socioeconomic status and socioecologic stress, influence survivorship outcomes such that better income, higher education, and lower life burden are strong correlates of better QOL. Ethnic variations in QOL according to socioeconomic status exist; however, the pattern in health-related QOL according to socioeconomic status were similar across ethnic groups, such that lower socioeconomic status breast cancer survivors, regardless of ethnicity, reported lower QOL; increases in socioeconomic status resulted in an expected QOL increase. Of all socioeconomic status indicators, income significantly influenced physical and mental health QOL, whereas education only influenced physical health QOL. In addition, results revealed that the lowest-income European American breast cancer survivors reported physical health QOL outcomes that were either as good as or better than the middle income groups for other ethnicities. However, ethnic differences disappeared at the highest income levels. Socioecologic stress also was a key factor affecting physical and mental health QOL.

The findings are consistent with other results (Robert et al., 2004; Short & Mallonee, 2006), suggesting the positive correlation between income and health-related QOL. Freeman (2003) concluded that the primary cause of disparities in cancer outcomes and health-related

QOL among different ethnic groups was poverty. The five-year survival rate for affluent individuals was more than 10% higher than that for poorer individuals (Singh, Miller, Hankey, & Edwards, 2003). Notably, African Americans had poverty rates almost three times those of European Americans. Therefore, poverty measured by income as a proxy appears to have a significant effect on all of the domains of health-related QOL among breast cancer survivors.

With respect to the interaction effects of income and education, overall, the scores from physical and mental health QOL gradually improved as income and education levels improved. In particular, groups with higher income rather than education reported higher physical health QOL, demonstrating that income may be more influential than education in the improvement of physical health QOL. Different patterns, however, emerged for mental health QOL. The low-income and high-education groups expressed lower mental health QOL than the high-income and low-education groups. Individuals with higher education generally seek to be more affluent. In fact, society tends to accept such trends. Therefore, individuals with higher educational attainment and relatively low earnings may experience decreased personal power and esteem and, ultimately,

Table 5. Hierarchical Regression Model of Mental Health Quality of Life

Mental Health Quality of Life	Model 1		Model 2		Model 3		Model 4	
	b	t	b	t	b	t	b	t
Intercept	70.90	13.11	49.47	7.10	6.95	0.77	10.65	1.09
Ethnicity								
European	0.27	0.13	-1.58	-0.75	-1.87	-0.93	-1.70	-0.84
African	-1.73	-0.74	-2.07	-0.90	-1.77	-0.80	-1.71	-0.77
Latina	-5.80	-2.75**	-2.17	-0.99	-2.54	-1.20	-2.65	-1.25
Number of comorbidities	-5.48	-10.69***	-5.16	-10.26***	-4.45	-8.99***	-4.42	-8.93***
Cancer stage	-3.10	-2.76**	-3.07	-2.82**	-2.63	-2.50*	-2.59	-2.47*
Years since diagnosis	1.72	3.62***	1.55	3.36**	1.44	3.24**	1.48	3.31**
Age	0.19	2.39*	0.27	3.35**	0.22	2.88**	0.22	2.80**
Living situation								
Alone	1.81	0.69	2.09	0.82	1.85	0.75	1.77	0.72
Partner	3.86	1.67	0.62	0.27	0.41	0.18	0.28	0.12
Partner and children	4.27	1.93	2.27	1.00	2.35	1.07	2.12	0.96
Income	-	-	0.13	4.42***	0.10	3.44**	0.06	1.18
Education	-	-	0.02	0.46	0.01	0.31	-0.03	-0.53
Job type								
Homemaker	-	-	9.60	2.07*	7.39	1.65	7.53	1.68
Manager	-	-	9.90	2.03*	8.20	1.74	8.39	1.78
Technician	-	-	11.66	2.45*	9.83	2.14*	10.41	2.24*
Service	-	-	15.55	3.15**	14.53	3.06**	14.85	3.12**
Socioecologic stress	-	-	-	-	10.26	7.06***	10.33	7.10***
Interaction of income and education	-	-	-	-	-	-	-	0.98
R²	0.21 (F _{10, 635} = 17.04***)		0.27 (F _{16, 629} = 14.33***)		0.32 (F _{17, 628} = 17.47***)		0.32 (F _{18, 627} = 16.55***)	

*p < 0.05
 **p < 0.01
 ***p < 0.001

poorer QOL, suggesting that groups that experience greater education and income discrepancy may be at greater risk for low health-related QOL.

Employment status or job type is an important adjustment issue for breast cancer survivors. Although most women who worked before their breast cancer diagnoses returned to work following their treatment, survivors face many concerns (Spelten, Sprangers, & Verbeek, 2002). Cancer or its treatment may interrupt career advancements, prompt retirement from an undesirable career, or inspire the search for a new career that is more satisfying personally but less lucrative (Institute of Medicine & National Research Council, 2006). As a result, people who experience career disruptions (e.g., quit a job or are dissatisfied with the job after cancer treatment is complete) may express lower life satisfaction and QOL. Findings from the current study indirectly reflect such conclusions: QOL scores for homemakers and laborers were worse than others. Therefore, an urgent need exists to investigate the changing patterns in employment and career status during and after cancer treatment and to further understand employment issues and functional strain among survivors.

In terms of correlates between socioeconomic status and ethnicity, ethnic minorities experienced the greatest improvements in physical health QOL scores as a result

of increased income. In fact, Latina Americans with the highest income had the most favorable physical health QOL, a finding that may point to the direct influence of income on quality of health care, which is highly predictive of physical health QOL, particularly for ethnic minorities (Short & Mallonee, 2006). On the other hand, European Americans experienced relatively consistent and favorable physical health QOL regardless of income levels. The expected mental health QOL improvement relative to income with little ethnic variability suggested that mental health QOL was influenced by personal resources; income is definitely an influential individual resource. The results suggest the need for additional studies to explore the complex relationships among income, ethnicity, quality of care, and health-related QOL.

In the relationships between education and ethnicity, the current study found that health-related QOL patterns according to education level were unique for African Americans. The medium-education group showed the lowest physical and mental health QOL compared with low- and high-education groups. Therefore, it remains unclear whether African American breast cancer survivors show different patterns in the relationship between education and health-related QOL than other ethnicities or whether sample selection bias, despite the population-based and socioeconomically diverse sample

of this study, affected this result. Regardless, the finding may allude to the struggles of the moderately educated African American woman for independence and social status and may illustrate how this experience contributes to health-related QOL. The patterns in health-related QOL, according to education among multiethnic breast cancer survivors, should be examined in more detail.

Finally, the hierarchical regression model demonstrated that socioecologic stress was the most important factor influencing physical and mental health QOL. Less socioecologic stress significantly contributed to more favorable health-related QOL beyond the influences of socioeconomic status indicators. A notable explanation for the effects of social ecology on health-related QOL could be that socioecologic stress, including housing or living situation, public services, and crime, is related to lower socioeconomic status and poorer access to health care and community resources and, ultimately, lower health-related QOL. Therefore, research investigating socioecologic factors is needed to elucidate their unique contribution to broader contextual issues, such as the medical care system, socioeconomic status, and familial, social, and community issues.

Limitations

Although this research reports on an understudied area with an ethnically diverse population-based sample, several limitations exist. A primary limitation is that data were self-reported and may be influenced by participant reactivity in response to items dealing with socioeconomic status. This limitation suggests that additional research is needed to increase understanding of cultural sensitivity in reporting socioeconomic status data. Additionally, the study uses cross-sectional data and limits the ability to assess changes in health-related QOL over time. Future research must include a longitudinal assessment of health-related QOL. This research used household income, education, and job type as proxies of socioeconomic status; however, other important factors indicating socioeconomic status (e.g., number in household, social status, social rank) may exist. More comprehensive studies are required.

Implications for Oncology Nursing Practice, Research, and Policy

The findings hold clinical and research implications. Lower-income cancer survivors (lower-income, ethnic minority cancer survivors in particular) are mostly

absent from survivorship research. The current study confirms previous reports that cancer survivors with lower socioeconomic status bear an unequal burden. The findings draw attention to the need for practitioners to develop programs to relieve the physical and mental strains associated with the dual diagnosis of breast cancer and poverty.

The results on physical and mental health QOL suggest that clinicians and researchers need to develop a fuller appreciation for the determinants of physical and emotional function in cancer survivors. On the research side, the findings support the need for greater examination of the unique contributions of socioeconomic status, socioecologic stress, and ethnicity on health-related QOL among a large multiethnic, population-based cohort of breast cancer survivors. The findings also highlight the need for more research on survivorship outcomes and, in particular, survivorship studies that include lower-income survivors who may be at increased risk for lower quality of care (including follow-up care) and family, functional, and financial distress.

On a policy level, the results provide some insights into the complex relationship among socioeconomic status, socioecologic stress, ethnicity, and survivorship outcomes. The findings provide additional evidence that contextual factors, namely socioeconomic status and socioecologic stress, influence health-related QOL among breast cancer survivors. Therefore, the healthcare system must address cancer disparities and the unequal burden of cancer faced by patients from lower socioeconomic status groups; unfortunately, an over-representation of ethnic minorities exists among the lowest socioeconomic status groups. The research findings should help energize a call to action among cancer and breast cancer advocacy organizations to support and encourage research and programs to address the needs of less-fortunate survivors.

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