Contextual factors influencing health-related quality of life in African American and Latina breast cancer survivors

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Abstract

Purpose—This study explored the relationships between systemic and individual-level contextual factors and health-related quality of life (HRQOL) in a cohort of African American and Latina breast cancer survivors (BCS).

Methods—Baseline questionnaire data of 320 BCS who participated in a HRQOL psycho-educational intervention were abstracted from the parent study. Hierarchical regression analysis tested the independent effects of contextual factors on HRQOL.

Results—HRQOL was higher in BCS who: were diagnosed at <stage 2 ($b=-1.38$, $p<0.05$), expressed satisfaction with their health care ($b=0.20$, $p<0.001$), had fewer comorbidities ($b=-0.60$, $p<0.001$) and depressive symptoms ($b=-0.30$, $p<0.001$), and practiced healthy diet and exercise habits ($b=0.02$, $p<0.05$). Demographic and cancer-related factors accounted for 14 % of the variance in HRQOL ($F[6, 274]= 7.25$, $p<0.001$). The socio-cultural context (i.e., ethnicity, life stress, perceived social support) explained 20% of the variance in HRQOL (F [3, 271]=27.32,

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$p<0.001$). The health care system context contributed an additional 8 % to explaining HRQOL (F [1, 270]=34.88, $p<0.001$). Health status and behavioral factors accounted for 18 % of the variance (F [4, 266]=29.55, $p<0.001$). The full model explained 59 % of the variance in HRQOL (F[14, 266]=27.76, $p<0.001$).

Conclusions—HRQOL in ethnic minority BCS is multifaceted and is significantly influenced by cancer-related, socio-cultural, health care system, health status, and behavioral contextual factors. Therefore, survivorship research and practice must address broad multi-level domains to achieve equitable and optimal breast cancer outcomes.

Implications for cancer survivors—To enhance HRQOL, survivors must be provided the know-how and support to maintain healthy lifestyle and self-management practices. Advocates must engage the care team to consider systemic factors, including life stress and community resources, to be more patient-centered.

Keywords

Breast cancer survivorship; Health-related quality of life; African American; Latina; Ethnic minority cancer survivors

Introduction

Advances in diagnostic and therapeutic methods have led to improved breast cancer survival rates in the USA [1]. According to data published by the American Cancer Society for breast cancer patients followed through 2006 and through 2010, 5-year cause-specific breast cancer survival rates increased from 77.3 to 78.9 % (respectively) in African American women and from 85.8 to 87.0 % (respectively) in Hispanic/Latina (Latina) women [1, 2]. These trends suggest that African American and Latina breast cancer patients will continue to represent an important segment of the growing number of survivors. Ethnic minority breast cancer survivors (BCS) often experience a greater cancer burden than non-Hispanic White survivors [3, 4], including poorer health-related quality of life (HRQOL), which encompasses physical, emotional, social, and spiritual well-being and role functioning [5]. Furthermore, marginalized cancer patients may have limited awareness of strategies and resources to enhance their health and well-being [6, 7].

The perpetual inequalities in survivorship outcomes necessitate a more complete understanding of the needs of underserved BCS, in order to inform the development of programs that will optimize their health and overall survivorship experience. Research to delineate the factors associated with HRQOL in ethnic minority cancer survivors is limited [8]. The purpose of this study was to explore relationships among these factors in a sample of African American and Latina BCS, using the Contextual Model of HRQOL [9] (hereafter referred to as "'Contextual Model" or "model") as a framework to guide the research. The model emphasizes the inclusion of cultural and socio-ecological contextual factors in investigations of HRQOL to facilitate a more comprehensive assessment of its determinants in ethnically diverse samples of cancer survivors.

According to the Contextual Model, the macro/systemic level context consists of socio-ecological, cultural, demographic, and health care system domains. Demographic factors

(i.e., age, relationship status) are conceptualized in the model as social constructs, as they often designate one's position within a social hierarchy and determine exposure to risks and access to resources that affect health [10]. They are, thus, included as systemic-level contextual factors. At the micro/individual level, general health (including health status and behaviors), cancer-specific medical factors, health efficacy (including personal control beliefs), and psychological well-being directly predict HRQOL. These individual-level factors may also mediate the relationships between systemic-level factors and HRQOL [11]. Previous research has applied the Contextual Model to investigate HRQOL determinants in ethnic minority and rural BCS [12–16]; however, only one of these included African American women. Other studies have applied this framework to the investigation of predictors of related outcomes (e.g., depressive symptoms, physical quality of life) [11, 17]. Identifying the predominant determinants of HRQOL is essential to developing targeted, culturally relevant behavioral and psycho-educational interventions. To date, no study has used the Contextual Model to examine the independent influence of individual-level contextual factors on overall HRQOL in a cohort of African American and Latina cancer survivors, who often are medically underserved and have unmet psychosocial needs.

Guided by existing literature, the theoretical model, and variables available in the study dataset, we explored factors that have been shown to influence HRQOL in cancer survivors and to vary by ethnicity. Factors associated with HRQOL in BCS include life burden (e.g., role limitations, neighborhood characteristics, daily stressors) [15], social support [18], ethnicity [8], ethnic identity [19], spirituality [4], socioeconomic status [20], employment status [21], chronological age and marital/relationship status [18], health insurance status [22], quality of the patient-physician relationship [23], side effects of cancer treatment and comorbidities [24], diet and exercise habits [20, 25], stage at diagnosis and treatment characteristics [4, 18], personal control beliefs [26], and depressive symptomology [27].

Positive lifestyle changes, including healthier eating habits and increased physical activity, can ease the burden of cancer and improve breast cancer survivorship outcomes. However, certain barriers, including comorbid conditions, psychological distress, and self-limiting health beliefs, may inhibit engagement in these behaviors [25]. Research examining the distinct influence of personal health behaviors, as well as their individual-level facilitators and barriers, on HRQOL in ethnic minority BCS may inform interventions aiming to address breast cancer disparities. The Contextual Model posits that systemic-level factors exert a broad influence on HRQOL, while more proximal individual-level contextual factors have a more direct impact on this outcome. We hypothesized that personal health and psychological status, health efficacy, and behavioral factors (i.e., comorbidities, depressive symptoms, perceived control over health, and diet and exercise behaviors) would have significant independent effects on HRQOL in our sample of African American and Latina BCS, controlling for demographic and cancer-related medical characteristics and socio-cultural and other systemic-level variables.

Materials and methods

Participants and setting

The current study examined self-administered questionnaire data of 320 African American and Latina BCS who participated in a psycho-educational HRQOL intervention at City of Hope National Medical Center in Duarte, CA, between 2005 and 2009. The parent study was approved by the City of Hope Institutional Review Board (IRB). A detailed description of the recruitment and methodology of the parent study is beyond the scope of this investigation and is published elsewhere [28, 29]. The Loma Linda University IRB approved the data abstraction and analyses for the current study.

Women were eligible to participate if they, namely, (1) were within 1–5 years of a breast cancer diagnosis, (2) were diagnosed with stages 0 to 3A breast cancer, (3) were 18 years or older, (4) did not have other major disabling medical/ psychiatric conditions, (5) self-identified as African American or Latina, and (6) could read/speak English or Spanish. Eligible women who consented to study participation were randomly assigned to the intervention or the comparison group. The intervention group received the survivorship kit containing printed breast cancer-related resources and 8 weekly, individually tailored telephone counseling sessions administered by trained postdoctoral psychology trainees. These sessions provided breast cancer education and coping, stress management, relational, and communication skills. The comparison group received only the survivorship kit. Participants were compensated with $20 and $25 gifts cards upon completion of the baseline and 6-month follow-up questionnaires.

Data collection and measures

Using a cross-sectional design, this secondary study examined baseline questionnaire data abstracted from the parent intervention. The questionnaire contained items developed specifically for the intervention as well as from instruments validated for HRQOL research in breast cancer patients. For continuous variables, total scores were obtained by summing individual item scores. Where necessary, item scores were reverse-coded so that all items in a given scale were coded in the same direction and a higher total score reflected a higher level of the variable being measured.

Overall HRQOL—The outcome variable, *overall HRQOL*, was assessed with the Functional Assessment of Cancer Therapy–General (FACTG) [30]. Subscale (i.e., physical, social/family, emotional, and functional well-being) total scores were summed to calculate an aggregate HRQOL score. Total FACT-G scores were standardized according to published scoring instructions, with higher scores (on a scale of 0 to 100) denoting better overall HRQOL. The measure demonstrated acceptable reliability in this sample (Cronbach's α=0.72).

Socio-cultural context—*Ethnicity* was determined by whether participants self-identified as Black/African descended or Hispanic/Latina. The variable was dummy-coded, with Latina participants as the reference group. *Ethnic identity* was assessed using four items (e.g., being African American/African descended or Latino/Hispanic is an important part of

my overall identity) developed by the principal investigator (PI) of the parent study, rated on a 4-point scale (not at all to very much). Cronbach's α=0.90 for this measure. *Spirituality* was measured with four items, developed by the parent study PI, assessing the role of spirituality/religion in helping participants to find purpose after breast cancer diagnosis and treatment and to cope with their cancer experience. Items were rated on a 5-point scale (not at all/none to very much). Cronbach's α=0.81 for this measure.

Life stress was measured using the Urban Life Stress Scale [31]. The 19-item measure is a Likert-style instrument with anchors of 1 (extreme stress) and 5 (no stress); for the current study, all items were reverse-coded so that 0=no stress and 4= extreme stress. Cronbach's α=0.88 for this measure. *Perceived social support* was measured using the Medical Outcomes Study (MOS) Social Support Scale [32]. The instrument contains 19 items that assess the extent to which emotional/informational, tangible, and affectionate support and positive social interaction are available if needed, rated on a 5-point scale (none of the time to all of the time). Cronbach's α=0.96 for this measure.

Demographic/SES and health care system contexts—Demographic variables were self-reported by study participants. *Age, relationship status*, and *employment status* were assessed, as well as *educational level* and *annual household income*, which were used as proxies for SES. *Health insurance status* was self-reported and measured dichotomously as currently insured/uninsured. *Satisfaction with health care* was measured using 11 items, including seven items from a modified version of the Interpersonal Aspects of Care subscale of the Adherence Determination Questionnaire [33] pertaining to patients' perceptions of communication/rapport with their physicians. Other items assessed participants' level of satisfaction with information and resources provided by doctors and their belief that they were provided with the best cancer treatment available. Cronbach's α=0.80 for this measure.

Cancer-specific medical factors and general health status contexts—*Number of treatment-related side effects* and *number of comorbidities* were determined from self-report checklists, developed by the parent study PI, indicating which cancer treatment side effects (e.g., fatigue/anemia, pain, nausea) and chronic conditions (e.g., diabetes, heart disease) participants endorsed. *Stage at diagnosis* (dichotomized as <stage 2 and ≥ stage 2), surgery type (*lumpectomy*, *mastectomy*), and receipt of adjuvant therapies (*radiation*, *chemotherapy*, and *hormone therapy*) were self-reported by participants. Whether participants adopted healthier behaviors after being diagnosed with breast cancer was determined by their response to the question, "Have you made any lifestyle or health changes since your breast cancer treatment?" Among participants who marked "yes," diet and exercise changes were assessed by whether they checked the box corresponding to each behavior. Due to multicollinearity, a composite *healthier lifestyle* ordinal variable was created (no change, healthier diet, and healthier diet+more exercise).

Health efficacy and psychological well-being contexts—*Perceived control over health* was assessed with six items, developed by the parent study PI, pertaining to participants' beliefs about health and illness (e.g., "I am in control of my health") and rated on a 4-point scale. Cronbach's alpha for the measure was low in this sample (α=0.52) but deemed satisfactory for this descriptive study. The *depressive symptoms* variable was

measured using the 19-item Center for Epidemiological Studies Depression Scale (CES-D) [34]. Items are rated on a 4-point scale. Cronbach's $\alpha=0.92$ for this measure.

Statistical analyses

Analyses were performed using SPSS v.21 (SPSS Inc., 2012, Chicago, IL). Missing data were excluded from the analyses. All test of statistical significance were two-sided with a criterion level of significance of 0.05. Chi-square and ANOVA tests compared demographic and medical characteristics between African American and Latina participants.

Pearson, Spearman's rho, point-biserial, and phi correlation analyses were run to identify significant associations between variables of interest and HRQOL among study participants. A hierarchical regression analysis was conducted to determine the contribution of each contextual dimension significantly influencing HRQOL, controlling for covariates. The order in which variables were added to the regression model allowed for an evaluation of the influence of the personal health status, psychological well-being, health efficacy, and behavioral factors on HRQOL, after accounting for less modifiable determinants. In the interest of parsimony, variables that were not significantly correlated with HRQOL were excluded from the regression analysis. Demographic/SES variables and cancer-specific medical factors were entered in model 1, sociocultural factors were entered in model 2, and satisfaction with health care (a health care system factor) was entered in model 3. Model 4 included individual-level factors from the general health, health efficacy, and psychological well-being contexts as well as all variables previously entered. Multicollinearity among variables was ruled out by a variance inflation factor (VIF) <5.

Results

Demographic and medical characteristics

Table 1 presents the demographic and medical characteristics of the study population.

Among the 320 African American and Latina women who completed the baseline and follow-up assessments, 88 (27 %) were African American and 232 (73 %) were Latina. Among Latinas, 95 (30% of total sample) completed the English version of the survey and 137 (43 % of total sample) completed the Spanish version. Participants' ages ranged from 26 to 89 years old (M=54.3 years, SD=11.85). There was a significant difference in participants' ages by ethnicity (χ^2[4, N=319] =16.65, p<0.01). For example, 14% of African American were 75 years of age or older, compared to 3 % of Latinas. Compared to Latinas, African American participants had more years of formal education (χ^2[4, N=318] = 57.00, p<0.001) and higher annual household incomes (χ^2[4, N=318] =14.43, p<0.01) and were more likely to be unpartnered (not in a committed relationship) (χ^2[1, N=319] = 8.89, p<0.01) and to have had a lumpectomy (χ^2[1, N=320] =8.26, p<0.01). Latinas were more likely to have undergone chemotherapy (χ^2[1, N=320]= 4.04, p<0.05) and to have more treatment-related side effects than African American participants (F[1, 290]=7.82, p<0.01). Most participants were unemployed (61.4 %) and had health insurance (94.0 %) at the time of the study. Participants were most likely to have been diagnosed with <stage 2 breast cancer (56.8 %). The mean number of comorbidities endorsed was 2.4 (SD=1.8). HRQOL

was significantly lower in Latina participants (M= 56.3, SD=6.61) than in African American participants (M= 59.9, SD=7.92) (t[318]=−4.12, p<0.001).

Correlation analysis

Significant correlations between contextual factors and HRQOL are shown in Table 2. Medium correlations were found between HRQOL and life stress (r=−0.43), perceived social support (r=0.43), satisfaction with health care (r= 0.49), and number of comorbidities (r=−0.36) (p<0.01). There was a strong association between HRQOL and depressive symptoms (r=−0.70; p<0.01).

Hierarchical regression analysis

Results of the hierarchical regression analysis are presented in Table 3. Demographic/SES and cancer-specific medical variables (model 1) explained 14% of the variance in HRQOL (F[6, 274]=7.25, p<0.001). BCS who had higher family incomes (b=0.77, p<0.05) had higher HRQOL. Treatment-related side effects were negatively associated with HRQOL (b= −0.40, p<0.001). Socio-cultural factors, which were entered in model 2, explained an additional 20 % of the variance in the outcome (F [3, 271]=27.32, p<0.001). Compared to Latina ethnicity, African American ethnicity predicted better overall HRQOL (b=2.24, p<0.05). Life stress (b=−0.17, p<0.001) and perceived social support (b=0.11, p<0.001) were also significantly associated with HRQOL. Employment status became significant in model 2 (b=1.86, p<0.05). Number of treatment-related side effects maintained significance in model 2; however, annual household income was no longer significant in this model. Model 3 included health care system factors and explained an additional 8 % of the variance in HRQOL (F [1, 270]=34.88, p<0.001). Participants who expressed satisfaction with their health care were significantly more likely to have higher HRQOL (b=0.32, p<0.001). Employment status, number of treatment side effects, life stress, and perceived social support maintained significance in model 3.

Model 4, the final model, included individual-level behavioral and health status variables and accounted for an additional 18 % of the variance in HRQOL (F [4, 266]=29.55, p<0.001). HRQOL was significantly higher in women who practiced healthier diet and exercise behaviors since cancer diagnosis (b=0.02, p<0.05), and lower in women with more comorbid conditions (b=−0.60, p<0.001) and depressive symptoms (b=−0.30, p<0.001). Perceived control over health did not significantly predict HRQOL (p>0.05). Stage at diagnosis became significant in model 5 (b=−1.38, p<0.05). Specifically, higher breast cancer stage was associated with worse HRQOL. Satisfaction with health care maintained significance in model 4; however, employment status, life stress, and perceived social support were no longer significant. The final model, including all study variables, explained 59 % of the variance in HRQOL (F[14, 266]=27.76, p<0.001).

Discussion

We explored the independent contributions of systemic-and individual-level contexts in explaining overall HRQOL in a sample of African American and Latina BCS. Ethnic minority cancer patients encounter unique socio-cultural challenges as well as

marginalization within the medical system, which may contribute to diminished HRQOL and cancer disparities [5]. The current study expands existing knowledge by demonstrating that adopting healthy behaviors and effectively managing comorbid health conditions and psychological difficulties may offset the negative impacts of socio-cultural barriers to health among African American and Latina BCS. Our results show, however, that even when lifestyle and health status are taken into account, BCS' satisfaction with the health care they receive significantly affects their HRQOL. It has been reported that breast cancer patients' perception of their own competency in communicating with physicians may have a greater impact than their perception of physicians' communication skills on their HRQOL [23]. Therefore, in addition to ongoing provider training in cultural competence, interventions that educate and empower all BCS to be effective self-advocates in their interactions with medical professionals are of critical importance.

We determined that when satisfaction with health care was accounted for, life stress and social support were still significant predictors of HRQOL. Thus, our results add to the literature by showing that HRQOL interventions focused on empowering African American and Latina BCS to communicate effectively with medical care providers can be enriched by incorporating personally tailored strategies for overcoming socio-cultural challenges, including maintaining social connections and identifying and coping with stressors. Medical and health education professionals can be instrumental in linking patients to community-based resources for social support (e.g., peer support and advocacy services) and other psychosocial services [35].

In our sample, HRQOL was negatively influenced by advanced cancer stage, comorbid conditions, and psychological difficulties. Survivors facing these challenges often have simultaneous sources of distress, including the increased probability of job loss [21]. We found that the influence of employment status was significant only after the inclusion of socio-ecological factors. From these results, it appears that the contribution of work status to a BCS' quality of life becomes particularly important when she is faced with additional life stressors and inadequate social support. African American and Latina BCS could benefit substantially from culturally responsive interventions designed to enhance self-care management for multiple chronic conditions, patient activation (e.g., care seeking, adhering to screening/followup care recommendations), balancing work and treatment demands, symptom and stress management, and developing and maintaining strong social support networks [36]. The results of our study partially support our hypothesis and indicate that although socio-cultural factors significantly influence HRQOL, other systemic/institutional factors, lifestyle, and health and psychological status may be more relevant to the survivorship experience of ethnic minority and underserved BCS. Contrary to what we hypothesized, however, personal control beliefs did not affect HRQOL when other contexts were controlled for. This finding also contradicts other investigators' reports [26]. Our results suggest that in African American and Latina BCS, more consequential factors related to the cancer experience (e.g., cancer stage, comorbidities, navigating through the health care system) may override the influence of health efficacy on their HRQOL.

Hence, incorporating patient activation and communication strategies in behavioral and psycho-educational interventions can enhance the well-being of cancer survivors. Gaston-

Johansson et al. [37] found that a cognitive-behavioral coping and disease self-management intervention improved overall quality of life in a sample of mostly non-Hispanic White breast cancer patients [37]. A similar program conducted by Lechner et al. [38] demonstrated high study retention and acceptability among African American BCS. These findings are promising; however, there remains a need to determine whether comparable interventions can improve HRQOL for ethnic minority survivors, particularly those who are diagnosed with advanced-stage cancers, experience considerable socio-cultural stress, and have limited access to resources to enhance certain coping skills [39].

A potential limitation of the current study is that, due to its cross-sectional design, we could not determine causality between independent variables and the main outcome. Also, the study did not assess the relationships between contextual predictors and HRQOL across ethnic or linguistic groups. Other studies have shown that certain predictors of HRQOL (e.g., comorbidities and psychological difficulties) vary between African American, English language-preferred Latina, and Spanish language-preferred Latina BCS [36]. Additionally, it is not clear from our results which specific dimensions of HRQOL (i.e., physical, social, emotional, functional wellbeing) were affected by factors influencing overall HRQOL. Moreover, since only African American and Latina women were included in this study, the findings may not be generalizable to other ethnic populations.

Despite these potential limitations, this study further identifies salient factors influencing HRQOL in a sample of African American and Latina BCS. Cancer survivors' HRQOL depends on the contexts in which they conduct their daily lives, and multi-level contextual factors may contribute to ethnic disparities in survivorship outcomes [40]. Thus, highly tailored and individualized interventions that take into consideration the whole person and the environment in which each patient's cancer experience evolves are likely to be most effective for underserved BCS. Our results indicate that interventions focusing on healthy lifestyle habits and self-management skills are likely to enable survivors to overcome certain socio-cultural challenges; however, it is advantageous to also address system- and institutional-level determinants of health in order to promote sustainable changes in these populations [25]. To tackle the complex, multi-level determinants of cancer outcomes and equalize survivorship outcomes among ethnically diverse patients, interventionists must incorporate diverse perspectives through collaborative involvement of patients, researchers, health care providers, cancer advocates, and policy makers. Future studies should be longitudinal in design, examine predictors of cancer survivorship outcomes across larger samples of ethnic minority and linguistic subgroups, and include plans for dissemination and implementation in clinical and community practice.

Acknowledgments

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Table 1

Demographic and medical characteristics of study participants

	Overall (*N*=320)	African American (*N*=88)	Latina (*N*=232)	
	Frequency (%)			χ^2
Demographic characteristics				
Age				16.65[**]
25– 44 years	49 (15.4)	11 (12.6)	38 (16.4)	
45– 54 years	121 (37.9)	27 (31.0)	94 (40.5)	
55– 64 years	87 (27.3)	23 (26.4)	64 (27.6)	
65– 74 years	44 (13.8)	14 (16.1)	30 (12.9)	
75+years	18 (5.6)	12 (13.8)	6 (2.6)	
Relationship status				8.89[**]
Partnered	177 (55.5)	37 (42.0)	140 (60.6)	
Unpartnered	142 (44.5)	51 (58.0)	91 (39.4)	
Educational level				57.00[***]
<High school	113 (35.5)	4 (4.5)	109 (47.4)	
High school diploma	45 (14.2)	12 (13.6)	33 (14.3)	
Vocational/some college	92 (28.9)	41 (46.6)	51 (22.2)	
Bachelor's degree	34 (10.7)	15 (17.0)	19 (8.3)	
Master's/doctorate	34 (10.7)	16 (18.2)	18 (7.8)	
Employment status				0.25
Employed	123 (38.6)	32 (36.4)	91 (39.4)	
Unemployed	196 (61.4)	56 (63.6)	140 (60.6)	
Annual household income				14.43[**]
<$25 K	152 (47.8)	27 (31.0)	125 (54.1)	
$25– 45 K	73 (23.0)	26 (29.9)	47 (20.3)	
$45– 60 K	20 (6.3)	9 (10.3)	11 (4.8)	
$60– 75 K	21 (6.6)	7 (8.0)	14 (6.1)	
>$75 K	52 (16.4)	18 (20.7)	34 (14.7)	
Health insurance status				0.43
Insured	300 (94.0)	84 (95.5)	216 (93.5)	
Uninsured	19 (6.0)	4 (4.5)	15 (6.5)	
Medical characteristics				
Stage at diagnosis				0.54
0/1	179 (56.8)	46 (53.5)	133 (58.1)	
2/3	136 (43.2)	40 (46.5)	96 (41.9)	
Lumpectomy				8.26[**]
Yes	188 (58.8)	63 (71.6)	125 (53.9)	
No	132 (41.3)	25 (28.4)	107 (46.1)	
Mastectomy				2.91
Yes	152 (47.5)	35 (39.8)	117 (50.4)	

	Overall (*N*=320)	African American (*N*=88)	Latina (*N*=232)	
No	168 (52.5)	53 (60.2)	115 (49.6)	
Radiation				0.31
Yes	222 (69.4)	59 (67.0)	163 (70.3)	
No	98 (30.6)	29 (33.0)	69 (29.7)	
Chemotherapy				4.04[*]
Yes	213 (66.6)	51 (58.0)	162 (69.8)	
No	107 (33.4)	37 (42.0)	70 (30.2)	
Hormonal therapy				1.06
Yes	207 (64.7)	53 (60.2)	154 (66.4)	
No	113 (35.3)	35 (39.8)	78 (33.6)	
	Mean (SD)			*F*
Number of side effects	6.3 (5.0)	5.0 (4.5)	6.8 (5.2)	7.82[**]
Number of comorbidities	2.4 (1.8)	2.4 (1.6)	2.4 (1.9)	0.04

[*]
$p<0.05$;

[**]
$p<0.01$;

[***]
$p<0.001$

Table 2

Correlations between contextual variables and HRQOL

Variables	r
Demographic/SES and cancer-related medical variables	
Relationship status	0.13[*]
Education level	0.18[**]
Annual household income	0.29[**]
Employment status	0.12[*]
Stage at diagnosis	−0.14[*]
Number of side effects	−0.26[**]
Socio-cultural variables	
Ethnicity	0.23[**]
Life stress	−0.43[**]
Social support	0.43[**]
Health care system variables	
Satisfaction with health care	0.49[**]
Health status, psychological well-being, health efficacy, and behavioral variables	
Number of comorbidities	−0.36[**]
Depressive symptoms	−0.70[**]
Perceived control over health	−0.12[*]
Healthier lifestyle	0.23[**]

[*]
$p < 0.05$;

[**]
$p < 0.01$

Table 3

Results of a hierarchical regression analysis of contextual variables predicting HRQOL (*N*=280)

Variables	Unstandardized *b* coefficients			
	Model 1	**Model 2**	**Model 3**	**Model 4**
Demographic/SES and cancer-related medical variables				
Relationship status	1.25	0.14	0.06	−0.30
Education level	0.17	−0.07	−0.07	−0.05
Annual household income	0.77*	0.35	0.29	0.03
Employment status	1.09	1.86*	1.56*	0.99
Stage at diagnosis	−0.54	−0.48	−0.83	−1.38*
Number of side effects	−0.40***	−0.28***	−0.27***	−0.05
Socio-cultural variables				
Ethnicity		2.24*	1.21	0.80
Life stress		−0.17***	−0.14***	−0.03
Social support		0.11***	0.07**	0.03
Health care system variables				
Satisfaction with health care			0.32***	0.20***
Health status, psychological well-being, health efficacy, and behavioral variables				
Number of comorbidities				−0.60***
Depressive symptoms				−0.30***
Perceived control over health				0.09
Healthier lifestyle				0.02*
R^2	0.14	0.34	0.41	0.59
F	7.25***	15.33***	19.01***	27.76***
R^2	0.14	0.20	0.08	0.18
F for R^2	6.49***	27.32***	34.88***	29.55***

*
p<0.05;

**
p<0.01;

***
p<0.001