



## Empirical Articles

# Psychological Variables Associated With Health-Related Quality-of-Life in Uruguayan Women Surgically Intervened for Breast Cancer

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## Abstract

**Aim:** This study described demographic, clinical, psychological and health-related quality of life (HRQOL) characteristics in women surgically intervened for breast cancer, and the present study was conducted to examine the association between these characteristics.

**Method:** Uruguayan women (N = 116) diagnosed and surgically intervened for breast cancer were assessed on demographic, clinical and psychological indicators and HRQOL, by self-report questionnaires (i.e., BDI-II, PSS, Brief-COPE, and SF-36). Study was conducted adopting a non-experimental, cross-sectional methodology. After studying associations between variables assessed, hierarchical regression analyses were performed to identify HRQOL predictors.

**Results:** HRQOL Physical Health Component (SF-36) was predicted by perceived stress and depression, above and beyond demographic and clinical factors. And HRQOL Mental Health Component (SF-36) was predicted by education, time elapsed since diagnosis of breast cancer, time hospitalized during the past year, perceived stress and depression.

**Conclusion:** Results suggest that psychological variables may have a significant role for HRQOL prediction, and need to be taken into account along with demographic and clinical markers in order to explain HRQOL outcomes in women with breast cancer.

**Keywords:** breast cancer, women, HRQOL, stress, depression, coping

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## Introduction

Breast cancer remains a prevalent and stressful experience for hundreds of thousands of women each year around the world (Chopra & Kamal, 2012; Culver, Arena, Antoni, & Carver, 2002; Culver, Arena, Wimberly, Antoni, & Carver, 2004; Henselmans, Helgeson, Stelman, de Vries, Sanderman, & Ranchor, 2010; Pocino et al., 2007; Urcuyo, Boyers, Carver, & Antoni, 2005). Survival rates of the women with breast cancer are expected to be superior to 15 years, and over 95% of those with localized disease will survive additional five years or more (American Cancer Society, 2001). Breast cancer is a chronic disease in which malignant cells grow into the breast tissue (MD Anderson Cancer Center, 2009). Characterized by uncontrollable proliferation and development of abnormal cells (American Cancer Society, 2009), it is the most common type of cancer in women worldwide (Rodríguez

Cuevas & Capurso García, 2006). More than 1.1 million women are diagnosed with breast cancer each year, representing 10% of the total number of malignancies (Breast Health Global Initiative, 2006).

Over the past years there has been considerable research on health related quality of life (HRQOL) of women with breast cancer (Montazeri, 2008; Reich & Remor, 2010), as it has various implications, both in the short-term and in the long-term.

HRQOL is a concept that refers to a person's subjective evaluation of his/her health status and ability to achieve and maintain an overall level of functioning that allows him/her to pursue valued life goals and is reflected on their general well-being (Shumaker & Naughton, 1995).

According some authors, one of the main purposes of assessing HRQOL is enabling a global examination of the disease's impact on the patient's functioning as well as measuring medical treatment's effects on people's daily lives (e.g., Consiglio & Bellosso, 2003; Kershaw, Northouse, Kritpracha, Schafenacker, & Mood, 2004; Morrison & Bennett, 2008; Ritterband & Spielberger, 2001; Schou, Ekeberg, Sandvik, Hjermsstad, & Ruland, 2005; Tomich & Helgeson, 2002; Yen et al., 2006). Several studies indicate the relevance of assessing HRQOL of breast cancer patients (e.g., Arraras, Illarramendi, Manterola, Salgado, & Domínguez, 2007; Carver, Smith, Petronis, & Antoni, 2006; Pozo et al., 1992; Reich & Remor, 2011; Wapnir, Cody, & Greco, 1999).

Even though the evaluation of cancer therapies has historically focused on biomedical measures, there has been an increasing interest in determining the disease's and its treatment's impact on HRQOL (Aronson et al., 1993; Reich & Remor, 2011). Recent investigations indicate that psychological variables play a major role in predicting HRQOL (Montazeri, 2008).

Due to the variability of findings on adjustment to the disease discussed in the literature (Ganz et al., 2004; Glanz & Lerman, 1992; Moyer & Salovey, 1996), characterizing personal or contextual factors that may facilitate a better adjustment and psychosocial adaptation is highly relevant to breast cancer research.

There is almost no previous research addressing a psychological perspective on cancer in Uruguay. Taking the latter circumstances into account, the aim of this study is mainly descriptive and exploratory. In the present work we focus on describing several characteristics - including psychological indicators - and HRQOL, and examine the association between these variables with HRQOL, as a main outcome.

The study objectives include: describing coping strategies, depressive symptomatology, perceived stress and HRQOL, in a sample of Uruguayan women surgically intervened for breast cancer; analysing cross-sectional relationships between health status and selected psychological variables, comparing the samples results to those obtained among a comparative sample of healthy women; identifying study variables associated with better adjustment and higher levels of HRQOL.

## Hypotheses

**HRQOL and depressive symptomatology** — Lumpectomized and breast-reconstructed women shall present higher overall HRQOL (Wapnir et al., 1999), physical and mental functioning (Giroto, Schreiber, & Nahabedian, 2003), and lower levels of depressive symptomatology (Costanzo et al., 2007; Suárez & Rueda, 2007; Wong-Kim & Bloom, 2005) when compared with mastectomized non-reconstructed peers. Healthy women shall self-report higher levels of HRQOL (Conde et al., 2005; Schou, Ekeberg, & Ruland, 2005; Yen et al., 2006), and lower levels

of depressive symptomatology (e.g., Giedzinska, Meyerowitz, Ganz, & Rowland, 2004; Golden-Kreutz & Andersen, 2004; Ritterband & Spielberger, 2001; So et al. (2010); Valle et al., 2006; Yen et al., 2006) than women with breast cancer. Time elapsed since diagnosis shall predict increased levels of HRQOL (Holland, 2002). Increased levels of depressive symptomatology shall predict lower levels of HRQOL (e.g., Deshields, Tibbs, Fan, & Taylor, 2006; So et al., 2010; Yen et al., 2006), and be associated with more recent diagnosis (Holland, 2002).

**Coping strategies and perceived stress** — The use of problem solving focused coping strategies shall be associated with better adjustment (Carver et al., 1993). Avoidant coping styles shall be associated with increased levels of distress (Culver et al., 2002; Pieterse et al., 2007), and lower levels of Mental HRQOL (Kershaw et al., 2004). Higher levels of distress shall predict lower levels of HRQOL (Perry, Kowalski, & Chang, 2007).

More severe levels of depressive symptomatology (Costanzo et al., 2007; Reddick, Nanda, Campbell, Ryman, & Gaston-Johansson, 2006; Wong-Kim & Bloom, 2005; Yen et al., 2006), and increased levels of distress (Gilbar, 2005; Stanton, Danoff-Burg, & Huggins, 2002) shall be found among younger women when compared to older peers.

## Methods

### Participants

A total of 116 Uruguayan women diagnosed and surgically intervened for breast cancer in different stages (I - IV) according to clinical criteria (National Cancer Institute, 2009), were recruited for the present study, after their post-surgical visit at the outpatient department on either public or private health care centres. Hospitals participating in this study were selected on a convenience basis. Participants were eligible if they met the following criteria: (i) having been diagnosed at least one month prior to assessment; (ii) having been surgically intervened for breast cancer; (iii) voluntarily agreeing to participate; (iv) having an educational level that enabled questionnaire's comprehension and administration; (v) participants should be attending outpatient consultation at a national health care centre; (vi) no previous neoplastic diagnosis.

Exclusion criteria (which were rarely invoked) were as follows: (i) psychoactive medication consumption; (ii) mental or cognitive disorder that may interfere with the administration; (iii) having been diagnosed with a severe or impairing disease besides cancer.

### Variables and Instruments

All instruments were pretested for language comprehension and regional Spanish.

HRQOL was assessed by the *SF-36 version 2.0 Health Questionnaire* (Ware, 2000; Ware & Sherbourne, 1992) Spanish version for Uruguay (<http://www.iqola.org/>). Higher scores represent a better HRQOL. It is composed by eight domains measuring different HRQOL dimensions: a) physical functioning (PF,  $\alpha = 0.92$ ), b) physical role (PR,  $\alpha = 0.94$ ), c) bodily pain (BP,  $\alpha = 0.87$ ), d) general health (GH,  $\alpha = 0.81$ ), e) vitality (VT,  $\alpha = 0.75$ ), f) social functioning (SF,  $\alpha = 0.62$ ), g) emotional role (ER,  $\alpha = 0.83$ ), and h) mental health (MH,  $\alpha = 0.91$ ). The latter are grouped into physical (PHC,  $\alpha = 0.93$ ) and mental (MHC,  $\alpha = 0.90$ ) health components.

*Depression* was assessed by the *Beck Depression Inventory II* (BDI II; Beck, Steer, & Brown, 2006), Spanish version (Penley, Wiebe, & Nwosu, 2003). Higher scores indicate higher levels of depressive symptoms. BDI is a

21-items self-report inventory that assesses cognitive, affective, and vegetative depressive symptomatology (Cronbach's  $\alpha = .90$ ).

*Coping styles and strategies* were assessed by the *Brief COPE* (Carver, 1997), Spanish version (Perczek, Carver, Price, & Pozo-Kaderman, 2000). Higher scores indicate greater use of coping styles and strategies. It is a 24-items self-report coping scale that evaluates 12 coping strategies. Brief COPE-Spanish version comprises the following subscales: a) self-distraction ( $\alpha = 0.58$ ), b) active coping ( $\alpha = 0.84$ ), c) denial ( $\alpha = 0.52$ ), d) substance use ( $\alpha = 0.83$ ), e) use of emotional support ( $\alpha = 0.84$ ), f) behavioural disengagement ( $\alpha = 0.66$ ), g) venting of emotions ( $\alpha = 0.57$ ), h) positive reframing ( $\alpha = 0.76$ ), i) planning ( $\alpha = 0.65$ ), j) humour ( $\alpha = 0.80$ ), k) acceptance ( $\alpha = 0.70$ ), l) religion ( $\alpha = 0.90$ ).

*Perceived Stress* was assessed by the *Perceived Stress Scale* (PSS; Cohen, Kamarck, & Mermelstein, 1983), Spanish version (Remor, 2006). Higher scores indicate higher levels of perceived stress. PSS was designed to measure the extent to which daily life situations are appraised as stressful. This 14-items self-report instrument evaluates perceived stress during the month prior to assessment (Cronbach's  $\alpha = .86$ ).

*Demographic and clinical features* (survey designed for this study) included information regarding: time elapsed since breast cancer diagnosis, clinical status, therapies received to treat breast cancer, previous neoplastic diagnosis, diagnosis with a severe disease besides cancer, time hospitalized during the year prior to data collection, family history of cancer, breast cancer stage, mental health disorder, time elapsed since mental health psychological or psychiatric treatment, age, place of residence, marital status, people participants cohabited with, sons/daughters, occupation, employment status, education, religious beliefs (comprises a question on whether the participant is or isn't a believer, and the religion she adheres to, if affirmative).

## Procedures

The study used a cross-sectional design. The study protocol was submitted and approved by the Ethics and Bioethics Review Boards of the University (*Universidad Católica del Uruguay/UCU*) and Clinical Oncology Departments at the following local Health Centers: '*Instituto Nacional del Cáncer (INCA)*', '*Hospital Británico*', and '*Hospital Evangélico*' before the study began.

After the health centre's approval, recruitment of participants into the study began with a brief description of the project by a member of the medical staff, or one of the research team members/assistants. Once prospective participants were identified, researchers used the snowball sampling technique to identify additional participants. In all cases, the research team members made it clear to women that their participation in this project was strictly voluntary and that their participation in the current study, or refusal to participate, would not affect their ability to receive any present or future services to which they would otherwise be entitled. All participants were recruited with non-probability sampling techniques. Women with breast cancer were recruited from the outpatient area of the Clinical Oncology Units, once the clinical records had been checked for eligibility. A small percentage of participants were recruited from breast cancer patients support groups and non-governmental organizations. Researchers explained the study's most relevant aspects, and obtained participant's informed consent before data collection. In order to evaluate these criteria, investigators administered a demographic and clinical form, especially designed for this purpose. Information was gathered by these means, as well as by double-checking data on patient's clinical records. Questionnaire administration process took 30 to 45 minutes per participant, and data were collected between May and November, 2010.

## Statistical Analyses

Data were analysed using Statistical Package for the Social Sciences (SPSS) version 18.0 for Windows. The information obtained was checked by three researchers to minimize data transcription errors. Normality, asymmetry, and kurtosis values were obtained for all the study measures. Firstly, descriptive and frequency analyses were conducted for descriptive purposes. Mean scores, standard deviations; minimum and maximum values were also obtained. The associations between all study variables were examined by correlations (Pearson or Spearman) or contingency analyses (nominal variables level) according to the type of variable. Finally, hierarchical regression analyses (stepwise) were conducted to predict PHC and MHC of SF-36 Health Survey (subscales outcome measure) while controlling for demographic and clinical variables. To control the effects of these variables (e.g., age, education, time elapsed since diagnosis, time hospitalized during the past year, time elapsed since initiation of mental health treatment), they were entered in the first two blocks in the regression model. To test their independent contribution, psychological variables (e.g., stress, depression, coping) were entered in the third and final block. Assessment of the assumption of no multicollinearity was made by the Variance Inflation Factor (VIF) (expected lower than 10; Hair, Anderson, Tatham, & Black, 2006). Significance tests were set at 0.05 alpha level.

## Results

### Characteristics of the Women with Breast Cancer Assessed by the Study

One hundred sixteen women with breast cancer in Uruguay have been assessed by the present study. Mean age of women assessed was 50.8 (SD 9.4) years, and 47.4% of participants had achieved at least elementary school. Mean time elapsed (years) since breast cancer diagnosis was 4.5 (24.2% less than a year since diagnosis; 34.5% between 1 and 5 years since diagnosis; and 26% more than 5 years diagnosis). The majority lived in the capital city of the country (50%), and were married or living with a partner (58.7%), 55.2% was currently employed.

Additional sample characteristics are summarized on [Table 1](#).

Table 1

*Most Salient Clinical Features of the Sample (n = 116), Uruguay.*

Characteristic	%
<b>Mental health specialist consultation</b>	
No	40.5
Yes	59.5
Among which	
Due to problems associated with breast cancer diagnosis	71.0
Other reasons	28.9
< 2 years prior to data collection	53.6
2-5 years prior to data collection	36.0
> 5 years prior to data collection	10.4

Characteristic	%
<b>Mental health treatment</b>	
No	47.4
Yes	52.6
Among which	
Individual psychological treatment (no-pharmacologic)	95.5
< 5 years prior to data collection	89.5
> 5 years prior to data collection	10.5
<b>Time hospitalized Turing the current year</b>	
<1 week	80.0
1-3 months	10.3
Not hospitalized	9.7
<b>Clinical status</b>	
In complete remission	51.0
In adjuvant treatment	40.0
In partial remission	9.0
<b>Type of surgery</b>	
Radical mastectomy without reconstruction	40.5
Radical mastectomy with reconstruction	25.9
Breast-conserving surgery	33.0
<b>Adjuvant treatments</b>	
Chemotherapy	82.8
Radiation therapy	62.1
Hormonal therapy	55.2
Chemotherapy and radiation therapy	57.0
Chemotherapy, radiation therapy, and hormonal therapy	53.4
Chemotherapy and radiation therapy, exclusively	43.0
Chemotherapy, but no radiation therapy	26.0
Chemotherapy and hormonal therapy, exclusively	22.0
Hormonal therapy, exclusively	7.0
Chemotherapy, exclusively	4.3
Radiation therapy, exclusively	5.0
No adjuvant treatment received	5.0
<b>Family history of cancer</b>	
No neoplastic family history	7.0
Grandparents	33.6
Mother	21.6
Father	12.0
Brother/s-sister/s	8.6
Other relatives	17.2
<b>Cancer Stage</b>	
I or II	77.6
III	19.0
IV	3.4

Clinical features show that more than half the women with breast cancer had undergone psychological treatment up to 2 years prior to data collection, mainly due to problems associated with breast cancer diagnosis. Participants had been diagnosed with early stage breast cancer (I & II), 2 to 5 years prior to data collection, and had achieved

a full remission status. Modified radical mastectomy without reconstruction was the surgical procedure undergone by the majority of women, who had also received chemotherapy, radiation therapy, or both adjuvant treatments.

### **Association Between Study Variables in the Sample of Women With Breast Cancer**

Significant associations were found among various demographic, medical, health-related, and psychological variables for the current sample (see details in [Table 2](#)).

Results showed that higher educational level was associated with better mental health. Lower levels of depression and perceived stress were associated to higher HRQOL (both PHC and MHC). Women reporting good physical health also presented good mental health. The longer ago mental health treatment had taken place, the better scores in MHC were found. Depression and stress levels were both associated. Problem focused coping and emotion focused coping styles were positively associated. More cycles of radiation treatment were associated to older and less educated participants. Women who had been diagnosed more recently reported having been more frequently hospitalized during the year prior to data collection, and had initiated treatment with a mental health professional in recent past. Younger and more educated participants self-reported the use of emotion focused coping style more often than older, less educated women. Younger women were also to whom more doses of both treatments (radio and chemotherapy) were prescribed, and who had received more doses of chemotherapy, when compared to older participants.

Additional association analyses by contingency tables were performed with nominal variables. Results showed that employment status ( $C = .50, p < .001$ ); education ( $C = .40, p = .006$ ), clinical status ( $C = .41, p = .001$ ); and type of surgery ( $C = .34, p = .016$ ) were related to PHC of HRQOL. Employment status ( $C = .46, p = .024$ ), education ( $C = .41, p = .021$ ), clinical status ( $C = .50, p = .000$ ), and the type of surgery ( $C = .36, p = .048$ ). Depression was associated with employment status ( $C = .55, p < .001$ ), clinical status ( $C = .38, p = .023$ ), type of surgery ( $C = .41, p = .005$ ), immunotherapy ( $C = .33, p = .003$ ), and disease stage ( $C = .41, p = .007$ ) were associated with MHC of HRQOL. Marital status ( $C = .67, p = .009$ ), employment status ( $C = .77, p < .001$ ), education ( $C = .76, p < .001$ ), chemotherapy ( $C = .44, p = .036$ ), immunotherapy ( $C = .45, p = .022$ ), and family history of cancer ( $C = .86, p = .005$ ) were associated with Problem focused coping style. Marital status ( $C = .68, p = .010$ ), employment status ( $C = .76, p = .001$ ), education ( $C = .71, p = .001$ ), type of surgery ( $C = .66, p = .003$ ), and family history of cancer ( $C = .86, p = .011$ ) were associated with Emotion focused coping style, whereas Avoidance oriented coping style was associated only with education ( $C = .75, p < .001$ ).

**Table 2**  
**Statistically Significant Correlations Between Demographic, Clinical Markers, Psychological, and HRQOL Variables in the Sample of Women With Breast Cancer (n = 116)**

	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
<b>HRQOL (SF-36)</b>															
(1) PHC	.614**	-.597**	-.522**	.224*	.314**	-.121	.278**	-.226*	-.260*	-.075	-.096	.034	.366**	-.184*	-.209*
(2) MHC		-.606**	-.616**	.217*	.267**	-.028	.394**	-.464**	-.098	.050	-.115	.099	.553**	-.012	.195*
<b>Psychological</b>															
(3) BDI (Depression)			.662**	-.333**	-.370**	-.088	-.106	.186*	.128	.002	-.004	-.128	-.264*	.066	-.014
(4) PSS (Perceived stress)			-.440**	-.435**	-.123	-.123	-.151	.392**	.374**	.295*	-.197	-.175	-.436**	.054	-.001
<b>Coping Styles (Brief COPE)</b>															
(5) Problem focused coping style				.678**		.278**	-.180	.037	-.082	-.037	.023	.145	.105	-.253**	.295**
(6) Emotion focused coping style					.240**		-.038	.014	-.065	-.025	-.121	.006	.246*	-.362**	.334**
(7) Avoidance oriented coping style						-.149	-.037	-.037	.014	-.096	.280	.176	.072	-.006	-.020
<b>Clinical markers</b>															
(8) Time elapsed since diagnosis								-.596**	-.307*	-.141	.131	.223	.565**	.336**	-.093
(9) Time hospitalized									.352**	.281*	-.410**	-.308*	-.481**	-.344**	.115
(10) N° of chemotherapy doses scheduled										.896**	-.420**	-.384*	-.329*	-.393**	.166
(11) N° of chemotherapy doses received											-.366*	-.213	-.301	-.362**	.158
(12) N° of radiotherapy cycles scheduled												.843**	.215	.286	-.395**
(13) N° of radiotherapy cycles received													.215	.387*	-.323*
(14) Time elapsed since initiation of mental health treatment														.375**	-.417**
<b>Demographic</b>															
(15) Age															
(16) Education															

\*p < .05. \*\*p < .01.



## Prediction of HRQOL From Demographic, Clinical, and Psychological Variables in Women With Breast Cancer

Since prior results showed a variety of associations on several study measures in the current sample, we decided to examine the role that demographic, clinical and psychological variables have to explain variance in HRQOL scores (separate summary components for physical and mental health) in women with breast cancer. This analysis may contribute to identify potential risk or protection factors for HRQOL outcome, since it may add light towards better understanding aspects that might be addressed in the context of breast cancer in Uruguay. Analyses included both unchangeable sample features, and modifiable risk/protection factors.

Table 3 summarizes the results of hierarchical regression model addressing the Physical Health Component (SF-36) and presents standardized regression coefficients of predictors.

Table 3

*Hierarchical Regression Analysis Summary Predicting Physical Health Component (SF-36)*

Step and predictor variable	$\beta$	$R^2$	$\Delta F (p)$	$t$	$p$	VIF
<b>Step 1</b>		.14	6.71 (.013)			
Time elapsed since initiation of mental health treatment	.379			2.59	.013	1.00
<b>Step 2</b>		.60	44.41 (.000)			
Time elapsed since initiation of mental health treatment	-.112			-0.89	.378	1.53
Perceived stress (PSS)	-.835			-6.66	.000	1.53
<b>Step 3</b>		.67	8.99 (.005)			
Time elapsed since initiation of mental health treatment	-.081			-0.71	.481	1.54
Perceived stress (PSS)	-.579			-4.06	.000	2.38
Depression (BDI-II)	-.366			-2.99	.005	1.74

Note.  $\beta$ : Standardized Beta;  $R^2$ : R square; VIF Variance Inflation Factor.

Results demonstrated that the first block of variables (demographic controls: age [ $t = -.91, p = .370$ ] and education [ $t = 1.33, p = .190$ ]) made no contribution to the model. When the second block of variables (clinical controls) was entered, only time elapsed since initiation of mental health treatment ( $\beta = .38, p = .013$ ) predicted the Physical Health Component (SF-36). Finally, when the psychological variables (e.g., stress, depression, coping) were entered into the model in the third block, only perceived stress ( $\beta = -.57, p < .001$ ), and depression ( $\beta = -.36, p = .005$ ) predicted the Physical Health Component.

Time elapsed since initiation of mental health treatment turned not significant when psychological variables were entered in the model. In other words, perceived stress and depression were predictors of physical component of quality of life independent of demographic and clinical indicators for the current sample (Final model explained 67% of variance:  $F = 26.46, p < .001$ ).

Table 4 summarizes the results of hierarchical regression model addressing the Mental Health summary Component (SF-36) and presents standardized regression coefficients of predictors.

Table 4

*Hierarchical Regression Analysis Summary Predicting Mental Health Component (SF-36)*

Step and predictor variable	$\beta$	$R^2$	$\Delta F (p)$	$t$	$p$	VIF
<b>Step 1</b>		.10	7.28 (.009)			
Education	.32			2.70	.009	1.00
<b>Step 2</b>		.36	26.79 (.000)			
Education	.32			3.20	.002	1.00
Time elapsed since diagnosis	.51			5.20	.000	1.00
<b>Step 3</b>		.44	7.79 (.007)			
Education	.28			3.00	.004	1.01
Time elapsed since diagnosis	.38			3.52	.001	1.28
Time hospitalized (last year)	-.30			-2.80	.007	1.29
<b>Step 4</b>		.73	66.19 (.000)			
Education	.30			4.53	.000	1.01
Time elapsed since diagnosis	.37			4.92	.000	1.28
Time hospitalized (last year)	-.10			-1.23	.222	1.43
Perceived stress (PSS)	-.58			-8.14	.000	1.14
<b>Step 5</b>		.75	5.13 (.027)			
Education	.27			4.11	.000	1.06
Time elapsed since diagnosis	.34			4.67	.000	1.30
Time hospitalized (last year)	-.16			-1.99	.050	1.63
Perceived stress (PSS)	-.40			-3.90	.000	2.58
Depression (BDI-II)	-.22			-2.26	.027	2.32

Note.  $\beta$ : Standardized Beta;  $R^2$ : R square; VIF Variance Inflation Factor.

Results demonstrated that when the first block of variables (demographic controls) was entered, only education ( $\beta = .32$ ,  $p = .009$ ) predicted the outcome (MHC). When the second block of variables (clinical controls) was entered, only time elapsed since diagnosis of breast cancer ( $\beta = .51$ ,  $p < .001$ ) and time hospitalized during the past year ( $\beta = -.16$ ,  $p = .050$ ) predicted the Mental Health Component (SF-36). Finally, when the psychological variables (e.g., stress, depression, coping) were entered into the model in the third block, only perceived stress ( $\beta = -.40$ ,  $p < .001$ ) and depression ( $\beta = -.22$ ,  $p = .027$ ) predicted the Mental Health Component.

The final model explained 75% of variance ( $F = 36.27$ ,  $p < .001$ ) including the following variables: education ( $\beta = .27$ ,  $p < .001$ ), time elapsed since diagnosis of breast cancer ( $\beta = .34$ ,  $p < .001$ ), time hospitalized during the past year ( $\beta = -.16$ ,  $p = .050$ ), perceived stress ( $\beta = -.40$ ,  $p < .001$ ), and depression ( $\beta = -.22$ ,  $p = .027$ ).

## Discussion

The present study reports original and interesting findings related to Uruguayan women who have been surgically intervened for breast cancer. For example, women's HRQOL was more related to their psychological state, than to their clinical and demographic characteristics. Our results, based on hierarchical regression analyses, show that the demographic, clinical and contextual features make no contribution to the prediction of the physical health component of HRQOL outcome. Contextual features, as time elapsed since initiation of mental health treatment (duration of psychological support) predicted the outcome only before psychological features were considered. So, when the psychological variables were entered into the model, perceived stress, and depression predicted

the PHC beyond of demographic, clinical and contextual features for the current sample. Moreover, coping styles were not predictors of the PHC of perceived quality of life. Data reported here support results from prior studies presented in a previous literature review (Chopra & Kamal, 2012), and provide original evidence of the impact of psychological variables on Uruguayan women's HRQOL.

Regarding the mental health component of HRQOL, our results demonstrate that education level, time elapsed since diagnosis of breast cancer, and time of hospitalization during the past year, along with perceived stress and depression levels predicted the mental health component of quality of life. These results also corroborate previous findings (e.g., Deshields et al., 2006; Shapiro et al., 2001; So et al., 2010; Yen et al., 2006). However, a couple of clinical indicators that might be expected to matter e.g., type of surgery and adjuvant treatments – did not show association with HRQOL on our regression models. It is revealing, on the other hand, that among demographic variables, only education level played a role in prediction of HRQOL outcomes. Again, coping styles were not shown as predictors of the mental health component of perceived quality of life. This was an unexpected result, as problem-focused and emotional coping styles were both correlated with HRQOL in previous studies (see review by Reich & Remor, 2011). Previous literature on coping styles and breast cancer (Chopra & Kamal, 2012), consistently criticized the use of cross-sectional designs (e.g., Berger, 1986; Rajulton, 2001) to evaluate the effectiveness of specific coping strategies under the assumption that coping is a dynamic process. Bearing in mind that the effectiveness of specific coping strategies is thought to be dependent on various personal and situational variables, prospective process-oriented approaches over time are recommended in order to be able to identify coping efforts and perceived health outcomes (Fontes de Gracia, García-Gallego, Garriga-Trillo, Pérez-Llantada, & Sarría, 2001). So, considering that our study was cross-sectional, the lack of prediction related to coping may be related to our study design limitation.

However, the above mentioned psychological variables, as well as the time elapsed since breast cancer diagnosis, time of hospitalization - the only clinical aspects yielded as predictors -, and educational attainment are relevant for these women's well-being and adjustment.

Similarly, the predictive role of the time elapsed since diagnosis on HRQOL outcomes reported on here suggests that the impact of breast cancer and its treatments on HRQOL occurs especially during or shortly after diagnosis, improving as time goes by. Time elapsed since breast cancer diagnosis, less frequent recent hospitalizations, and formal education completed, were significantly associated with enhanced levels of HRQOL and mental health, suggesting that early psychological support might be suitable and most needed, and that lower educational attainment and recent hospitalizations have emerged as risk factors and should be, therefore, addressed. Beneficial effects of the passage of time with regard to breast cancer and its treatment's impact on well-being were suggested by scores observed on mental-related QOL, levels of depression and perceived stress symptoms. Similar results have been reported by previous studies (e.g., Bulotienė, Ostapenko, & Vesėliūnas, 2006; Culver et al., 2002; King, Kenny, Shiell, Hall, & Boyages, 2000; Osowiecki & Compas, 1999; Roussi, Krikeli, Hatzidimitriou, & Koutri, 2007; Yen et al., 2006).

On the other hand, some limitations on this study should be noted, in order to better understand the results shown. The sample studied here was a non-representative piece of volunteer women with breast cancer. Study participants may be biased toward women with the time and interest to complete our measures, who felt relatively well, and were more educated than those who were not reached by our assessment. Thus, the sample is comprised by exclusively Caucasian and relatively well educated women, resulting in a null minority representation, and results

may not therefore be generalized to women with different features. In addition, convenience sampling drawn from women related to breast cancer support and advocacy groups may lead to systematic overestimation or underestimation of the long-term impact of breast cancer and its treatments on HRQOL and well-being, given the fact that these women's participation may be related to their survivorship experience. These limitations should be kept in mind in interpreting the present findings.

Furthermore, these results also have methodological limitations. As the data reported here are cross-sectional, there is no way to determine causal relationships among variables, or even draw any inference regarding directionality of influence. Thus, we were able to determine a set of variables that covariate with HRQOL at the time of data collection, but it was not possible to determine causal ordering.

Beyond these limitations, the results presented here are relevant and came from the first study to examine the relationships between demographic, psychological variables, and their possible association with HRQOL in Uruguayan women who have been surgically intervened for breast cancer.

In conclusion, our results supported the idea that HRQOL of the women with breast cancer improves as time since diagnosis, surgery and adjuvant treatments go by. Psychological variables were yielded as important predictors of HRQOL outcomes. This influence should receive further attention. Although the literature indicates there is discrepancy in the relationships between the studied variables, it seems clear that psychological well-being and the way a woman copes with the disease and its treatments can affect adjustment and HRQOL in breast cancer survivors.

In summary, this study indicates that women with breast cancer that are experiencing stress and depression – related or not to their illness condition – may be affected by quality of life impairment, beyond and independent of receiving a proper medical treatment.

We claim these variables need to be taken into account when studying or developing strategies to improve HRQOL, as they are susceptible to be addressed by emotional-regulation management training. Early detection and empowerment through individual or group-based tailored psychoeducational programs that specifically target this population's mental health and psychosocial need to be promoted.

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### **Competing Interests**

The authors have declared that no competing interests exist.

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