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Risk Reduction Opportunities in Breast Cancer Survivors: Capitalizing on Teachable Moments

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Abstract

Purpose—With advancements in detection and treatment, the number of breast cancer survivors is growing. To reduce mortality among survivors, tailored health promotion programs are needed to combat comorbidities. However, the demand for such program exceeds that which are available for a vastly diverse population of survivors. The goal of the present study was to describe the prevalence of comorbidities in a group of breast cancer survivors and to examine associations between biological proximal factors of and the more distal individual level factor on the number and types of comorbidities.

Methods—In addition to medical chart reviews, breast cancer survivors (N=369) from hospitals in two urban locations completed self-report measures. Bivariate analyses examined the relationship between distal and proximal predictors and the outcomes: number of comorbidities and comorbidity types.

Results—Both proximal and distal factors were associated with comorbidities. African American, women with lower education attainment, and older women were more likely to be obese and have more comorbidities than their counterparts. In particular, they were more at risk for cardiovascular disease. Those who initiated hormonal therapy, chemotherapy, and radiation therapy were more likely to have comorbidities. Several psychosocial variables were related to proximal psychosocial factors.

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Informed Consent

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 (5). Informed consent was obtained from all patients for being included in the study.

Conflicts of Interest

The authors have no conflicts of interest to declare.

Conclusions—The present findings highlight the need for targeted health promotion treatments for breast cancer survivors, particularly for African-Americans, those with lower education attainment, those who are obese, and those who may be older. Given the relationships between specific comorbidities and proximal psychosocial factors, future interventions may benefit from tailored approaches.

Implications for Cancer Survivors—Tailored interventions for survivors may be more effective when accounting for factors associated with health promotion engagement.

Keywords

Health Promotion; Breast Cancer Survivors; Comorbidities; Race; Treatment

Introduction

Given the benefits of early detection of breast cancer through mammography screening and advances in systemic and targeted therapies, 90% of invasive breast cancer patients can expect to survive this disease for five or more years [1]. Many survivors seek opportunities to improve their health and reduce their risk of developing other diseases or suffering a recurrence. Thus, in addition to appropriate surveillance, the breast cancer survivorship presents a unique opportunity to identify and develop risk reduction strategies (e.g. reducing obesity, increasing physical activity). Although being diagnosed with a cancer has been identified as a “teachable moment,” [2] health promotion efforts to meet the growing needs of diverse survivors lag behind efforts in asymptomatic populations.

Health promotion in cancer survivors is becoming an important component of cancer control continuum. Breast cancer survivors experience a myriad of comorbidities, some of which may be attributable to risk factors for breast cancer (e.g. overweight, obesity, or diabetes after menopause) [3], others that are exacerbated by [4] or are the result of breast cancer treatments [5]. Comorbidities may be associated with disparities in breast cancer outcomes for African American women and women from low socioeconomic backgrounds, compared with their White and higher socioeconomic status counterparts [6-8]. However, research on comorbid conditions, their role in cancer disparities, and interventions to reduce or manage such conditions among diverse breast cancer survivors is limited.

The health promotion framework proposed by Schmitz and colleagues [6] suggests that biological, social, and environmental factors are potentially related to disparities in cancer survival and outcomes. Distal factors (e.g., socio-demographic factors, etc.) may directly impact cancer survival and can lead to disparities in biological responses such as obesity and comorbidities, which constitute the most proximal factors impacting disparities in cancer outcomes. These factors may be important targets for health promotion since cancer survivors who are obese and those with comorbid conditions are at greater risks for poorer outcomes and higher mortality rates [6, 9-11].

For women with breast cancer, the presence of comorbidities may be associated with specific proximal psychosocial factors (e.g. provider trust, self-efficacy, mood, barriers to treatment, information sources, treatment making decision preferences) that could impact

future health promotion programs. For example, provider trust is positively related to perceived level of care in survivorship [12]. Increased self-efficacy [13] has been identified as a key factor related to health promotion among cancer survivors. Furthermore, consulting interpersonal and media information sources have been associated with healthy dietary choices among those with cancer [14]. Less is known whether specific comorbidities are associated with such proximal psychosocial factors. Learning such associations could help tailor future health promotion programs for women with particular comorbidities.

This report is part of the Narrowing Gaps in Breast Cancer Adjuvant Therapy [15] study. The goal of the present study was to describe the prevalence of comorbidities in a group of breast cancer survivors and to examine associations of proximal biological (e.g., obesity) and distal individual-level (e.g., sociodemographics) factors with the number and types of comorbidities. The findings from this study can inform targets for future cancer control interventions in breast cancer survivors.

Methods

Setting and Population

We recruited a convenience sample of women between July 2006 and April 2011 via hospital in-reach at three hospitals in Washington DC and one in Detroit, MI. Outreach efforts (e.g. fliers, posters) were also used to complement hospital recruitment. Details of recruitment and procedures have been reported elsewhere [15]. To be eligible for the study women had to self-identify either as African American or White, be over age 21, be able to speak English and provide informed consent. Additionally, they must have been diagnosed with invasive nonmetastatic breast cancer and be < 20 weeks past their definitive surgery. Patients with ductal and lobular carcinoma in-situ, distant metastasis, recurrent disease, and second primaries were excluded. Study procedures were approved by Institutional Review Boards at all institutions.

A total of 678 potentially eligible patients were screened for the study, of which 477 were eligible, and 395 (82.8%) consented to take part in the study. We excluded 26 women from subsequent analyses due to missing clinical data. The remaining 369 women comprised the final analytic data set.

Data Collection

The research team identified potentially eligible hospital patients through surgery logs, pathology reports, and electronic appointment systems. After confirming eligibility criteria, clinical research assistants obtained consent to conduct the interviews and review medical charts. Women responding to outreach recruitment self-referred to the study and went through the same process of eligibility check and consent. Interviews lasted about 50 minutes and were conducted centrally by telephone using a standardized computer-assisted telephone survey (CATI). A \$25 incentive was provided. Participants were interviewed on an average of 3 months after their definitive surgery and medical abstractions of treatment and clinical variables were conducted between 12-18 months after interviews.

Measures

Distal Individual Level Risk Factors—Sociodemographic factors included race, education, marital status, type of insurance, and employment status. In the present analyses, race and education were selected as distal predictors. Race was based on self-identification as Black/African American or White.

Proximal Biological Risk Factors—Weight was measured using body mass index calculated from data in the medical charts and categorized as normal weight ($\text{kg/m}^2 < 25$), overweight ($\text{kg/m}^2 > 25\text{--}29.9$) or as obese ($\text{kg/m}^2 > 30$). Age was measured at the time of data collection. Treatment type was divided into three variables: initiation of radiation, chemotherapy, and hormonal therapy (yes vs. no). Diagnosis stage was recorded by patients' providers in their medical charts. Stage at diagnosis ranged from 0 to 4.

Proximal Psychosocial Risk Factors—Anxiety and depression symptoms were evaluated with the Hospital Anxiety and Depression Scale (HADS) [16]. Higher scores represent higher anxiety or depressive symptoms. This 14-item measure has demonstrated good overall reliability and validity, ranging from .68 to .93 (mean .83) for HADS-A and from .67 to .90 (mean .82) for HADS-D [17]. The HADS was administered to a subsample of women in the study ($n=82$).

Self-efficacy was assessed with the Communication Attitudinal Self-Efficacy Scale (CASE) [18] to assess patients' confidence in understanding and participating in care (e.g. It is easy for me to actively participate in decisions about my treatment), maintaining a positive attitude (e.g. I won't let cancer get me down), and seeking and obtaining information (e.g. It is easy for me to ask nurses questions). This 19-item four-point scale has shown a high internal consistency and construct validity ($\alpha = .76$ in each subscale). Higher scores indicate higher self-efficacy.

A brief scale assessed barriers to receiving health care. Participants were asked to indicate "yes" or "no" to whether the following potential barriers had been a problem for them: finding a provider, provider office hours, distance to appointments, too many other medical appointments, childcare, caring for others, health insurance, and money. The sum of the endorsements represented a total barriers score.

Provider trust was assessed with a 7-item scale [19]. Patients were asked to rate their level of agreement to statements pertaining to provider trust (e.g. "My cancer doctors care as much as I do about my health."). Responses were placed on a 5-point Likert scale, ranging from "strongly disagree" to "strongly agree."

Sources of health information. Sources of health information were assessed with an item adapted from the Health Information National Trends Survey [20]. Participants were asked whether they had received information about their cancer treatment from a list of nine sources (yes vs. no) (e.g. family, doctor, Internet) and the number of information sources was summed for the score.

Decision-Making. Women's involvement in breast cancer treatment decisions was measured with two items. One item queried for participant's general preferred level of participation in treatment decision-making on a five point response scale ranging from not preferring any involvement to preferring great involvement [21]. The other item assessed participant's actual degree of involvement in their surgery decision on a five response scale ranging from the doctor making the decision, shared decision-making, and the patient making the decision [22].

Adherence determinants were assessed with an 8-item scale assessing patients' perceived severity (e.g. "the kind of cancer I have is a terrible disease") and susceptibility (e.g. "the chances I might develop cancer again are pretty high.") regarding breast cancer [23]. Patients rated their level of agreement on a 5-point Likert scale, with responses ranging from "strongly disagree" to "strongly agree."

Comorbidity Outcomes—Comorbidity was assessed using conditions listed in the medical record. An unweighted comorbid score was calculated by adding the comorbid conditions reported in the medical chart. The number of comorbid conditions was then categorized into three groups: No comorbidities, 1-2 comorbidities, and 3+ comorbidities. Comorbid conditions were also categorized by type: (1) Cardiovascular (hypertension, angina, arrhythmia, history of myocardial infarction, congestive heart failure, cerebrovascular accident, peripheral vascular disease, anemia), (2) Musculoskeletal (arthritis, osteoporosis, weight loss>10 pounds), (3) Neurological/Psychological (dementia, history of depression/anxiety), (4) Endocrine/Metabolic (diabetes, thyroid disease), (5) Pulmonary (chronic obstructive pulmonary disease), (6) Gastrointestinal (ulcer, hepatitis, colitis), and (7) Other Cancer.

Statistical Analysis

Descriptive statistics were used to characterize the sample. Bivariate analyses (χ^2 tests, ANOVA, t-test) examined the relationship among distal (race, education) and proximal predictor variables (weight category, age, treatment type). Bivariate analyses were also used to examine the association of distal and proximal predictors with the outcomes: number of comorbidities and comorbidity types.

Results

Descriptive Statistics (Table 1)

Participants were mostly African American, had a college degree, were not employed full-time, and had an average age of 55 years. The average BMI was 29.04 and 67% of the sample was overweight or obese. Most participants had undergone a lumpectomy (65%) and initiated radiation (58%). Most of the sample (73%) had at least one comorbidity. The three most common comorbidities were anemia, hypertension, and depression/anxiety.

Bivariate Associations Between Distal Individual Level and Proximal Biological Risk Factors

There were several significant bivariate relationships among the distal and proximal predictor variables in the study including race, education, BMI category, age, and treatment type. African American participants (33%) were less likely to have a college education than their White counterparts (70%) ($p<.001$). Almost half of African American participants (51%) were obese, compared to 22% of White participants ($p<.001$). Those with HS Diploma/GED or less education were more likely to be overweight or obese (85%) than those with some college/Associate's degree (73%) and those with a Bachelor's degree (56%) ($p<.001$). African American participants were more likely to have initiated chemotherapy (45%) and radiation therapy (65%) than White participants (30% and 48%, respectively) ($p=.003$; $p=.001$, respectively). Those with a HS Diploma/GED or less education were more likely to have initiated chemotherapy (56%) than those with some college/Associate's degree (39%) or a Bachelor's degree (30%) ($p<.001$). In the case of radiation initiation, those with a Bachelor's degree (50%) were less likely to have initiated radiation therapy than those with a HS Diploma/GED or less education (66%) or those with some college/Associate's degree (65%) ($p<.001$). Participants with BMI < 25 were less likely to have initiated radiation therapy (47%) than those with BMI > 25-29.9 (62%) or BMI > 30 (61%) ($p=.048$). Those who had initiated chemotherapy tended to be younger (Mean_{age}=50.58, SD=10.89) than those who had not (Mean_{age}=58.27, SD=11.60) ($p<.001$). On the contrary, those who initiated radiation tended to be older (Mean_{age}=56.47, SD=11.86) than those who had not (Mean_{age}=52.30, SD=11.58) ($p=.01$).

Bivariate Associations Between Distal Individual Level Risk Factors and Number (Table 2) and Type Of Comorbidities (Table 3)

Race—We examined whether race, a distal individual risk factor, was associated with the number of comorbidities (Table 2) and comorbidity types (Table 3). While there were no racial differences in the mean number of comorbidities categories, there were differences in the prevalence of specific types of comorbidities. African Americans had cardiovascular (49%) and pulmonary (10%) comorbidities at higher rates than Whites (34% and 2%, respectively). In particular, African Americans had hypertension (44% vs. 25%), peripheral vascular disease (21% vs. 3%), and COPD (10% vs. 2%), at higher rates than Whites ($p<.05$).

Education—Education, a distal individual risk factor, was associated with the number of comorbidities (Table 2) and comorbidity types (Table 3). Participants with a Bachelor's degree were more likely to report having no comorbidities than those with HS Diploma/GED or less education or some college/Associate's degree. In particular, those with Bachelor's degrees were less likely to have cardiovascular disease, such as hypertension (26%) than those with a HS Diploma/GED or less education (43%) or some college/Associate's degree (48%). Those with a Bachelor's degree were also less likely to have congestive heart failure (1%) than those with some college/Associate's degree (7%) ($p<.05$).

Bivariate Associations Between Proximal Biological Risk Factors and Number (Table 2) and Type Of Comorbidities (Table 3)

Weight Category—Overweight (BMI 25-29.9) and obese (BMI ≥ 30) participants were more likely to have comorbidities than those with BMI < 25. In particular, participants with BMI < 25 were less likely to have cardiovascular and endocrine/metabolic diseases such as hypertension (14%) and diabetes (7%) than those overweight (38% and 14%, respectively; $p<.05$) and obese (53% and 26%, respectively; $p<.05$) participants.

Age—Increasing age was associated with increasing number of comorbidities. Participants with cardiovascular, musculoskeletal, and endocrine/metabolic conditions tended to be older than those who did not have these conditions. In particular, individuals with hypertension, peripheral vascular disease, arthritis, osteoporosis, and diabetes tended to be older than those without these conditions ($p<.05$).

Treatment Type—Participants who had initiated chemotherapy were more likely to have comorbidities than those who had not initiated chemotherapy ($p=0.01$). Similarly, participants who had initiated either hormonal or radiation therapy were more likely to have any comorbidity compared to participants who had not initiated hormonal therapy or radiation therapy, respectively ($p<0.001$). In particular, those who had initiated chemotherapy were more likely to have cardiovascular and psychological/neurological conditions than those without chemotherapy ($p<0.05$). Participants who had initiated hormonal therapy were more likely to have cardiovascular ($p<0.01$), musculoskeletal ($p<0.01$), endocrine/metabolic ($p<0.05$), and gastrointestinal conditions ($p<0.05$). Those who had initiated radiation therapy were more likely to have cardiovascular, musculoskeletal, and endocrine/metabolic conditions ($p<.01$).

Bivariate Associations Between Proximal Psychosocial Risk Factors and Number (Table 2) and Type Of Comorbidities (Table 3)

Self-efficacy, barriers, hospital anxiety, hospital depression, provider trust, number of information sources, diagnosis stage, preferences in treatment decision involvement, preferences in surgery decision involvement, and adherence determinants were not associated with the number of comorbidities. However, there were several differences according to the specific comorbidity. Breast cancer survivors without musculoskeletal conditions reported higher self-efficacy than those with musculoskeletal conditions ($p<0.05$). Patients with psychological/neurological conditions reported greater barriers than those without such conditions ($p<0.05$). Those without endocrine disorders reported consulting more sources of information than those without endocrine disorders ($p<0.05$). Patients with cardiovascular conditions were more likely to have low involvement in treatment decision-making ($p<0.01$). Lastly, those with pulmonary conditions were more likely to have low involvement in surgery decision making ($p<0.05$) and reported greater adherence determinants ($p<0.01$).

Discussion

More women are surviving breast cancer today than ever before [1], making them not only a growing population, but an aging one [24]. However, high survival rates and comorbidity-free survival are not experienced equally by all [25]. In the present study, we identified several risk factors, which may be associated with increased mortality (i.e. comorbidities). Overall, almost one in four women had at least one comorbidity, which is very similar to recent reports among ethnically-diverse breast cancer survivors [26]. Specifically, African American women and those with lower education attainment tended to have more comorbidities and were more at risk for obesity, as well as cardiovascular disease (e.g. hypertension) than Whites and women with higher education, respectively [7, 8]. Cancer survivors who are overweight and experience comorbid conditions have been shown to be at greater risk of mortality and of having poorer cancer outcomes [6, 9-11]. Specifically, African American survivors are not only at an elevated risk for obesity, but for lower physical functioning which accompanies this condition [27]. Therefore, socio-demographic differences in comorbidities and obesity may lie at the heart of racial disparities [6]. Cancer treatment can produce or exacerbate comorbid conditions such as heart disease [4,5], thereby compounding survival disparities. In the present study, we found that women who initiated chemotherapy, radiation, and/or hormonal therapy were more likely to have higher number of comorbidities, as well as specific comorbidities such as cardiovascular disease.

Taken together, health promotion programs should not only target survivors from disadvantaged backgrounds, but also be mindful of the iatrogenic effects of breast cancer treatment. Such programs should encompass and account for the entirety of the cancer experience by providing behavioral and lifestyle interventions to reduce treatment symptoms and increase the likelihood of cancer-free survival [28]. Our results suggest the use of tailored health promotion approaches according to specific comorbidity type. In the present sample, patients without musculoskeletal conditions reported higher self-efficacy than those with musculoskeletal conditions. Patients with musculoskeletal conditions may benefit from health promotion efforts that incorporate means of targeting and enhancing self-efficacy. Because patients with psychological/neurological conditions reported greater barriers than those without such conditions, they may be harder to engage and maintain adherence. Though interventions attempt to naturally build in means of reducing barriers, it may be especially necessary to be mindful of such barriers among those with psychological/neurological conditions. Those without endocrine disorders reported consulting more sources of information than those without endocrine disorders. As such, those with endocrine disorders may benefit from having multiple sources of information (e.g. print materials, internet resources, health promotion navigators, peer-mentors) to bolster engagement in health promotion. We also found that patients with cardiovascular conditions were more likely to have low involvement in treatment decision-making. Lastly, those with pulmonary conditions were more likely to have low involvement in surgery decision making and reported greater adherence determinants. These associations are concerning given that those with pulmonary conditions may be especially at risk for low physical activity [29], but in the greatest need of health promotion efforts.

Due to the emphasis on “fighting cancer” many survivors at diagnosis are losing the battle with obesity and numerous chronic conditions. Addressing obesity may reduce several of the comorbidities in breast cancer patients, especially among African Americans or those with less education. For example, in an exercise intervention study of overweight and obese African American breast cancer survivors, those in the exercise condition improved their cardiovascular functioning, while survivors in the control arm experienced a decline [30]. Such findings give hope to future intervention studies and programs that have the potential to reach more women.

Limitations of the study include the cross-sectional nature of the data and the limited generalizability of the results to other forms of cancer or for men. Despite these limitations, the study has several strengths including an over sample of African American women, as well as the inclusion of clinical and self-reported data. Results from this study point towards tailored, health-promotion opportunities which address comorbidities while accounting for socio-demographic, factors, and thus utilize the cancer-diagnosis as a teachable moment [2].

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Table 1

Characteristics of the study population (N=369)

Variable	n (%)
Race	
African American	217 (59%)
White	152 (41%)
Education	
HS Diploma/GED	80 (22%)
Some College/AA	111 (30%)
Bachelors or more	178 (48%)
Marital status	
Married/Living with someone	187 (51%)
Single	182 (49%)
Employment	
Full-time	130 (38%)
Not full-time	215 (62%)
Age, mean (SD)	54.93 (11.90)
BMI (in kg/m ²), mean (SD)	29.04 (6.66)
BMI category	
25	114 (33%)
25-29.9	102 (29%)
30	133 (38%)
Chemotherapy Treatment	
No	227 (62%)
Yes	142 (38%)
Hormonal therapy Treatment	
No	159 (59%)
Yes	210 (41%)
Radiation Treatment	
No	155 (42%)
Yes	214 (58%)
Surgery type	
Lumpectomy	234 (65%)
Mastectomy	128 (35%)
Comorbidities	
None	135 (27%)
1-2 Comorbidities	130 (35%)
>2 Comorbidities	104 (28%)

Table 2

Association of the number of comorbidities with selected participant characteristics

	Number of Comorbidities			χ^2 or F (p)
	No comorbidities (n=135)	1-2 comorbidities (n=130)	3+ comorbidities (n=104)	
Race, n (%)				
African American (n=217)	70 (32%)	80 (37%)	67 (31%)	4.45 (.11)
White (n=152)	65 (43%)	50 (33%)	37 (24%)	
Education category, n (%)				
HS Diploma/ GED (n=80)	24 (30%)	30 (38%)	26 (33%)	12.53 (.01)
Some College/Associate's Degree (n=111)	37 (33%)	32 (29%)	42 (38%)	
Bachelor's Degree (n=178)	74 (42%)	68 (38%)	36 (20%)	
Age mean (SD)	51.42 (11.66) ^a	54.31 (12.37) ^b	60.33 (9.65) ^{a, b}	10.61 (<.001)
BMI category, n (%)				
25 (n=114)	56 (49%)	38 (33%)	20 (18%)	19.29 (.001)
25-29.9 (n=102)	30 (29%)	45 (44%)	27 (27%)	
30 (n=133)	42 (32%)	41 (31%)	50 (38%)	
Chemotherapy, n (%)				
No (n=227)	97 (43%)	69 (30%)	61 (27%)	10.36 (.01)
Yes (n=142)	38 (27%)	61 (43%)	43 (30%)	
Hormonal therapy, n (%)				
No (n=159)	85 (54%)	48 (30%)	26 (16%)	37.64 (<.001)
Yes (n=210)	50 (24%)	82 (39%)	78 (37%)	
Radiation therapy, n (%)				
No (n=155)	88 (57%)	45 (29%)	22 (14%)	51.25 (<.001)
Yes (n=214)	47 (22%)	85 (40%)	82 (38%)	
Self-Efficacy mean (SD)	72.22 (4.55)	73.19 (3.80) ^a	71.60 (5.44) ^a	3.26 (.04)
Barriers mean (SD)	12.79 (1.75)	12.59 (1.61)	12.63 (1.61)	.44 (.65)
Hospital anxiety mean (SD)	5.82 (3.50)	5.73 (3.83)	6.83 (4.21)	.63 (.54)
Hospital depression mean (SD)	4.76 (3.36)	4.31 (3.26)	5.48 (4.32)	.64 (.53)
Provider trust mean (SD)	22.25 (4.18)	28.26 (4.39)	28.30 (3.24)	<.01 (1.00)
Number of information sources mean (SD)	4.79 (2.10)	5/13 (1.97)	4.52 (2.12)	2.03 (.13)
Diagnosis stage mean (SD)	1.59 (.87)	1.71 (.70)	1.52 (.82)	1.72 (.18)
Involvement in decision, n, %				
Low involvement	27 (28%)	35 (36%)	36 (37%)	6.12 (.05)
High involvement	106 (39%)	95 (35%)	68 (25%)	
Involvement in surgery decision, n, %				
Low involvement	25 (30%)	33 (40%)	25 (30%)	1.65 (.44)
High involvement	84 (38%)	75 (34%)	64 (29%)	
Adherence determinants scale mean (SD)	7.83 (.92)	7.89 (.77)	7.82 (1.01)	1.71 (.18)

Note: Post-hoc tests examined differences between groups using Tukey's difference test. Different superscripts represent significantly different values between groups

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	Type of Comorbidity											
	Cardiovascular			Musculoskeletal			Psychological/Neurological			Endocrine/Metabolic		
	No	Yes		No	Yes		No	Yes		No	Yes	
Initiated radiation, n (%)	97 (46)	** 113 (54)		127 (61)	** 83 (39)		160 (76)	50 (24)		158 (75)	* 52 (25)	
No (n=155)	115 (74)	** 40 (26)		130 (84)	** 25 (16)		127 (82)	28 (18)		136 (88)	** 19 (12)	
Yes (n=214)	96 (45)	** 118 (55)		127 (59)	** 87 (41)		163 (76)	51 (24)		156 (73)	** 58 (27)	
Self-efficacy mean (SD)	72.46 (4.51)	72.27 (4.78)		88 (3.93)	* 71.30 (5.71)		72.50 (4.63)	71.96 (4.59)		72.41 (4.59)	72.26 (4.78)	
Barriers mean (SD)	12.74 (1.71)	12.59 (1.59)		12.70 (1.68)	12.62 (1.63)		* 12.56 (1.62)	* 13.11 (1.73)		12.73 (1.71)	12.47 (1.46)	
Hospital anxiety mean (SD)	5.98 (3.72)	6.23 (3.98)		5.93 (3.68)	6.43 (4.14)		5.84 (3.81)	7.21 (3.64)		5.89 (3.90)	6.62 (3.51)	
Hospital depression mean (SD)	4.46 (3.51)	5.43 (3.76)		4.78 (3.57)	4.91 (3.78)		4.71 (3.73)	5.36 (3.00)		4.80 (3.53)	4.86 (3.93)	
Provider trust mean (SD)	28.16 (4.24)	28.42 (3.69)		28.31 (4.17)	28.17 (3.62)		28.22 (4.06)	28.43 (3.83)		28.22 (4.19)	28.47 (3.22)	
Number of information sources mean (SD)	4.83 (1.99)	4.83 (2.20)		4.82 (2.14)	4.84 (1.93)		4.83 (2.07)	4.82 (2.09)		4.96 (2.11)	* 4.28 (1.83)	
Diagnosis stage mean (SD)	1.58 (.80)	1.67 (.80)		1.63 (.81)	1.59 (.78)		1.61 (.79)	1.65 (.82)		1.65 (.83)	1.49 (.66)	
Involvement in decision, n, %												
Low involvement (n=98)	44 (45)	** 54 (55)		62 (63)	36 (37)		79 (81)	19 (19)		76 (78)	22 (22)	
High involvement (n=269)	165 (61)	104 (39)		193 (72)	76 (28)		209 (78)	60 (22)		214 (80)	55 (20)	

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	Type of Comorbidity													
	Cardiovascular		Musculoskeletal		Psychological/Neurological		Endocrine/Metabolic		aPulmonary		Gastrointestinal		Other Cancer	
	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Involvement in surgery decision, n, %														
Low involvement (n=83)	46 (55)	37 (45)	56 (68)	27 (33)	63 (76)	20 (24)	65 (78)	18 (22)	45 (8)	* 8 (15)	43 (80)	11 (20)	47 (90)	5 (10)
High involvement (n=223)	130 (58)	93 (42)	152 (68)	71 (32)	174 (78)	49 (22)	174 (78)	49 (22)	140 (95)	7 (5)	127 (84)	24 (16)	129 (88)	18 (12)
Adherence determinants scale mean (SD)	7.85 (.92)	7.85 (.86)	7.82 (1.00)	7.92 (.60)	7.87 (.76)	7.77 (1.28)	7.88 (.80)	7.73 (1.20)	7.41 (1.97)	** 7.92 (.53)	8.00 (.00)	7.96 (.79)	7.96 (.20)	7.87 (.77)

*** $p<.01$

* $p<.05$