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Patient-Reported Causes of Distress Predict Disparities in Time to Evaluation and Time to Treatment After Breast Cancer Diagnosis

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Abstract

BACKGROUND: We examined whether the National Comprehensive Cancer Network distress thermometer (DT), a patient-reported outcome measure, could be used to identify levels and causes of distress associated with racial/ethnic disparities in time to care among patients with breast cancer.

METHODS: We identified women aged ≥18 years with stage O-IV breast cancer who were diagnosed in a single health system between January 2014 and July 2016. The baseline visit was defined as the first postdiagnosis, pretreatment clinical evaluation. Zero-inflated negative binomial

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CONFLICT OF INTEREST DISCLOSURES
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(ZINB) regression (modeling non-zero DT scores and DT scores = 0) and logistic regression (modeling DT score ≥ 4, threshold for social services referral) were used to examine associations between baseline score (0 = none to 10 = extreme) and types of stressors (emotional, familial, practical, physical, spiritual) after adjustment for race/ethnicity and other characteristics. Linear regression with log transformation was used to identify predictors of time to evaluation and time to treatment.

RESULTS: A total of 1029 women were included (median baseline DT score = 4). Emotional, physical, and practical stressors were associated with distress in both the ZINB and logistic models (all $P < .05$). Black patients (n = 258) were more likely to report no distress than Whites (n = 675; ZINB zero model odds ratio, 2.72; 95% CI, 1.68-4.40; $P < .001$) despite reporting a similar number of stressors ($P = .07$). Higher DT scores were associated with shorter time to evaluation and time to treatment while being Black and having physical or practical stressors were associated with delays in both (all $P < .05$).

CONCLUSIONS: Patient-reported stressors predicted delays in time to care, but patient-reported levels of distress did not, with Black patients having delayed time to care despite reporting low levels of distress. We describe anticipatory, culturally responsive strategies for using patient-reported outcomes to address observed disparities.

Keywords

breast cancer; distress; health disparities; modifiable risk factors; patient-reported outcomes; race/ethnicity

INTRODUCTION

The National Comprehensive Cancer Network (NCCN) distress thermometer (DT) and problem list is a widely used instrument through which patients with cancer can report overall distress and identify psychosocial and logistical sources of distress. In our health system, it is completed by patients with breast cancer at most appointments, with the exception of nurse-only visits for radiation or systemic therapy[1] DT scores ≥4 are used as a threshold for clinically significant distress in our system and others,[2,3] and this threshold is intended to trigger clinician-initiated referrals to cancer support services—including psycho-oncology and financial counseling—depending on patient-identified stressors. Accordingly, assessment of distress at a patient's initial postdiagnosis appointment offers an opportunity to identify and address potentially modifiable barriers to timely, guideline-concordant care.

We recently demonstrated that many patients who were newly diagnosed with breast cancer had clinically significant distress levels at initial consultation after diagnosis, but that over time, distress levels eventually declined to low levels for a majority of women.[4] However, we noted significant racial/ethnic differences in levels of self-reported distress—measured on a scale of 0 (no distress) to 10 (severe distress)—at patients' first postdiagnosis oncology appointments. Given known disparities in time to care[5-8] and the racial and ethnic differences in self-reported distress we had also observed, we sought to identify patient-reported stressors associated with clinically significant distress in patients with newly diagnosed breast cancer and to determine whether these causes of distress were independently associated with racial/ethnic disparities in time to evaluation and time to treatment.[9]

MATERIALS AND METHODS

Patient and clinical data, including DT score at baseline visit, were collected from the electronic health records for all women aged ≥18 years with newly diagnosed clinical stage 0-IV breast cancer who were first seen in the Duke Health System between January 2014 and July 2016, a cohort that has been described previously.[4] The baseline visit was defined as the first cancer-center evaluation after pathological diagnosis and before any treatment including surgery, chemotherapy, endocrine therapy, targeted therapy, or radiation.

Patient characteristics including median levels of distress were summarized by racial/ethnic group with n (%) for categorical variables and median (interquartile range [IQR]) for continuous variables. Fisher's exact tests or chi-square tests were used to compare categorical variables, and a Wilcoxon rank-sum test was used to compare continuous variables as appropriate.

Using multivariate regression, we examined the association between individual patients' DT scores at baseline visit (dependent variable) and the causes of distress they selected from the DT problem list, which includes 39 individual stressors grouped into 5 different categories: emotional (6 items), familial (4 items), practical (6 items), physical (22 items), and spiritual (1 item). In addition to logistic regression modeling DT score ≥4 (the threshold for referrals in our health system), zero-inflated negative binomial regression (ZINB, modeling both likelihood of non-zero score and DT score = 0)[10] was also used to examine the relationship between DT score and individual stressors, because many patients (22%) had baseline scores of 0 and the data displayed overdispersion.

Both regression models were adjusted for age (continuous), American Joint Commission on Cancer seventh edition clinical stage (0-IV), insurance status (Medicaid, Medicare, private, unknown, and other [including TriCare, self-pay]), marital status (married/partnered, divorced, singled, widowed, unknown), and self-reported race combined with self-reported ethnicity, which together were parsed into 3 categories: 1) non-Hispanic Black, 2) non-Hispanic White, and 3) other (including Asian/Pacific Islander [PI], Hispanic, Native American, multiracial, and race not reported or unknown), given the small sample sizes for Asian/PI and Hispanic patients. We also performed sensitivity analyses in which race/ethnicity was disaggregated into 5 categories: 1) Asian/PI, 2) non-Hispanic Black, 3) Hispanic, 4) non-Hispanic White, and 5) other (including Native American, multiracial, and race not reported or unknown), to ensure that important distinctions between Asian/PI and Hispanic patients were not elided. Interactions between race/ethnicity and having a stressor in any of the 5 domains were tested and are reported if significant.

Linear regression was used to identify covariates including DT score and race/ethnicity that could be predictive of time to evaluation and time to treatment after adjusting for age, clinical stage, insurance, marital status, and race/ethnicity, plus treatment sequence (neoadjuvant [preoperative chemotherapy, endocrine therapy, and/or targeted therapy] vs surgery first) for the time to treatment linear regression model only. Log transformations were used on both time to evaluation and time to treatment to ensure that the assumption of linearity was fulfilled. Time-to-evaluation was defined as time from date of pathologic diagnosis to first appointment with a medical, radiation, or surgical oncologist. Time-to-treatment was defined as time from date of pathologic diagnosis to first oncologic treatment. As with the logistic and ZINB regression models, we conducted our primary analyses with race/ethnicity parsed into 3 categories (Black, White, other) and conducted sensitivity analyses in which race/ethnicity was disaggregated into 5 categories (Asian/PI, Black, Hispanic, White, other). Interactions between race/ethnicity and DT score and between race/ethnicity and having a stressor in any of the 5 domains were tested, and significant interactions are reported.

We report incidence rate ratios and odds ratios (ORs) for the ZINB models, ORs for the logistic model, and exponentiated estimates (EEs) for the log-linear models with 95% CIs. A significance level of $P < .05$ was used for all analyses, which were performed in SAS version 9.4 (SAS Institute, Cary, North Carolina). Our study was approved by the institutional review board at Duke University (protocol Pro00083052).

RESULTS

Patient and Treatment Characteristics

A total of 1029 women were included (Fig. 1, Table 1).[4] The median age at diagnosis was 58 years and ranged from 43 to 60 years, with the youngest group being Hispanic women (n = 23) and the oldest group being non-Hispanic Black women (n = 258). A majority of patients were non-Hispanic White (65.6%, n = 675), married/partnered (59.2%, n = 609), and had early-stage (0-I) disease (59.8%, n = 615). Among non-Hispanic Black patients, the most common form of insurance was Medicare (51.9%, n = 134); private insurance was more common for other groups except Hispanic patients, who had the lowest rates of any private and/or federal insurance (all $P < .001$).

Black patients had the highest proportion of women receiving neoadjuvant treatment (27.9% vs ~11% among the rest of the cohort; $P < .001$). Lumpectomy was the most common surgical procedure across all groups except among Hispanic women, nearly half of whom (47.8%) underwent mastectomy without reconstruction ($P = .005$).

Patient-Reported Levels and Causes of Distress

The median DT score for the entire cohort was 4 (IQR, 1-7) (Fig. 2, Table 1), the threshold for clinician-initiated referral to support services in our health system. Black patients had the lowest median DT score (3 [IQR, 0-6]) and were the only racial/ethnic group to have a median DT score below the referral-triggering threshold of 4, whereas Asian/PI patients (n = 28; DT score = 5; IQR, 0-7) and Hispanic patients (n = 23; DT score = 5; IQR, 1-9) had the highest median DT scores ($P = .01$). In addition to these differences in overall distress, there were also significant differences between racial/ethnic groups with regard to having a physical or spiritual stressor (Fig. 2, Table 1). Despite these variations, however, there was no significant difference in the number of individual stressors reported by Asian/PI, Black, White, and Hispanic patients ($P = .07$).

When patients were considered in aggregate, the 3 most commonly reported stressors were in the emotional domain: worry (n = 511 [49.7%]), nervousness (n = 489 [47.5%]), and fears (n = 381 [37%]), a pattern that persisted within every racial/ethnic group except for Asian/PI, for whom the primary stressor was treatment decisions within the practical domain (Fig. 3).

After adjustment, the presence of 1 or more emotional, physical, or practical stressors was significantly associated with distress in both the ZINB and logistic models (all $P < .05$) (Supporting Table 1). Black patients were significantly more likely to report no distress than Whites (ZINB zero model OR, 2.72; 95% CI, 1.68-4.40; $P < .001$) and less likely to report clinically significant distress (ie, a DT score ≥4 [logistic OR, 0.59; 95% CI, 0.41-0.83; $P = .003$]). Of all the covariates included in the logistic regression model, having any emotional stressors (OR, 4.50; 95% CI, 3.30-6.15; $P < .001$) was associated with the highest odds of reporting clinically significant distress (Supporting Table 1). We examined both the logistic and ZINB models with the 5 more granular racial groups, and the behavior of the coefficients in the models was essentially the same.

Time to Evaluation and Time to Treatment

Time-to-evaluation differed significantly across racial/ethnic groups, with Hispanic patients having the longest median length of time between diagnosis and first cancer-center evaluation (Asian/PI, 15 days; Black, 21 days; Hispanic, 23 days; White, 17 days [$P < .001$]) (Table 1). As with time to evaluation, Hispanic patients had the longest median length of time between diagnosis and treatment initiation (Asian/PI, 51 days; Black, 47 days; Hispanic, 71 days; White, 45 days [$P < .001$]) (Table 1), a pattern that persisted even among patients undergoing surgery first. Notably, there was no difference in time to evaluation and time to treatment between Hispanic patients who reported English versus Spanish as their primary language.

After adjusting for other covariates, higher DT score was associated with shorter time to evaluation (EE, 0.97; 95% CI, 0.96-0.99; $P < .001$) (Supporting Table 2). Being non-White (Black: EE, 1.16; 95% CI, 1.06-1.28; $P = .002$; other: EE, 1.30; 95% CI, 1.13-1.49; $P < .001$) or divorced (EE, 1.14; 95% CI, 1.00-1.29; $P = .045$) was associated with longer time to evaluation, as was having any physical (EE, 1.12; 95% CI, 1.03-1.22; $P = .01$) or practical stressors (EE, 1.21; 95% CI, 1.11-1.33; $P < .001$).

When we split the racial/ethnic groups into more granular categories (Asian/PI, Black, Hispanic, White, and other [Table 2]), being Black (EE, 1.22; 95% CI, 1.09-1.37; $P < .001$) was associated with longer time to evaluation, as was having any physical stressors (EE, 1.11; 95% CI, 1.02-1.21; $P = .02$) or practical stressors (EE, 1.26, 95% CI, 1.13-1.40; $P < .001$). There was also a significant interaction between race/ethnicity and having any practical stressors ($P = .03$): for Hispanic patients, having a practical stressor significantly delayed time to evaluation compared with White patients who had a practical stressor (EE, 1.74; 95% CI, 1.02-2.96; $P = .04$).

Higher DT score was associated with shorter time to treatment after adjustment for other covariates (EE, 0.98; 95% 0.97-1; $P = .02$) (Supporting Table 2). Receiving neoadjuvant treatment rather than surgery first was also associated with shorter time to treatment (EE, 0.49; 95% CI, 0.44-0.54; $P < .001$), but there was no significant difference among those receiving different types of surgery, including those undergoing reconstruction. Being non-White (Black: EE, 1.12; 95% Cl, 1.03-1.22; $P = .008$; other: EE, 1.24; 95% CI, 1.09-1.40; $P < .001$) and having higher stage disease (vs stage I; all $P < .001$) were associated with longer time to first treatment. As with time to evaluation, having physical stressors (EE, 1.08; 95% CI, 1.00-1.16, $P = .005$) or practical stressors (EE, 1.20; 95% CI, 1.10-1.30; $P < .001$) was associated with longer time to treatment.

When we used more granular racial/ethnic categories (Table 2), being Black (EE, 1.19; 95% CI, 1.07-1.32; $P = .001$), having a higher stage of disease (vs stage I; all $P < .001$), and having a practical stressor (EE, 1.23; 95% CI, 1.12-1.35; $P < .001$) continued to be associated with longer time to treatment, but having a physical stressor was not. As with time to evaluation, a significant interaction between race/ethnicity and having any practical stressors was observed: Hispanic patients who had a practical stressor had longer time to treatment compared with White patients who had a practical stressor (EE, 2.14; 95% CI, 1.34-3.41; $P = .002$).

DISCUSSION

In our analysis of distress after breast cancer diagnosis, having physical or practical stressors predicted delays in time to evaluation and time to treatment, particularly for Hispanic patients, who represent only a small proportion of our cohort but had the longest delays to evaluation (23 days) and treatment (71 days) of any group and some of the highest median self-reported distress levels. Being Black (vs White) was associated with longer time to both evaluation and treatment, despite the fact that Black patients had the lowest self-reported levels of distress and reported a similar number of stressors compared with other groups of patients. Indeed, we found that higher distress scores were unexpectedly associated with shorter time to evaluation and time to treatment.

Thus, the NCCN DT can potentially be used to identify factors that contribute to disparities in time to care among breast cancer patients, but not by using a rigid threshold, as is currently done at many institutions (including our own). Our findings suggest that the types of stressors contributing to patient-reported distress predict which patients are at risk for disparate care, but that the summative self-assessed levels of distress reported by patients do not. Indeed, using summative distress scores rather than individual stressors to initiate interventions may prevent potentially vulnerable patients from being connected with services that could facilitate more timely care.

Accordingly, we must collectively reconsider how the NCCN DT is currently used to address patient-reported concerns, and this re-examination must go beyond simply shifting the threshold for clinical significance as has been suggested by some.[11,12] At many institutions, including ours, pathological diagnosis of breast cancer is typically communicated over the phone by the radiologist or surgeon who performed the diagnostic biopsy. However, patients may benefit from a more extensive conversation that includes needs assessment and psychosocial evaluation at the same time these diagnoses are being communicated to address potentially modifiable barriers to care initiation at the point of diagnosis.

Telehealth via a patient's or family member's computer, smartphone, or other device with internet connectivity could serve as an excellent modality through which a patient with a new diagnosis of cancer could not only have a face-to-face conversation with a clinician to communicate pathology results but also complete psychosocial screening via the NCCN DT. In response to that screening, referrals to support services could be made immediately on the patients behalf, thereby preempting potential barriers to timely care initiation. Additional in-person follow-up could subsequently take place in coordination with the patient's initial oncologic consultations. There are, however, significant age-, ethnicity-, and race-related disparities regarding mobile device ownership and internet connectivity.[13,14] Accordingly, we must collectively prioritize the thoughtful dissemination of both telehealth and the technological resources required to facilitate its equitable implementation and avoid the risk of exacerbating extant disparities in patient access. The COVID-19 pandemic has unexpectedly fast-tracked our collective use of telehealth, and we hope that a silver lining of this otherwise challenging time is that the accelerated evolution and deployment of telehealth may potentially improve access to care for some of our more vulnerable patients.[15]

Using patient-reported DT scores to trigger support service referrals may be especially misleading for patients who have several stressors before breast cancer diagnosis. Black and Hispanic women had longer time to evaluation and time to treatment compared with White women, and there is evidence that women of color may have more logistical, social, and psychological barriers to breast cancer care initiation than their White peers.[16-18] Black patients had the highest rate of neoadjuvant systemic therapy (27.9%) of any racial/ethnic group in our cohort (Table 1), reflecting the higher rates of triple-negative, HER2+, and locally advanced breast cancer historically observed in this group compared with White patients.[19] However, despite the fact that neoadjuvant treatment was independently associated with shorter time to treatment and that Black patients received it more frequently than any other group, Black patients still experienced delays in treatment overall, demonstrating how entrenched barriers to care initiation can be.

The relatively low DT scores reported by Black women in our study do not necessarily represent a failure of self-perception, though we do acknowledge that denial may be a contributor to these lower scores and even to the higher rates of late-stage presentation observed among Black women. Rather, this tendency to report lower levels of distress compared with their peers of different races may actually reflect greater levels of resilience, or the ability to rebound from adversity.[20]

At-risk populations, including people of color who are stigmatized because of their race/ethnicity, often develop a combination of internalized and culturally specific mechanisms that help them to persevere in the face of adversity and bias. Among Black women, resilience has been identified as a protective factor with regard to cardiovascular disease, HIV/AIDS, and pregnancy outcomes.[20-24] The resilience of already stressed patients who receive the additional burden of a breast cancer diagnosis is not to be minimized. However, it is imperative that we avoid penalizing patients who have been forced to embrace this coping strategy. Institutions must prioritize recruitment of diverse support staff as well iterative clinician training in culturally responsive needs assessment to better address the modifiable challenges of potentially vulnerable patients.

Our study limitations include those inherent to retrospective reviews. Because this analysis was performed using data from a clinical electronic health record, several patients were excluded due to missing data. In addition, records for 31 of the 96 patients in the race/ethnicity category “other” did not contain any meaningful racial/ethnic data. Furthermore, the sample sizes for our Hispanic and Asian/PI patients were small, thus we urge caution in extrapolating results for these groups. Nevertheless, we felt it was important to report the findings derived from the analyses with the more granular racial/ethnic categories to ensure that potentially significant differences between Asian/PI and Hispanic patients were not obscured by funneling them into a single heterogeneous pool. We recognize that some of our comparisons are based on small sample sizes with multiple comparisons, and we consider this portion of our work to be hypothesis-generating. However, we also recognize that this work presents an opportunity to shift supportive care from an individual- to a population-level approach that has the potential to maximize the efficacy of an important element of clinical care. Finally, we describe our experience at a university-based health system and acknowledge that our conclusions might not be generalizable to clinical oncology practices different from our own.

In conclusion, our analysis of a contemporary cohort of women with breast cancer revealed that patient-reported causes of distress predicted delays in time to evaluation and time to treatment, but patient-reported levels of distress did not, with Black patients reporting lower levels of distress than White patients, despite having longer time to evaluation and time to treatment. We recommend that assessments of distress be performed at the time cancer diagnoses are communicated. This early psychosocial evaluation—in combination with a more nu-anced application of the NCCN DT—could potentially address delays in time to care and mitigate disparities for vulnerable patients through targeted and culturally responsive interventions.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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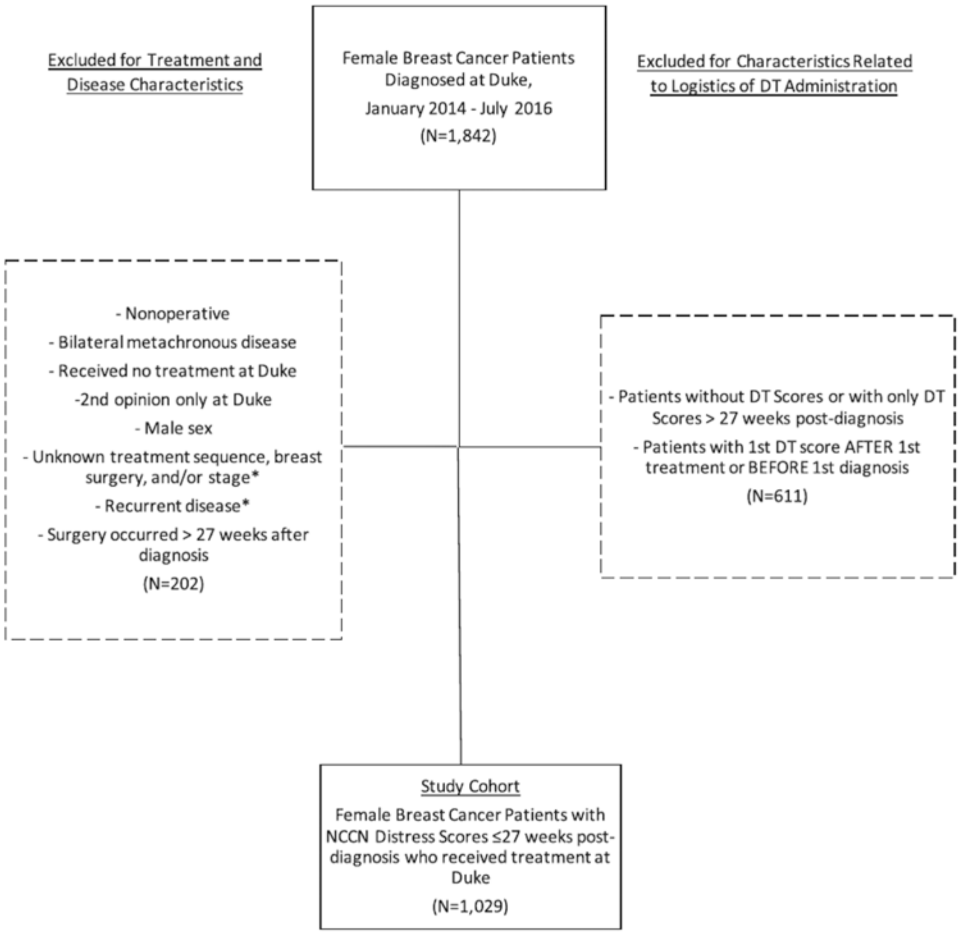


Figure 1.

Flow diagram of patients newly diagnosed with breast cancer between January 2014 and July 2016. DT, distress thermometer; NCCN, National Comprehensive Cancer Network.

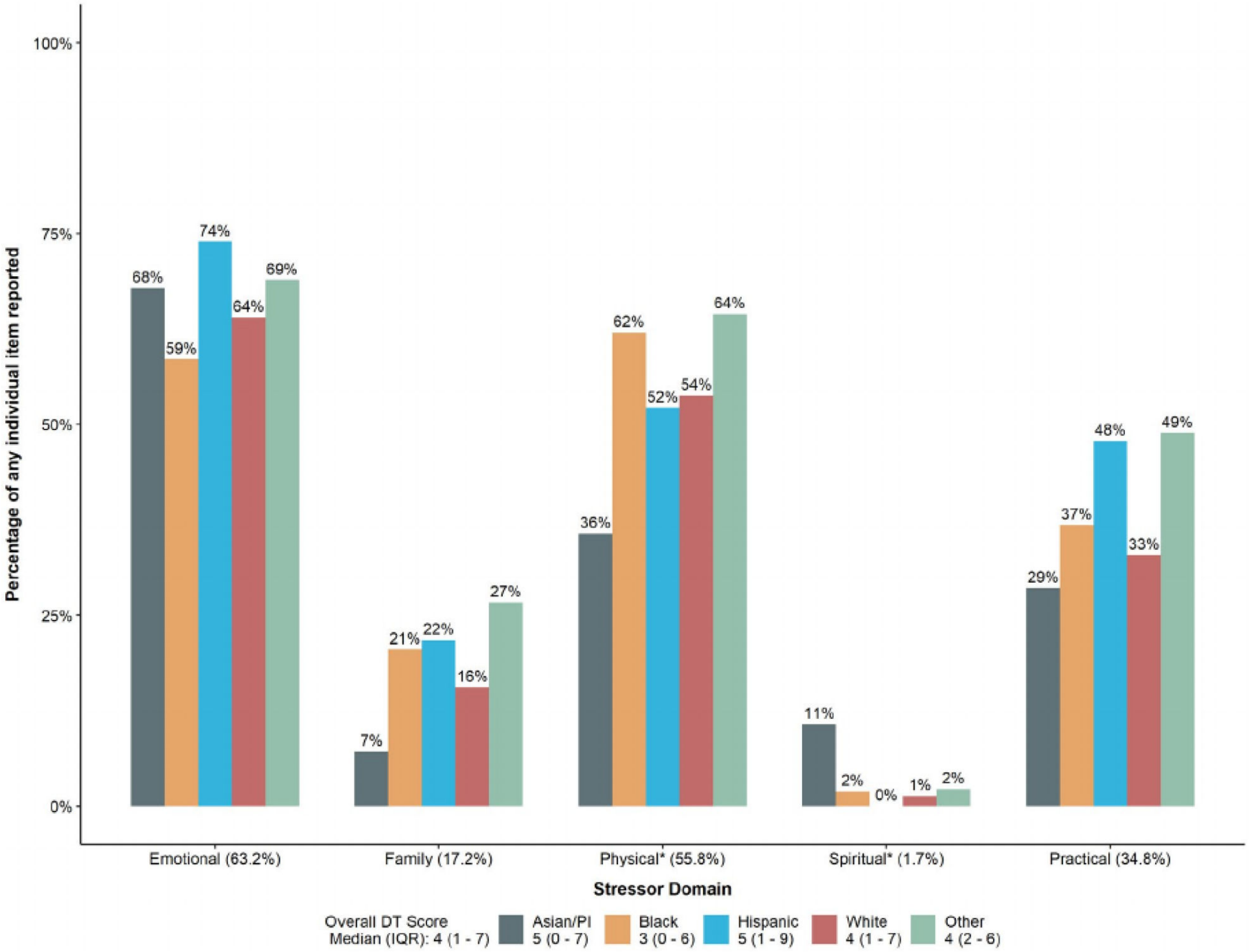
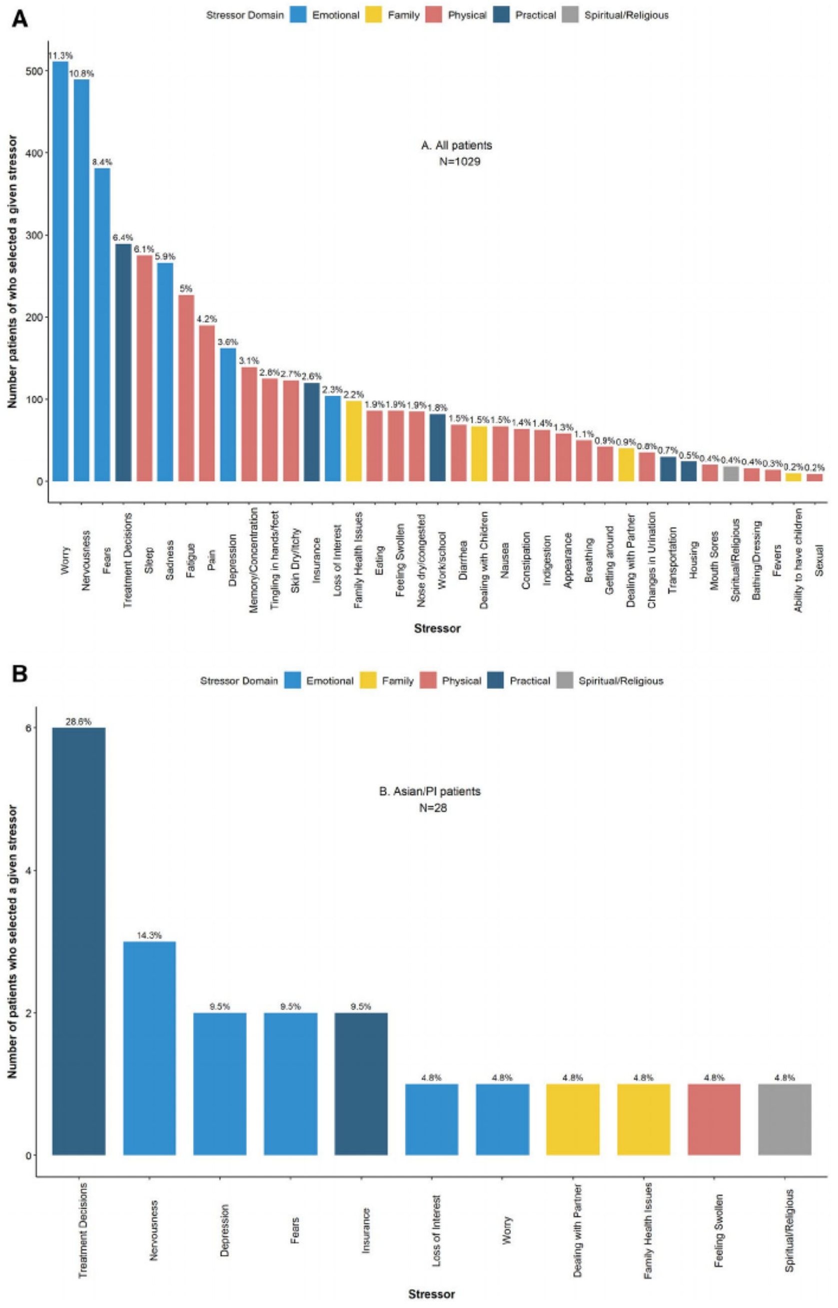
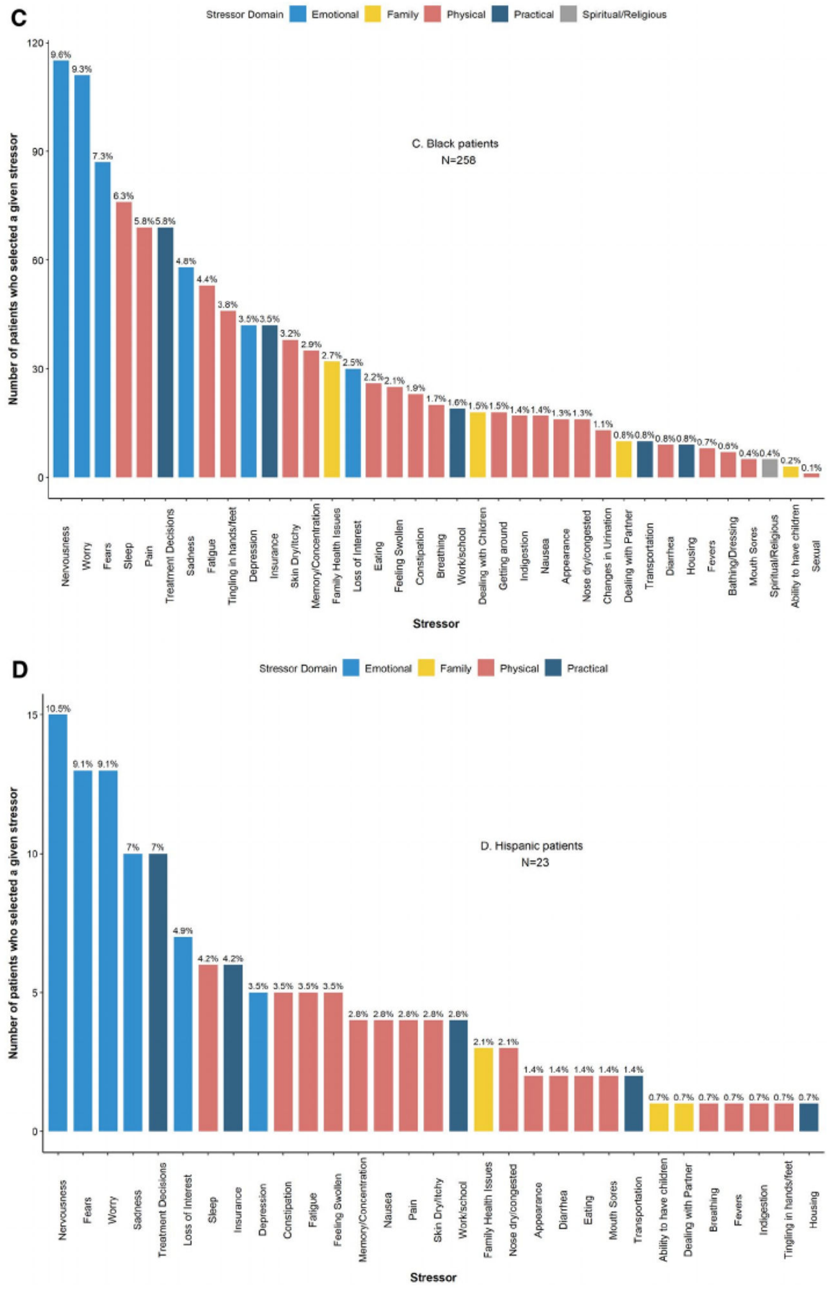


Figure 2.

Levels and causes of patient-reported distress among patients newly diagnosed with breast cancer between January 2014 and July 2016 (n = 1029). DT, distress thermometer; IQR, interquartile range; PI, Pacific Islander. *Statistically significant difference between racial/ ethnic groups.


A
Stressor Domain
Emotional
Family
Physical
Practical
Spiritual/Religious
A. All patients
N=1029
Number patients of who selected a given stressor
0
100
200
300
400
500
11.3%
10.8%
8.4%
6.4%
6.1%
5.9%
5%
4.2%
3.6%
3.1%
2.8%
2.7%
2.6%
2.3%
2.2%
1.9%
1.9%
1.9%
1.8%
1.5%
1.5%
1.5%
1.4%
1.4%
1.3%
1.1%
0.9%
0.9%
0.8%
0.7%
0.5%
0.4%
0.4%
0.4%
0.3%
0.2%
0.2%
Worry
Nervousness
Fears
Treatment Decisions
Sleep
Sadness
Fatigue
Pain
Depression
Memory/Concentration
Tingling in hands/feet
Skin Dry/Itchy
Insurance
Loss of Interest
Family Health Issues
Eating
Feeling Swollen
Nose dry/congested
Work/school
Diarrhea
Dealing with Children
Nausea
Constipation
Indigestion
Appearance
Breathing
Getting around
Dealing with Partner
Changes in Urination
Transportation
Housing
Mouth Sores
Spiritual/Religious
Bathing/Dressing
Fevers
Ability to have children
Sexual
Stressor
B
Stressor Domain
Emotional
Family
Physical
Practical
Spiritual/Religious
B. Asian/PI patients
N=28
Number of patients who selected a given stressor
0
2
4
6
28.6%
14.3%
9.5%
9.5%
9.5%
4.8%
4.8%
4.8%
4.8%
4.8%
4.8%
Treatment Decisions
Nervousness
Depression
Fears
Insurance
Loss of Interest
Worry
Dealing with Partner
Family Health Issues
Feeling Swollen
Spiritual/Religious
Stressor


C
Stressor Domain
Emotional
Family
Physical
Practical
Spiritual/Religious
C. Black patients
N=258
Number of patients who selected a given stressor
0
30
60
90
120
9.6%
9.3%
7.3%
6.3%
5.8%
5.8%
4.8%
4.4%
3.8%
3.5%
3.5%
3.2%
2.9%
2.7%
2.5%
2.2%
2.1%
1.9%
1.7%
1.6%
1.5%
1.5%
1.4%
1.4%
1.3%
1.3%
1.1%
0.8%
0.8%
0.8%
0.8%
0.7%
0.6%
0.4%
0.4%
0.2%
0.1%
Nervousness
Worry
Fears
Sleep
Pain
Treatment Decisions
Sadness
Fatigue
Tingling in hands/feet
Depression
Insurance
Skin Dry/Itchy
Memory/Concentration
Family Health Issues
Loss of Interest
Eating
Feeling Swollen
Constipation
Breathing
Work/school
Dealing with Children
Getting around
Indigestion
Nausea
Appearance
Nose dry/congested
Changes in Urination
Dealing with Partner
Transportation
Diarrhea
Housing
Fevers
Bathing/Dressing
Mouth Sores
Spiritual/Religious
Ability to have children
Sexual
Stressor
D
Stressor Domain
Emotional
Family
Physical
Practical
D. Hispanic patients
N=23
Number of patients who selected a given stressor
0
5
10
15
10.5%
9.1%
9.1%
7%
7%
4.9%
4.2%
4.2%
3.5%
3.5%
3.5%
3.5%
2.8%
2.8%
2.8%
2.8%
2.8%
2.1%
2.1%
1.4%
1.4%
1.4%
1.4%
1.4%
0.7%
0.7%
0.7%
0.7%
0.7%
0.7%
0.7%
Nervousness
Fears
Worry
Sadness
Treatment Decisions
Loss of Interest
Sleep
Insurance
Depression
Constipation
Fatigue
Feeling Swollen
Memory/Concentration
Nausea
Pain
Skin Dry/Itchy
Work/school
Family Health Issues
Nose dry/congested
Appearance
Diarrhea
Eating
Mouth Sores
Transportation
Ability to have children
Dealing with Partner
Breathing
Fevers
Indigestion
Tingling in hands/feet
Housing
Stressor

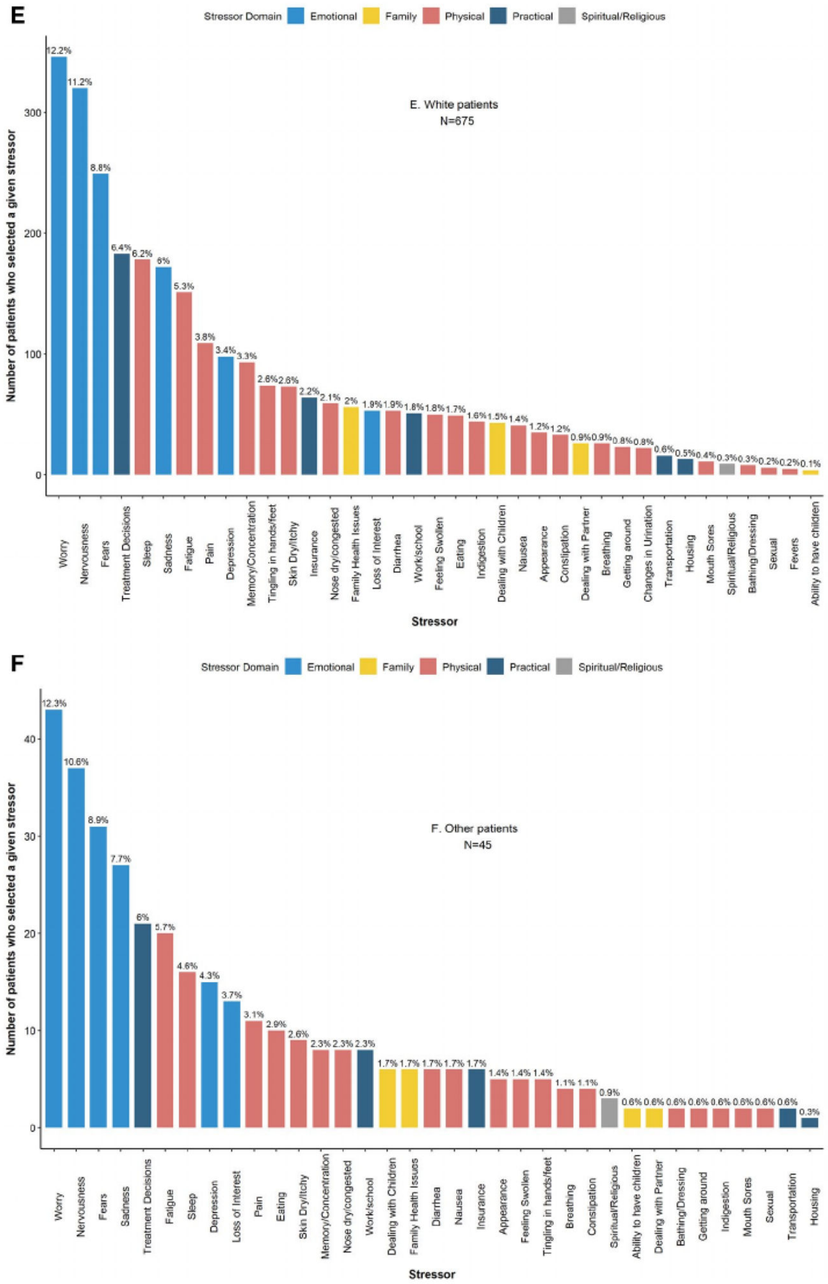


Figure 3.

Frequency of patient-reported stressors among patients newly diagnosed with breast cancer between January 2014 and July 2016 (n = 1029). (A) All patients. (B) Asian/PI patients. (C) Black patients. (D) Hispanic patients. (E) White patients. (F) Patients of other races/ethnicities. PI, Pacific Islander.

TABLE 1.

Demographic and Clinical Characteristics, Newly Diagnosed Breast Cancer Patients With Baseline Visit Between January 2014 and July 2016 (n = 1029)

	Total (N = 1029)	Asian/PI (n = 28)	Non-Hispanic Black (n = 258)	Hispanic (n = 23)	Non-Hispanic White (n = 675)	Other (n = 45)	*P*
Age, y, median (IQR)	58 (48-67)	51 (45-60)	60 (50-67)	43 (34-48)	59 (48-67)	52 (42-61)	<.001
Days to first evaluation, median (IQR)	19 (13-28)	15 (12.5-25)	21 (14-30)	23 (17-43)	17 (12-26)	21 (14-35)	<.001
Days to first treatment, median (IQR)	47 (35-70)	51 (33.5-115.5)	47 (36-72)	71 (47-180)	45 (34-64)	67(40-142)	<.001
DT score, median (IQR)	4 (1-7)	5 (0-7)	3 (0-6)	5 (1-9)	4 (1-7)	4 (2-6)	.01
DT score group							
0-3	481 (46.7)	11 (39.3)	143 (55.4)	10 (43.5)	299 (44.3)	18 (40)	.03
4-10	548 (53.3)	17 (60.7)	115 (44.6)	13 (56.5)	376 (55.7)	27 (60)	
Total no. of problem list items							
Median (IQR)	3 (1-7)	3.5 (0.5-6)	4 (1-7)	5 (1-9)	3 (1-6)	5 (2-8)	.07
≥1 emotional stressor	650 (63.2)	19 (67.9)	151 (58.5)	17 (73.9)	432 (64)	31 (68.9)	.33
≥1 family stressor	177 (17.2)	2 (7.1)	53 (20.5)	5 (21.7)	105 (15.6)	12 (26.7)	.08
≥1 physical stressor	574 (55.8)	10 (35.7)	160 (62)	12 (52.2)	363 (53.8)	29 (64.4)	.02
≥1 spiritual stressors	18 (1.7)	3 (10.7)	5 (1.9)	0 (0)	9 (1.3)	1 (2.2)	.006
≥1 practical stressor	358 (34.8)	8 (28.6)	95 (36.8)	11 (47.8)	222 (32.9)	22 (48.9)	.10
Treatment sequence							
Neoadjuvant	163 (15.8)	3 (10.7)	72 (27.9)	3 (13)	80 (11.9)	5 (11.1)	<.001
Surgery first	866 (84.2)	25 (89.3)	186 (72.1)	20 (87)	595 (88.1)	40 (88.9)	
Surgery type							
Lumpectomy	620 (60.3)	18 (64.3)	170 (65.9)	10 (43.5)	391 (57.9)	31 (68.9)	.005
Mastectomy without reconstruction	291 (28.3)	5 (17.9)	74 (28.7)	11 (47.8)	190 (28.1)	11 (24.4)	
Mastectomy with reconstruction	118 (11.5)	5 (17.9)	14 (5.4)	2 (8.7)	94 (13.9)	3 (6.7)	
Clinical disease stage							
0	151 (14.7)	4 (14.3)	39 (15.1)	3 (13)	97 (14.4)	8 (17.8)	.054
1	464 (45.1)	12 (42.9)	95 (36.8)	6 (26.1)	332 (49.2)	19 (42.2)	
2	323 (31.4)	10 (35.7)	91 (35.3)	10 (43.5)	197 (29.2)	15 (33.3)	
3	78 (7.6)	1 (3.6)	30 (11.6)	4 (17.4)	40 (5.9)	3 (6.7)	
4	13 (1.3)	1 (3.6)	3 (1.2)	0 (0)	9 (1.3)	0 (0)	
Insurance							

	Total (N = 1029)	Asian/PI (n = 28)	Non-Hispanic Black (n = 258)	Hispanic (n = 23)	Non-Hispanic White (n = 675)	Other (n = 45)	*P*
Private	475 (46.2)	19 (67.9)	90 (34.9)	8 (34.8)	329 (48.7)	29 (64.4)	<.001
Medicaid	13 (1.3)	1 (3.6)	5 (1.9)	2 (8.7)	4 (0.6)	1 (2.2)	
Medicare	449 (43.6)	5 (17.9)	134 (51.9)	2 (8.7)	299 (44.3)	9 (20)	
Other	26 (2.5)	1 (3.6)	8 (3.1)	6 (26.1)	9 (1.3)	2 (4.4)	
Unknown	66 (6.4)	2 (7.1)	21 (8.1)	5 (21.7)	34 (5)	4 (8.9)	
Marital status							
Married/Partnered	609 (59.2)	22 (78.6)	98 (38)	11 (47.8)	449 (66.5)	29 (64.4)	<.001
Divorced	124 (12.1)	1 (3.6)	50 (19.4)	4 (17.4)	66 (9.8)	3 (6.7)	
Single	164 (15.9)	2 (7.1)	67 (26)	7 (30.4)	81 (12)	7 (15.6)	
Unknown	49 (4.8)	0 (0)	12 (4.7)	1 (4.3)	30 (4.4)	6 (13.3)	
Widowed	83 (8.1)	3 (10.7)	31 (12)	0 (0)	49 (7.3)	0 (0)	

Abbreviations: DT, distress thermometer; IQR, interquartile range; PI, Pacific Islander; y, year.

Data are presented as n (%) unless indicated otherwise.

TABLE 2.

Days to First Evaluation and Days to First Treatment: Linear Regression Models With Log Transformation, 5-Level Race/Ethnicity Variable, and Race/Ethnicity*Any Practical Stressor Interaction Among Newly Diagnosed Breast Cancer Patients With Baseline Visit Between January 2014 and July 2016 (n = 1029)

	Days to First Evaluation[a]			**Days to First Treatment**[b]		
	EE (95% CI)	***P***	**Overall *P***	**EE (95% CI)**	***P***	**Overall *P***
Age[c]	1.00 (0.99-1.00)	.63	.63	0.99 (0.99-1.00)	.004	.004
DT score[c,d]	0.97 (0.96-0.99)	<.001	<.001	0.98 (0.97-1.00)	.02	.02
Race/Ethnicity (median days to evaluation/median days to treatment)						
Non-Hispanic White (17/45)	Reference		.001	Reference		.007
Asian/PI (15/51)	1.18 (0.89-1.57)	.24		1.09 (0.85-1.40)	.48	
Non-Hispanic Black (21/47)	1.22 (1.09-1.37)	<.001		1.19 (1.07-1.32)	.001	
Hispanic (23/71)	1.05 (0.72-1.53)	.81		0.82 (0.58-1.14)	.23	
Other (21/67)	1.65 (1.27-2.15)	<.001		1.47 (1.17-1.86)	.001	
Marital status						
Married	Reference		.30	Reference		.92
Divorced	1.13 (0.99-1.28)	.07		0.97 (0.87-1.08)	.56	
Single	1.00 (0.89-1.12)	.99		1.01 (0.92-1.12)	.80	
Unknown	1.08 (0.90-1.30)	.42		0.97 (0.82-1.14)	.70	
Widowed	0.96 (0.82-1.12)	.57		0.96 (0.84-1.10)	.54	
Treatment group[c]						
Surgery	Not adjusted			Reference		<.001
Neoadjuvant	–	–		0.49 (0.44-0.54)	<.001	
Surgery type						
Mastectomy without reconstruction	Not adjusted			Reference		.57
Lumpectomy	–			0.96 (0.88-1.04)	.32	
Mastectomy with reconstruction	–			0.95 (0.84-1.08)	.42	
Insurance						
Private	Reference		.26	Reference		.36
Medicaid	0.85 (0.59-1.21)	.33		0.83 (0.60-1.13)	.24	

	Days to First Evaluation[a]			Days to First Treatment[b]		
	EE (95% CI)	***P***	**Overall *P***	**EE (95% CI)**	***P***	**Overall *P***
Medicare	1.05 (0.94-1.17)	.41		1.04 (0.94-1.15)	.41	
Other	1.27 (0.98-1.65)	.07		1.19 (0.95-1.50)	.13	
Unknown	0.95 (0.81-1.12)	.58		1.00 (0.87-1.16)	.95	
Clinical disease stage[c]						
1	Reference		.64	Reference		<.001
0	0.98 (0.87-1.10)	.72		1.07 (0.97-1.19)	.18	
2	1.04 (0.95-1.14)	.41		1.36 (1.24-1.48)	<.001	
3	1.07 (0.92-1.25)	.37		2.01 (1.72-2.34)	<.001	
4	0.87 (0.61-1.23)	.43		2.30 (1.68-3.15)	<.001	
Problem list items						
≥1 Emotional stressor						
No	Reference		.14	Reference		.51
Yes	0.93 (0.85-1.02)	.14		0.97 (0.89-1.06)	.51	
≥1 Family stressor						
No	Reference		.38	Reference		.21
Yes	0.95 (0.85-1.06)	.38		0.94 (0.85-1.04)	.21	
≥1 Physical stressor[d]						
No	Reference		.02	Reference		.08
Yes	1.11 (1.02-1.21)	.02		1.07 (0.99-1.15)	.08	
≥1 Spiritual stressor						
No	Reference		.92	Reference		.56
Yes	1.02 (0.75-1.37)	.92		0.92 (0.71-1.20)	.56	
≥1 Practical stressor[c,d]						
No	Reference		<.001	Reference		<.001
Yes	1.26 (1.13-1.40)	<.001		1.23 (1.12-1.35)	<.001	
Race/Ethnicity (any practical stressor interaction)[c,d]						
Non-Hispanic White	Reference		0.03	Reference		.002
Asian/PI	0.78 (0.46-1.32)	.35		1.18 (0.74-1.87)	.49	
Non-Hispanic Black	0.87 (0.72-1.06)	.17		0.85 (0.72-1.01)	.06	

	Days to First Evaluation[a]			Days to First Treatment[b]		
	EE (95% CI)	***P***	**Overall *P***	**EE (95% CI)**	***P***	**Overall *P***
Hispanic	1.74 (1.02-2.96)	.04		2.14 (1.34-3.41)	.002	
Other	0.69 (0.47-1.00)	.05		0.79 (0.56-1.10)	.17	

Abbreviations: DT, distress thermometer; EE, exponentiated estimate; PI, Pacific Islander.

[a] A log(x + 0.5) transformation was used to ensure normality and to compensate occurrence of 0 days.

[b] A log transformation was used to ensure normality.

[c] Type 3 overall $P < .05$ for days to first treatment.

[d] Type 3 overall $P < .05$ for days to first evaluation.