Abstract

Emotional awareness (EA) is thought to facilitate psychological health by aiding emotion regulation in oneself and garnering social support from others. This study tested these potential relationships within a one-year longitudinal study of 460 women (age 23–91 years, mean 56.4 years) recently diagnosed with breast cancer (i.e., within four months). The women completed measures of emotional awareness, social support, social stress, affective symptoms, and wellbeing. Linear models tested EA as a moderator of social support and stress on affective symptoms and wellbeing. In those with higher EA, low social support was associated with greater depression and lower optimism. There was some evidence that higher EA predicted greater depression at baseline but lower depression at nine-month follow-up. These results support the idea that EA increases sensitivity to available social support and facilitates emotional adjustment over time, suggesting that assessment of EA could help guide clinicians in identifying those at greatest risk of adverse mental health outcomes in this population.

Keywords: breast cancer, emotional awareness, depression, wellbeing, social support

Introduction

Patients with cancer experience clinical depression and anxiety at a significantly higher rate than the general population (Mejareh et al., 2021). For patients with breast cancer in particular, the global prevalence of clinically elevated depressive symptoms is around 32% (Pilevarzadeh et al., 2019) and that of clinically elevated anxiety symptoms is around 41.9% (Hashemi et al., 2020). For these patients, a greater emotional burden is known to promote higher rates of suicide, lower medication adherence as well as functional impairments in work, family and social domains (Mausbach et al., 2015; Howard-Anderson et al., 2012; McFarland et al., 2019; Zaorsky et al., 2019). Therefore, it is crucial to identify factors that may moderate depression and anxiety in this population. Emotional awareness is one potential moderator in this regard, given its association with emotion regulation and socio-affective skills (Subic-Wrana et al., 2014; Lane and Smith, 2021; Boden and Thompson, 2015).

Emotional Awareness (EA) is the ability to recognize and verbalize awareness of current or potential emotional experiences in oneself and others. It is often measured by the number, complexity, and/or specificity of emotions of which a person is aware (Lane and Schwartz, 1987). EA is also an important component of the broader concept of emotional intelligence (EI): the ability to perceive, understand, and regulate emotions in oneself and others (Mayer, 1997). In the general population, a range of related EA and EI measures have shown negative associations with depressive outcomes and emotion dysregulation (Downey et al., 2008; Monti and Rudolph, 2014; Boden and Thompson, 2015), as well as positive associations with wellbeing (Guerra-Bustamante et al., 2019; Carmeli et al., 2009). For example, Boden & Thompson (2015) found that several components of EA – such as clarity in the type and source of emotion, and the tendency to attend to emotion – predicted the use of adaptive emotion regulation strategies, such as acceptance and reappraisal, as well as less use of emotion suppression. While adaptive emotion regulation strategies had negative relationships with depression, the correlation between emotion suppression and depression was positive. EA, and the other components of EI it may facilitate, is associated with more positive mental health outcomes in the general population.

Given its links to effective emotion regulation and social relationships, one might predict that EA would facilitate effective coping in difficult life situations, such as being diagnosed with breast cancer. Although there is limited research on EA in patients with breast cancer, there have been a few studies in recent years focusing on EI as a predictor of affective symptoms and wellbeing in this population (Mirzaei et al., 2019; Conley et al., 2016; Amirifard et al., 2017). One study of young adults with breast cancer, for example, found negative relationships between EI and both depression and anxiety (Amirifard et al., 2017). Specifically, they found that emotion regulation, interpersonal emotional understanding, and socio-emotional problem-solving abilities predicted less severe affective symptoms. Conversely, other work has shown that women with breast cancer who disengage from their emotional experiences show greater depressive and anxious systems (Conley et al., 2016). In addition to reduced negative affect, beneficial associations have also been found between cognitive-emotional skills and wellbeing in such patients. For example, Mirzaei and colleagues (2019) found positive relationships with such skills and multiple components of quality of life. Acceptance- and awareness-related socio-affective skills may serve as protective factors – both attenuating negative affect and improving wellbeing – by enabling the use of effective emotion regulation strategies and maintenance of interpersonal relationships when coping with this diagnosis.

Social context has also been shown to impact physical and psychological health for women with breast cancer. For example, one cross-sectional study found that emotional isolation and a lack of social support was associated with greater anxiety and depression after diagnosis (Puigpinós-Riera et al., 2018). Several others have also found that greater social support increases chances of survival (Funch and Marshall, 1983; Maunsell et al., 1995; Hislop et al., 1987; Weihs et al., 2008). Changes in social support further appear to play a role in physical and emotional health. Unfortunately, it is not uncommon for women with breast cancer to experience reduced social support after diagnosis (Fong et al., 2017; Salonen et al., 2013; Bloom and Spiegel, 1984). Unsurprisingly, these decreases predict greater depression (Fong et al., 2017) and lower health-related quality of life (Leung et al., 2014). High levels of interpersonal stress may also negatively impact women with breast cancer. For example, one study found that greater partner stress predicted higher levels of depression immediately after diagnosis (Stinesen Kollberg et al., 2019). Six months after diagnosis, those with lower partner stress also tended to have lower levels of depression (Stinesen Kollberg et al., 2019). Thus, it is apparent that high quality social relationships are an important protective factor for physical and psychological health in this population.

In summary, research suggests that emotional awareness could have a significant effect on the psychological health of women with breast cancer. In addition, previous studies have established a relationship between social context and wellbeing in this population. However, no studies to date have directly examined the connection between EA, social support, and social context in this population, nor have they examined the effect of these variables on changes in affective symptoms and wellbeing after diagnosis. Further, while the broader EI literature suggests the importance of emotional awareness in this regard, leading measures of trait EA in particular remain to be thoroughly examined. In this study, we therefore tested whether scores on a leading measure of emotional awareness – the Levels of Emotional Awareness Scale (LEAS) –

may moderate the influence of social context on affective symptims and wellbeing. Given the literature reviewed above, we hypothesized that EA would moderate the relationship between social context and affective symptoms/well-being. However, we did not have a strong hypothesis regarding the direction of those relationships.

Methods

Declaration of Conflicting Interests

The authors declare no conflict of interest.

Ethical Statement

Institutional Review approved the study before the start of recruitment. All participants provided written informed consent. Research was conducted ethically in accordance with the World Medical Association Declaration of Helsinki.

Data Availability and Pre-Registration

All datasets and materials used in the formulation of this manuscript are available upon request until analyses associated with the larger project are complete. Analyses were not pre-registered.

Participants

Adult females (min age = 21) were recruited within four months of an invasive breast cancer diagnosis (initial or recurrent). Participants were enrolled as close to their diagnoses as possible to capture the full trajectory of changes in risk markers for depression after the diagnosis. All participants were required to be fluent in English and not meet diagnostic criteria for bipolar disorder, schizophrenia, or other schizoaffective disorders. Those with dementia or active suicidality were also excluded. Recruitment and enrollment took place at private breast cancer clinics within a 30-mile radius of [blinded for peer review], or at [blinded for peer review]. See **Table 1** in for complete demographic and medical information. In total, 460 participants enrolled and completed the initial baseline assessment (conducted during 2010-2013). During this visit, participants completed self-report measures on a computer, as well as interviews with study staff. Participants returned to complete additional questionnaires and interviews at the four-month and nine-month follow-up (see **Supplemental Materials** for the mean score of measures at each time point). Please note that analyses reported here were carried out in the context of a larger funded study, the full details of which are beyond the scope of the present manuscript ([citation omitted for double-anonymized peer review]). Accordingly, 63 of the 460 participants had missing data (13.7%) and 88 dropped out of the study (19%), but these participants showed no significant difference in depressive symptoms ([citation omitted]). Previously published studies focusing on other aspects of this dataset can also be found in the following: [citations omitted]). Here, we focus on details relevant to the novel analyses and results described below.

Table 1. Demographic and Medical Information

Characteristic	N (%)
Age, mean (SD; range) years	56.4 (12.6; 23–91)
Number of participants at baseline	460
Number of participants returning for nine-month follow-up	407
Ethnicity	
Asian	24 (5.2)
Black/African American	10 (2.2)
Latina	89 (19.3)
Mixed race/ethnicity	8 (1.7)
Native American/Alaska Native	12 (2.6)
Native Hawaiian/Pacific Islander	3 (0.7)
Unreported	3 (0.7)
White/European American	311 (67.6)
Marital Status	
Married/living as married	305 (67.0)
Single	42 (9.2)
Divorced/separated	72 (15.9)
Widowed	36 (7.9)
Income	
<$50,000	124 (28.5)
$50,000–$74,999	97 (22.3)
$75,000–$100,000	57 (13.1)
>$100,000	157 (36.1)
Education	
>High school	18 (4.0)
High school	96 (21.1)
Two-year college	91 (20.0)
College graduate	164 (36.1)
Master's degree	62 (13.7)
Ph.D., M.D., other professional terminal degree	23 (5.1)
Employment Status	
Employed	236 (52.1)
Retired	134 (29.6)
Unemployed	83 (18.3)
Recruitment site	
Arizona	163 (35.4)
California	297 (64.6)
Number of comorbidities, mean (SD)	1.8 (1.9)
Cancer stage	
1	204 (44.4)
2	178 (38.8)
3	52 (11.3)
4	25 (5.4)
Cancer Status	
Primary non-metastatic	387 (84.3)
Recurrence/2nd primary	47 (10.2)
Primary metastatic	14 (3.1)
Metastatic recurrence	11 (2.4)
Months since diagnosis at study entry, mean (SD)	2.1 (0.8)
Months of oncological treatment, mean (SD)*	3.5 (2.0)
Oncologic Treatments Received	
Chemotherapy	242 (53.0)

Radiation therapy	170 (37.2)
Surgery	414 (90.6)
Herceptin	128 (28.0)
Aromatase inhibitor/endocrine antagonist	293 (64.1)

Measures

Emotional awareness

The 10-item version of the *Levels of Emotional Awareness Scale (LEAS)* was administered at baseline to measure participants' awareness of their own emotions and those of others (Lane et al., 1990). This assessment includes ten prompts describing hypothetical social scenarios including the participant and another person. For each scenario, the participant is asked to write how they would feel and how they expect the other individual would feel. For instance, a participant might write "I would feel happy, and the other person would feel relieved." Each response is scored from 0 to 5 based on the specificity and complexity of emotions described. For example, on the high end, a score of 5 indicates the response contained a blend of emotion concepts applied to both self and other (e.g., "I would feel regret and fear, but the other person would feel joy and relief."). Trained raters categorize each response using a glossary containing common words for each level of EA. Total scores reflect the sum of the 10 item scores. In prior work, the LEAS has been shown to possess high reliability and internal consistency ($\alpha = .78$); it also demonstrates strong convergent validity based on expected correlations with several other current measures of social/emotional functioning ~~(reviewed in~~ (reviewed in Lane and Smith, 2021)~~)~~.

In addition to writing about hypothetical feelings on the LEAS, participants were also given up to 15 minutes to write an essay about their deepest thoughts and feelings about breast cancer at both baseline and nine-month follow-up (Pennebaker and Beall, 1986). This is henceforth referred to as situational EA. A previously validated electronic scoring program was used to score each essay based on the same criteria described above (Barchard et al., 2010). This program identifies any words within the essays listed in the predefined LEAS database and assigns the associated point value for those words based on their level of emotional differentiation. To calculate the total EA score, the program then sums the value of each unique word from the database found in the essay (e.g., if the word "sad" was used twice, its numerical value [3 points] would only be applied at its first use). When this program has been used to score the LEAS, it also shows high internal consistency ~~($\alpha = .92$, $p < .001$)~~ (α=.92, p<.001; Barchard et al., 2010).

Affective symptoms

The *Patient Health Questionnaire (PHQ-9)* was used as a measure of depressive symptoms (Kroenke et al., 2001) at baseline. For each of nine questions, participants indicate how often over the past two weeks they have experienced the associated symptom, from 0 = "Not at all" to 3 = "Nearly Every Day". The score for each item is added to get the total score. The PHQ-9 is ~~commonly~~ a previously validated and widely used ~~as a validated~~ measure of depression severity in healthcare settings (Seo and Park, 2015; Costantini et al., 2021; Yutrirak et al., 2021). The measure has shown good internal consistency, with a Cronbach's α of .90 (Stafford et al., 2007).

The *Center of Epidemiologic Studies-Depression scale (CES-D)* was used as a convergent measure of depressive symptoms at baseline and nine-month follow-up (Radloff, 1977). For each of twenty questions, participants are asked to rate how often they had particular experiences over the past week, such as "I could not get going" or "I enjoyed life." Responses range from 0 = "Rarely or none of the time" to 3 = "Most or all of the time." After reverse scoring the required items, a total depression severity score is derived by summing the scores for each item. Recent studies demonstrate that the CES-D shows high construct validity, including among cancer patients (Heller et al., 2022; Yutrirak et al., 2021). The CES-D showed good internal consistency in our sample, with a standardized Cronbach's alpha of .91-.93 across time points.

The *Generalized Anxiety Disorder Screener (GAD-7)* was administered at baseline to assess levels of anxiety (Löwe et al., 2008). Here, participants rate how often they have experienced seven symptoms of anxiety, such as "trouble relaxing", over the past two weeks. Answers range from 0 = "Not at all" to 3 = "Nearly every day." Each response is summed to compute the total score. The GAD-7 is a previously validated and widely used measure of anxiety symptoms, with two recent studies confirming its accuracy as a screener for GAD in cancer patients (Esser et al., 2018; Clover et al., 2020). The GAD-7 showed good internal consistency in our sample, with a standardized Cronbach's α of .90.

Social Support

The *Social Relationships Index (SRI)* was administered at baseline to measure the quality of participants' romantic relationships (Uchino et al., 2001; Uchino et al., 1992), henceforth referred to as "partner support". For each of five items, participants rate a different dimension of their relationship, such as the extent to which their partner is "upsetting" or "helpful". Responses range from 1 = "Not at all" to 6 = "Extremely." A total score is found by summing individual item scores (after reverse-scoring required items). The SRI has demonstrated good construct validity in prior work based on strong correlations with other established measures of relationship quality (Campo et al., 2009) and has also been ~~-~~used in several recent clinical studies (Holt-Lunstad and Uchino, 2019; Hendrickson et al., 2023; Miller et al., 2020). The ~~measure~~ SRI showed good internal consistency in our sample, with a standardized Cronbach's α of .82.

The secure attachment subscale of the *Social Provisions Scale (SPS)* was administered at baseline to measure level of attachment security in social relationships (Cutrona and Russell, 1987), henceforth referred to as "relationship security". Here, participants are asked to rate their level of agreement with statements indicating high or low levels of secure attachment, such as "I feel that I do not have close personal relationships with other people." Each of the four items are rated from 1 = "Strongly Disagree" to 4 = "Strongly Agree". A total score representing participants' level of attachment security is found by averaging the item scores (after reverse-scoring negative items). The SPS has recently been ~~found~~ shown to ~~have~~ possess high construct validity (Osmane et al., 2021). The measure showed good internal consistency in our sample, with a standardized Cronbach's α of .78.

The *UCLA Life Stress Interview (LSI)* was used to measure interpersonal stress (Hammen et al., 1987) at baseline and nine-month follow-up. The LSI is a semi-structured interview measuring levels of chronic stress in distinct areas of life, including friendships (LSI Friendship), family relationships (LSI Family), and overall (LSI Interpersonal). For each area, an interviewer asks questions probing experiences of chronic stress over the past six months. A rubric for each life domain allows the interviewer to rate the level of relationship stress from 1 to 5, where 1 indicates little stress/excellent functioning and 5 indicates high stress/very poor functioning. For example, within the family relationships domain, a score of 1 indicates "Exceptional quality relationship with all members of family" and 5 indicates "Very poor-quality relationship with a parent." Training and supervision were provided on the administration and scoring of the interviews. This measure has ~~high~~ shown good construct validity~~, given high correlations between LSI scores an~~ based on strong correlations with other establishedd ~~other~~ measures of stress (Tanner Stapleton et al., 2016). It also shows high~~, and an~~ inter-rater reliability ~~coefficient of .97 (*p* < .001)~~ (r=.97, p<.001; Hammen et al., 1987)~~.~~ and continues to be used as a validated measure of chronic stress in recent work (Weissman et al., 2020; Sumner et al., 2023; Losiewicz et al., 2023; Mineka et al., 2020).

Wellbeing

The *Life Orientation Test-Revised (LOT-R)* was administered at the four-month follow-up as a measure of expectations related to wellbeing within positive psychology (Scheier and Carver, 1985). This measure asks participants to rate how much they agree with optimistic and pessimistic statements such as "In uncertain times, I usually expect the best" or "If something can go wrong for me, it will." The six items are rated from 1 = "I disagree a lot" to 6 = "I agree a lot." The sum of the optimistic items and reverse-scored pessimistic items is computed to get a total score. The LOT-R has also ~~been reported to~~ shown~~show~~ ~~high~~ good construct validity in prior work ~~given strong~~based on expected negative associations with established measures of hopelessness (r=-.65, p<.001) and depression ~~(r=-.60, p<.001)~~(r=-.60, p<.001; Hirsch et al., 2010). The total score for this measure also remains widely used in current studies~~(Herzberg et al., 2006)(Hinz et al., 2022; Glaesmer et al., 2012)~~ (Hinz et al., 2023; Hinz et al., 2024; Hinz et al., 2022; Marton et al., 2020; Liu et al., 2021). The measure showed good internal consistency in our sample, with a standardized Cronbach's α of .81.

As a second, convergent measure of wellbeing, the *Pearlin Mastery Scale (MS)* was used at four-month follow-up to assess participants' sense of control over life outcomes (Pearlin and Schooler, 1978). Here, participants rate seven statements indicating high and low levels of mastery, such as "I can do just about anything I really set my mind to." Ratings from 1 to 4 indicate how strongly participants agree or disagree with each statement. After reverse scoring the negatively framed items, the cumulative score is found by summing item scores. The MS has demonstrated adequate construct validity (Lim et al., 2022) and remains widely used in recent work (Brown et al., 2024; Guimond et al., 2024; Ben-Shlomo and Kabizon-Perry, 2023). The measure ~~-~~showed good internal consistency in our sample, with a standardized Cronbach's α of .76.

Statistical analyses

Statistical analyses were carried out in R Studio (v4.0.3.). Linear regression models (LMs) and linear mixed effect models (LMEs) were used to evaluate whether EA moderates the effect of social support variables on measures of affective symptoms (i.e., depression and anxiety) or wellbeing (i.e., optimism and sense of control). LMs were run using the *lm()* function and LMEs were run using the *lmer()* function in the *lme4* package (v1.1-34). The age of participants and the site of the study visit were included in all models as covariates. All continuous variables were mean-centered and scaled using the *gscale()* function of the *jtools* package (v2.2.2); site was sum-coded as a factor.

A small portion of the sample (11 participants) entered the study receiving treatment for recurrent metastatic breast cancer, while the rest received treatment for primary, secondary, or locally recurrent breast cancer. To account for any potential group differences for this sample, a binary variable tracking diagnostic grouping (recurrent metastatic or not) was added to all models as a covariate. The addition of this variable did not provide additional evidence or remove evidence for any predictor of interest. Thus, results presented in the manuscript include models without diagnostic grouping as a covariate.

For the first question, we tested if EA moderated the effect of social support on affective symptoms. We ran LMs predicting affective symptoms (i.e., PHQ-9, CES-D, or GAD-7 scores) based on social support (i.e., SPS or SRI scores), EA (LEAS or Essay scores), and their interaction. A moderation effect was considered present if the fitted coefficient value on the interaction term was significantly different from zero. For the second question, we similarly tested if EA moderated the effect of relationship quality on wellbeing measures (i.e., LOT-R, MS) taken at the four-month follow-up. We note here that the choice of the four-month follow-up for these measures was informed by the larger study design, and not in relation to these specific analyses. Our use of data from this time point was therefore based on availability only.

If the interaction term was significant in any analysis, interpretation was then informed by post-hoc contrasts of estimated marginal trends, using the *emtrends()* function from the *emmeans* package (v1.8.8). This allowed us to evaluate the effect of the moderating variable at EA values one SD above, one SD below, and at the mean.

Using longitudinal data to further address these questions, LMEs were run to evaluate scores on the subset of measures available at both baseline and nine-month follow-up. Specifically, we tested whether the variance in depression (CESD) over time could be explained by an interaction between EA (essay) and social stress (LSI Friendship, LSI Interpersonal, LSI Family). The exact form of each model was therefore: *CESD ~ Time_Point + EA_Essay_Score + LSI_Scale + Time_Point*EA_Essay_Score + Time_Point*LSI_Scale +*

*EA_Essay_Score*LSI_Scale + Time_Point*EA_Essay_Score*LSI_Scale + participant ID (random intercept)*.

For each test, we used a Bonferroni adjustment to correct for multiple comparisons. We used an adjustment of eight for the eight linear models predicting depression (CES-D or PHQ-9); an adjustment of four for each of the four linear models predicting anxiety (GAD-7), optimism (LOT-R), and sense of control (MS); and an adjustment of three for the three linear mixed-effect models predicting depression (CES-D). To provide the reader with a more complete picture of the patterns in the data, we report uncorrected results in **Table 2**, but restrict discussion to results that were significant or marginal after correction. As an additional post-hoc interpretive step, we also assessed results of the LMs predicting depression after adding GAD-7 as a covariate. Given the high rates of comorbidity between depression and anxiety (Rapaport, 2001), this allowed us to better interpret whether significant results were specific to depression or were better understood as relevant to the shared variance between depression and anxiety.

Results

EA Moderates the Relationship between Social Support and Depression

For the first question, we tested if EA moderated the relationship between social context and affective symptoms (i.e., depression and anxiety). In the model predicting depression (PHQ-9) using EA essay scores and partner support (SRI) at baseline, there were significant main effects of essay score and age in addition to a significant interaction between EA essay and partner support (see **Table 2**). Post-hoc contrasts showed that the slope of SRI was lower for high essay scores than average essay scores and lower for average essay scores than low essay scores (c = -.81, t(233) = -2.80, p = .006). As evident in **Figure 1a**, for those with greater EA, less partner support was associated with greater depression. When GAD-7 scores were added to the model as a covariate, the interaction term remained significant (b = -.62, CI = [-1.09, -.15], t = -2.58, p =.011). Thus, original results for depression could not be accounted for by co-morbid anxiety. In the LMs predicting anxiety based on EA, social context, and their interaction, no moderation effects were observed (see **Table 2** for full results).

Table 2. Linear Models Predicting Affective Symptoms at Baseline

Bold type indicates that the result remained significant after correction

Outcome Variable	Emotional Awareness	Social Context	Interaction	Degrees of Freedom
Models Predicting Depression and Anxiety				
CES-D	Essay: b = 0.45, CI = [-0.64, 1.53], t = 0.81, p = 0.419	SPS: b = -2.39, CI = [-3.42, -1.36], t = -4.56, **p <.001**	Essay:SPS: b = -0.86, CI = [-1.97, 0.25], t = -1.53, p = 0.128	368
CES-D	Essay: b = 0.83, CI = [-0.42, 2.08], t = 1.31, p = 0.193	SRI: b = -3.4, CI = [-4.57, -2.24], t = -5.74, **p <.001**	Essay:SRI: b = -1.19, CI = [-2.33, -0.04], t = -2.04, p = 0.042	261
CES-D	LEAS: b = -0.31, CI = [-1.37, 0.75], t = -0.58, p = 0.562	SPS: b = -2.34, CI = [-3.42, -1.25], t = -4.24, **p <.001**	LEAS:SPS: b = 0.36, CI = [-0.69, 1.42], t = 0.68, p = 0.500	344
CES-D	LEAS: b = -0.32, CI = [-1.54, 0.91], t = -0.51, p = 0.610	SRI: b = -3.47, CI = [-4.75, -2.19], t = -5.33, **p <.001**	LEAS:SRI: b = -0.82, CI = [-1.82, 0.19], t = -1.6, p = 0.112	259
GAD-7	Essay: b = 0.32, CI = [-0.17, 0.81], t = 1.3, p = 0.195	SPS: b = -1.07, CI = [-1.52, -0.61], t = -4.61, **p <.001**	Essay:SPS: b = -0.26, CI = [-0.76, 0.24], t = -1.02, p = 0.309	342
GAD-7	Essay: b = 0.03, CI = [-0.52, 0.57], t = 0.09, p = 0.927	SRI: b = -0.97, CI = [-1.48, -0.46], t = -3.74, **p <.001**	Essay:SRI: b = -0.23, CI = [-0.73, 0.28], t = -0.89, p = 0.372	265
GAD-7	LEAS: b = -0.21, CI = [-0.66, 0.25], t = -0.9, p = 0.369	SPS: b = -0.82, CI = [-1.28, -0.36], t = -3.47, **p = 0.001**	LEAS:SPS: b = -0.05, CI = [-0.51, 0.40], t = -0.24, p = 0.814	342
GAD-7	LEAS: b = -0.13, CI = [-0.66, 0.39], t = -0.5, p = 0.616	SRI: b = -0.98, CI = [-1.53, -0.44], t = -3.54, **p <.001**	LEAS:SRI: b = -0.04, CI = [-0.47, 0.39], t = -0.19, p = 0.850	263
PHQ-9	Essay: b = 0.47, CI = [-0.06, 1.01], t = 1.74, p = 0.082	SPS: b = -1.19, CI = [-1.70, -0.68], t = -4.6, **p <.001**	Essay:SPS: b = -0.29, CI = [-0.85, 0.26], t = -1.04, p = 0.297	326
PHQ-9	Essay: b = 0.62, CI = [0.00, 1.24], t = 1.98, p = 0.048	SRI: b = -1.46, CI = [-2.03, -0.88], t = -4.97, **p <.001**	Essay:SRI: b = -0.81, CI = [-1.38, -0.24], t = -2.8, **p = 0.006**	233
PHQ-9	LEAS: b = -0.25, CI = [-0.79, 0.28], t = -0.94, p = 0.350	SPS: b = -0.94, CI = [-1.48, -0.40], t = -3.43, **p = 0.001**	LEAS:SPS: b = -0.08, CI = [-0.62, 0.46], t = -0.29, p = 0.772	306
PHQ-9	LEAS: b = -0.23, CI = [-0.83, 0.38], t = -0.75, p = 0.456	SRI: b = -1.29, CI = [-1.92, -0.65], t = -4, **p <.001**	LEAS:SRI: b = -0.15, CI = [-0.64, 0.34], t = -0.6, p = 0.549	231
Models Predicting Wellbeing				
LOT-R	Essay: b = 0.36, CI = [-0.14, 0.86], t = 1.43, p = 0.152	SPS: b = 0.75, CI = [0.27, 1.22], t = 3.11, **p = 0.002**	Essay:SPS: b = 0.67, CI = [0.18, 1.15], t = 2.7, **p = 0.007**	325
LOT-R	Essay: b = 0.38, CI = [-0.16, 0.91], t = 1.4, p = 0.164	SRI: b = 0.91, CI = [0.41, 1.41], t = 3.6, **p <.001**	Essay:SRI: b = -0.2, CI = [-0.71, 0.32], t = -0.75, p = 0.451	239
LOT-R	LEAS: b = 0.04, CI = [-0.43, 0.51], t = 0.18, p = 0.857	SPS: b = 0.84, CI = [0.37, 1.31], t = 3.49, **p = 0.001**	LEAS:SPS: b = 0.53, CI = [0.08, 0.98], t = 2.3, p = 0.022	303
LOT-R	LEAS: b = 0.09, CI = [-0.41, 0.59], t = 0.36, p = 0.720	SRI: b = 1.06, CI = [0.56, 1.56], t = 4.17, **p <.001**	LEAS:SRI: b = -0.12, CI = [-0.59, 0.35], t = -0.5, p = 0.621	233
MS	Essay: b = 0.25, CI = [-0.12, 0.63], t = 1.32, p = 0.189	SPS: b = 0.72, CI = [0.36, 1.08], t = 3.96, **p <.001**	Essay:SPS: b = 0.27, CI = [-0.10, 0.64], t = 1.44, p = 0.150	325
MS	Essay: b = 0.23, CI = [-0.21, 0.67], t = 1.01, p = 0.313	SRI: b = 0.76, CI = [0.35, 1.17], t = 3.65, **p <.001**	Essay:SRI: b = -0.09, CI = [-0.52, 0.33], t = -0.43, p = 0.666	239
MS	LEAS: b = 0.06, CI = [-0.32, 0.44], t = 0.32, p = 0.751	SPS: b = 0.76, CI = [0.37, 1.14], t = 3.87, **p <.001**	LEAS:SPS: b = 0.19, CI = [-0.17, 0.56], t = 1.04, p = 0.301	303
MS	LEAS: b = -0.11, CI = [-0.53, 0.31], t = -0.52, p = 0.603	SRI: b = 0.84, CI = [0.42, 1.26], t = 3.98, **p <.001**	LEAS:SRI: b = -0.31, CI = [-0.71, 0.08], t = -1.57, p = 0.119	233

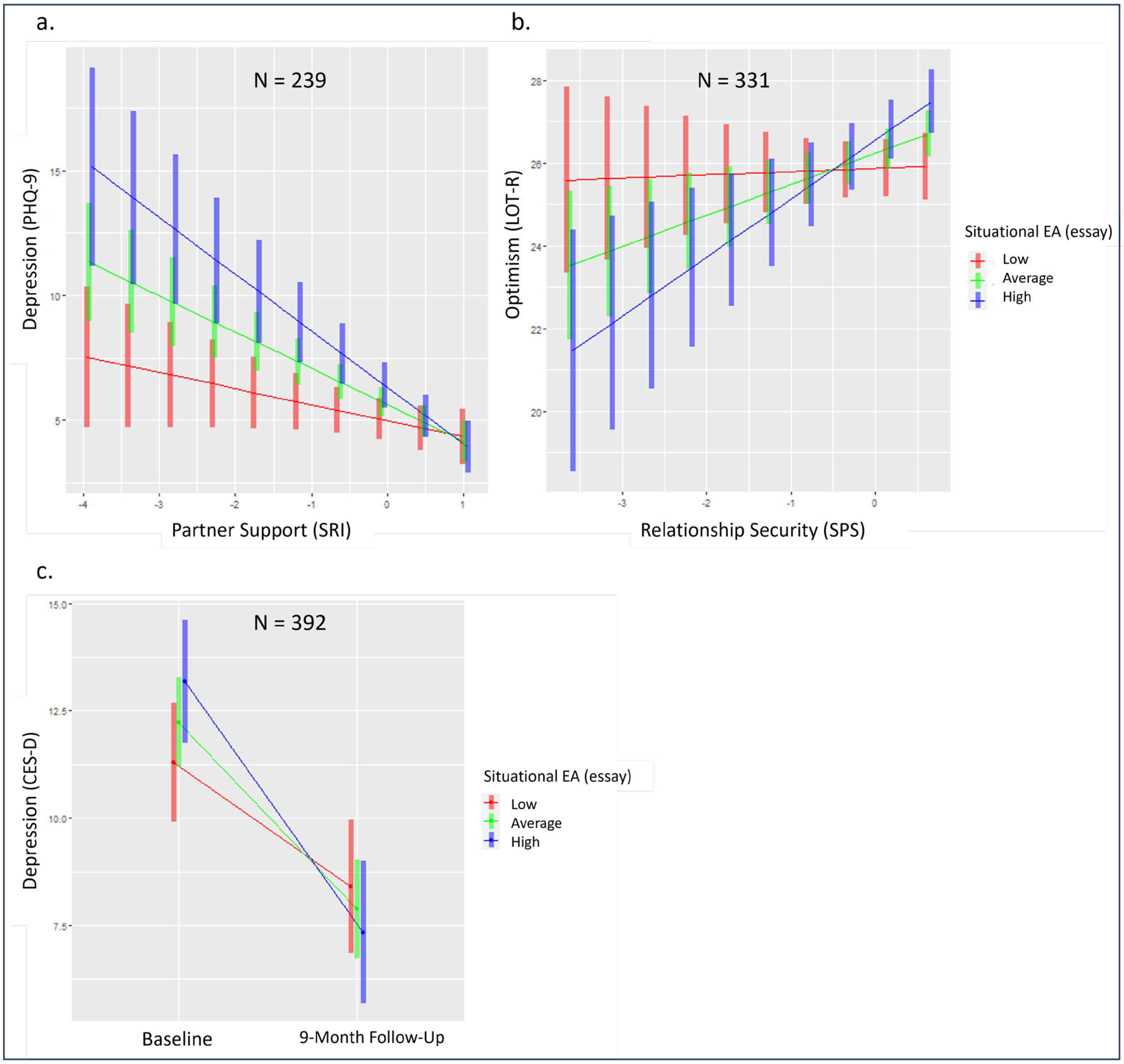

Figure 1. a.) Estimated conditional PHQ-9 score (with confidence intervals) for 10 evenly spaced levels of SRI at low (mean – SD), average, and high (mean + SD) EA Essay scores. b.) Estimated condition LOT-R score and for 10 evenly spaced levels of SPS at low, mean, and high EA essay scores. c.) Estimated conditional CESD score (with confidence intervals) for time = baseline and time = nine-month follow-up, at low, average, and high essay scores.

In the LME that included Friendship Stress (LSI) as a predictor of depression (CESD), we observed a main effect of LSI Friendship (b = 1.73, CI = [-1.03, 4.48], F(1,514.30)=24.76, p <.001), time (b = .061, CI = [-.170, .291], F(1,315.33) = 54.27, p <.001), and age (b = -.127, CI =

[-.197, -.056], $F(1,395.00) = 12.32$, $p < .001$). Time modulated the effect of essay scores ($b = -.0042$, CI = [-.011, .002], $F(1,415.14)=4.99$, $p = 0.026$), but this effect was only marginal after correction. As evident in **Figure 1c**, there was a decrease in the slope of situational EA (essay) from baseline to nine-month follow-up ($c = -1.38$, $t(415) = -2.23$, $p = .026$). Thus, there was marginal evidence that those with higher EA essay scores experienced more depression at baseline, but less depression at nine-month follow-up.

EA Moderates the Relationship Between Relationship Security and Optimism

For the second question, we tested if EA moderated the relationship between social context and wellbeing. In the LM predicting optimism (LOT-R) based on the interaction between EA essay scores and social relationship security (SPS), there were significant main effects of essay score and site as well as a significant interaction term (**Table 2**). Post-hoc contrasts showed that the slope of SPS was greater for high essay scores than average essay scores and greater for average essay scores than low essay scores ($c = .67$, $t(325) = 2.70$, $p = .007$). As evident in **Figure 1b**, social relationship security had the greatest effect on wellbeing for those with high situational emotional awareness (essay). In the LMs predicting MS based on EA, social context, and their interaction, no significant moderation effects were observed (see **Table 2**).

Discussion

In this study, we tested the hypothesis that emotional awareness (EA) moderated the effect of social support on the mental health and wellbeing of women with breast cancer. In support of this hypothesis, we found levels of depression and optimism were each more sensitive to levels of social support in those with higher EA. Interestingly, this effect was only found with respect to awareness of emotions related to their cancer diagnosis (situational EA), and not with trait EA (LEAS score) more generally. In addition, we found marginal evidence that the passage of time changed the relationship between situational EA and depression. Namely, women with breast cancer who had higher levels of situational EA tended to be more depressed at baseline but less depressed at nine-month follow-up, suggesting both greater sensitivity and a greater ability to adjust over time.

The observed interaction of EA and social stress/support was unexpected. Prior studies have found a negative relationship between emotional intelligence (EI) and depression for both this population and more generally (Mirzaei et al., 2019; Amirifard et al., 2017; Conley et al., 2016; Boden and Thompson, 2015; Downey et al., 2008; Monti and Rudolph, 2014; Carmeli et al., 2009; Guerra-Bustamante et al., 2019). The discussion that often follows this result is that higher EI is associated with a greater use of emotion regulation strategies that protect against adverse mental health outcomes. Given that EA is linked with emotion regulation and other aspects of EI, we expected the same protective effect when faced with low social support. However, we observed the opposite: greater diagnosis-specific EA predicted greater depression and lower wellbeing in the face of lower social support. One possible explanation is that the women with greater EA were both more aware of the negative emotions regarding the experience of breast cancer and more aware of the negative emotions resulting from not having support in their social and romantic relationships – leading to greater reported depressed mood than someone without such awareness.

Prior research on the relationship between EA, depression, and these types of emotional responses appears consistent with the possible explanation described above. Namely, it suggests that higher EA may lead to greater self-reported depression by facilitating awareness of emotional responses to other emotions – sometimes referred to as "meta-emotions" (e.g. feeling guilt about jealousy)(Jäger and Bänninger-Huber, 2015). For example, Bailen and colleagues (2019) found that self-reported EA positively correlated with the frequency of meta-emotions in everyday life, where the most common meta-emotions experienced were negative emotions in response to other negative emotions. Further, they found that the frequency of such negative-to-negative emotions related to participants' depression severity. Thus, EA might lead to greater depression by facilitating certain meta-emotions, such as those linked to low social support. Perhaps a similar trend emerged in our sample, wherein greater EA led to a higher incidence and awareness of negative emotions, possibly exacerbating participants' sensitivity to adverse social circumstances.

In contrast, although evidence was only suggestive after correction (i.e., significance dropped to marginal levels after Bonferroni adjustment), the change in depression over time as a function of EA was in line with its expected benefits. While greater EA related to higher depression at baseline, it related to lower depression at nine-month follow-up, suggesting improved coping over time. If replicated in future work, the baseline result could be seen to contradict prior studies that overwhelmingly support a positive relationship between EI and positive mental health outcomes for women with breast cancer (Mirzaei et al., 2019; Guil et al., 2022; Chen et al., 2022; Ahoiee et al., 2017). However, the timing of data collection appears to be a key difference between this and previous studies. For example, Mirzaei and colleagues' cross-sectional study only included women who had received treatment for at least six months. Chen and colleagues included women within three years of a breast cancer diagnosis (2022), while Guil and colleagues' (2022) included women within one year of diagnosis. Ahoiee and colleagues' (2017) did not appear to use time since diagnosis as inclusion criteria. In contrast, all participants in our study completed baseline measures within four months of breast cancer diagnosis. The negative relationship between EA and depression at nine-month follow-up corroborates previous findings when data were collected more than six months after diagnosis. Conversely, the positive relationship between EA and depression at baseline may support a more nuanced picture, wherein high EA increases sensitivity to novel, adverse circumstances; however, with the passage of time, high EA may become adaptive in facilitating the use of emotion regulation strategies.

It is important to consider the limitations of the present study when interpreting these unexpected results, and in determining if the results will generalize to other populations. Given that there was only evidence for a moderating effect of diagnosis-specific EA, but not trait EA, there is no evidence that the same result would manifest outside the context of breast cancer diagnoses. It is possible that the experience of breast cancer specifically accounted for the moderating effect of EA. However, it is also possible that the differing instructions of the diagnosis-specific and trait measures of EA could account for this incongruence. For the diagnosis-specific measure of EA, participants were asked to describe their own emotions regarding the breast cancer diagnosis; for the trait measure of EA, participants were asked to describe both their own emotions and others' emotions elicited by hypothetical scenarios that are not illness related. It is therefore possible that observed effects pertained specifically to awareness of emotions about oneself, or only awareness of emotions relevant to coping with the current situation, or with differences in the ability to imagine hypothetical scenarios generally. If so, evidence for a moderating effect of trait EA could have been masked by the inclusion of both self and interpersonal emotional awareness in the cumulative trait EA score, or by hypothetical scenarios of less personal relevance. Future research will be needed to further test these possibilities – as it may speak to optimizing means of assessing EA going forward in specific populations. More broadly, it will be important to further develop measurement approaches for diagnosis-specific EA. For example, future studies might focus on development of brief standardized questionnaires with open-ended prompts that could feasibly be completed in clinical settings.

Additional research is also needed to determine if these findings generalize to people with other types of cancer or severely stressful circumstances, as well as the general population. The sample lacked ethnic diversity, given that most participants (67.6%) were White/European American, and lacked geographic diversity, given that participants were only recruited from two distinct areas of the western United States. Further, sexual orientation and gender identity were not assessed. Transgender and non-heterosexual breast cancer patients often experience greater health disparities, and the lack of culturally appropriate care for sexual and gender minoritized individuals should be considered in both medical care and psychological research (Fehl et al., 2019; Eckhert et al., 2023).

Finally, it is also important to note that data collection for this study began in 2010 and completed in 2014, which raises the question of whether patterns in this data should be expected to generalize to the present day. It is possible, for example, that recent societal changes (e.g., increased use of social media) could impact the relationship between social support and psychological health/wellbeing. However, we are not aware of any evidence suggesting that the modulatory effect of emotional awareness on social support or psychological health has changed substantially in recent years, or that experiences with breast cancer would be expected to differ in relevant ways. Nevertheless, f~~F~~uture studies should therefore aim to replicate these results to ensure generalizability.

Despite these limitations, this study supports the idea that high EA relates to worse mental health outcomes for women with breast cancer soon after diagnosis; however, it relates to better mental health outcomes in the months that follow. Given these findings, it may aid clinicians working with this population to administer a measure of diagnosis-specific EA immediately after diagnosis and periodically thereafter. This could help with identifying the patients who are at a greater risk for developing depression in both the short- and long-term, allowing mental health professionals to allocate time and resources more effectively.

In summary, we found preliminary evidence that EA, specifically in relation to currently challenging circumstances with breast cancer, positively related to depressive symptoms at baseline (within four months of diagnosis) but negatively related to depressive symptoms nine months after diagnosis. Stronger evidence was found that EA moderated the effect of social support on mental health; namely, higher EA was associated with greater sensitivity to lack of partner support and interpersonal attachment security, with respect to both depression and optimism. These results support a nuanced picture of both positive and negative effects of differences in emotional awareness, and how they may be dynamic over time, in a specific population facing highly challenging emotional and social circumstances.

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