Original Article

Psychological distress, optimism and general health in breast cancer survivors: a data linkage study using the Scottish Health survey

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# Abstract

Purpose

To examine the association between optimism and psychological distress in women with breast cancer after taking into account their self-rated general health.

Methods

Data were aggregated from the Scottish Health Survey (2008 to 2011) to derive a nationally representative sample of 12,255 women (11,960 cancer-free controls, and 295 breast cancer cases identified from linked cancer registry data). The explanatory variables were optimism and general health, and the outcome variable was symptoms of psychological distress. Logistic regression analyses were conducted, with optimism entered in step one and general health entered in step two.

Results

In an unadjusted model, higher levels of optimism were associated with lower odds of psychological distress in both the control group (OR=0. 57, 95%CI=0.51-0.60) and breast cancer group (OR=0. 64, 95%CI=0.47-0.88). However, in a model adjusting for general health, optimism was associated with lower odds of psychological distress only in the control group (OR=0.50, 95%CI=0.44-0.57), but not significantly in the breast cancer group (OR=1.15, 95%CI=0.32-4.11). In the breast cancer group, poor general health was a stronger associate of psychological distress (OR=4. 98, 95%CI=1.32-18.75). Results were consistent after adjusting for age, years since breast cancer diagnosis, survey year, socio-economic status, education, marital status, body mass index, smoking status, and alcohol consumption.

Conclusion

This research confirms the value of multi-component supportive care interventions for women with breast cancer. Specifically, it suggests that following breast cancer diagnosis, healthcare professionals need to provide advice and signpost to services that assist women to maintain or improve both their psychological and general health.

**Keywords** Breast cancer   Optimism   Psychological distress   Psychosocial   Mental health   Self-rated health

# Introduction

Breast cancer diagnosis is a challenging event that may negatively impact a woman’s life, resulting in symptoms of poorer general health and psychological distress [[1-4](#_ENREF_1)]. Even after successful treatment, it is common for breast cancer survivors to experience stress, such as fear of recurrence, which has negative impacts on their psychological well-being [[5](#_ENREF_5)]. Therefore, research is needed to provide information on what factors can help support the breast cancer survivors’ psychological well-being [[6](#_ENREF_6)].

In theory, higher levels of optimism can convey beneficial effects on psychological well-being through buffering the negative effects of stress a person may experience [[7](#_ENREF_7)]. In addition, higher levels of optimism and lower levels of stress in breast cancer patients could improve their immune response [[8](#_ENREF_8)].

Existing evidence from longitudinal studies shows that optimism can lead to better coping with stressors and better mental well-being in the general population [[7](#_ENREF_7), [9](#_ENREF_9)]. With the intention of helping women with breast cancer to cope with cancer-related psychological distress, some clinicians, charities and health promotion campaigns encourage people with cancer to “be strong” and “be optimistic” [[10](#_ENREF_10), [11](#_ENREF_11)]. It is also common for breast cancer survivors to use psychological therapies, such as cognitive behaviour therapy, to help them cope with their emotions more optimistically [[12-14](#_ENREF_12)].

Supporting the utility of these psychological therapies, cross-sectional studies have shown that optimism is associated with better mental well-being in women with breast cancer [[15-17](#_ENREF_15)]. However, albeit people with higher levels of optimism can cope better with psychological distress [[18](#_ENREF_18)], general optimism in theory is considered an innate personality characteristic [[19](#_ENREF_19)]. Further, existing studies on optimism and mental well-being in breast cancer survivors have not taken into consideration the effects of the women’s general health. General health, which takes into account physical health, is a key factor to consider in research examining associations between optimism and psychological distress in patients with breast cancer because a cancer diagnosis is likely to lead to both poorer general health and psychological distress [[1](#_ENREF_1), [3](#_ENREF_3), [20](#_ENREF_20), [21](#_ENREF_21)]. Further, poorer general health is associated with lower levels of optimism [[22](#_ENREF_22)]. Therefore, general health is a key possible confounding factor in the relationship between optimism and symptoms of psychological distress.

The aim of the study is to examine the association between optimism and symptoms of psychological distress in women living with breast cancer, after adjusting for the effects of general health. Findings have implications for the delivery of supportive care interventions to reduce psychological distress in breast cancer survivors and for future research directions in supportive cancer care.

# Methods

## Data source

The Scottish Health Survey (SHeS) is an annual nationally representative cross-sectional survey of the health of the Scottish population. The data were drawn from the 2008, 2009, 2010, and 2011 SHeS (N = 36,811), with record linkage to cancer registry data. The SHeS is a general population health survey of Scottish non-institutional residents. The survey provides a nationally representative cross-sectional sample survey of health and health behaviours [[23](#_ENREF_23)]. Information and Statistics Division, the body responsible for health data in Scotland, has linked the SHeS to various administrative data sources. In this study, linked data from The Scottish Cancer Registry (linkage consent by SHeS participants over 90% [[24](#_ENREF_24)]) were used to identify which participants had previously been diagnosed with cancer.

## Sample

The sample was classified into a breast cancer group or a control group without a previous cancer diagnosis. Females aged 18 or over at the time of survey with one linked registration of pre-existing breast cancer were included in the breast cancer group. Females aged 18 or over without any type of cancer according to the linked data were included in the no cancer control group. This resulted in a total sample of 12,255 women, with 295 women in the breast cancer group, and 11,960 women in the no cancer control group (see Figure 1).

## Measures

General health was measured by an item that asked participants to rate their health on a five-point scale from “very good” to “very bad”. Higher scores indicated poorer levels of general health. Self-rated health has been demonstrated to provide a valid measure of general health, for example being strongly associated with mortality [[25](#_ENREF_25)].

Optimism was measured by an item that asked participants how much they had been feeling optimistic about the future in the last two weeks. Responses were made on a five-point Likert scale from “none of the time” to “all of the time”. Higher scores indicated higher levels of optimism [[26](#_ENREF_26)].

The outcome variable was psychological distress. Symptoms of psychological distress were measured using the General Health Questionnaire (GHQ) [[27](#_ENREF_27)]. The GHQ is a 12-item scale that measures psychological well-being using a “yes” or “no” response. Participants were asked to rate their health in general over the past few weeks. An example item is “Feeling unhappy and depressed”. Consistent with previous research [[28](#_ENREF_28)], a cut-off of four or more symptoms were categorised as psychological distressed.

Control variables included the following: age at survey, years since breast cancer diagnosis in the breast cancer group (1 to 4 years ago, 5 to 10 years ago, >10 years ago), survey year, socio-economic status (National Statistics Socioeconomic Classification [NS-SEC] which classifies people by occupations groups from managerial and professional, intermediate, routine and manual) [[29](#_ENREF_29)], highest level of education (no formal qualification, high school or certificate or diploma, university degree or above), marital status (not partnered, partnered), body mass index (underweight or normal, overweight, obese), smoking status (current smoker, ex-smoker, never smoked), alcohol consumption (drinker, non-drinker). These variables were included in the study because each has been associated with the outcome variable psychological distress [[21](#_ENREF_21), [28](#_ENREF_28), [30-33](#_ENREF_30)].

## Statistical analysis

Sample characteristics were compared between the no cancer control group and breast cancer group. Means were estimated for age, optimism, and poor general health. Percentages were estimated for socio-economic status, education, marital status, body mass index, smoking status, alcohol consumption, and psychological distress. The 95% Confidence intervals (95%CI) were reported.

Spearman’s correlation analyses were conducted to examine the univariate association between optimism, poor general health, and psychological distress. The correlation between optimism and poor general health was examined for possible inter-correlation issues. If the inter-correlation is strong, using a cut-off of >.75, then it would be deemed inappropriate for both the variables to be entered into one regression analysis. In addition, the correlation analyses were used to examine the univariate associations between both optimism and poor general health with levels of psychological distress.

Binary logistic regression analyses were conducted to examine the effects of optimism (explanatory) on psychological distress (outcome, not distressed as referent category). To answer the research question, a three step approach was employed. Model one included optimism alone as the explanatory variable. Model two included optimism and poor general health as the explanatory variables to examine the effects of optimism on psychological distress after adjusting for the effects of poor general health. Model three included optimism, poor general health, and all control variables, to examine whether the effects were consistent after adjusting for the control variables. For the control variables, age and survey year were entered as continuous variables, and all other control variables were entered as categorical. Separate analyses were conducted in the control group and breast cancer group.

Missing data (0.05% of the data) were imputed using multiple imputations across all variables examined in the study. Results were compared and found to be consistent between analyses conducted using the original and imputed dataset. The results based on the multiple imputation data are presented.

# Results

Sample characteristics are presented in Table 1. Compared to the control group, the breast cancer group was older, had lower education, were more likely to have quit smoking, and were less likely to drink. Overall, the breast cancer group (M=2.51, 95%CI=2.39-2.62) had poorer general health than the no cancer control group (M=1.97, 95%CI=1.95-1.99). Optimism levels were similar between the breast cancer group (M=3.19, 95%CI=3.08-3.30) and no cancer control group (M=3.27, 95%CI=3.25-3.28). The percentage of women who were psychologically distressed were similar between the breast cancer group (16.6%, 95%CI=16.0-17.3) and control group (16.9%, 95%CI=16.3-17.6).

<Please insert Table 1 about here>

Spearman’s correlation results showed a significant correlation between optimism and poor general health in both the no cancer group (r=-0.30, p<0.001) and breast cancer group (r=-0.26, p<0.001). The effect sizes of these correlations are moderately weak, and therefore these variables are appropriate for entering into regression analyses together as independent variables. As expected higher levels of poor general health, but lower levels of optimism, were associated with higher levels of psychological distress. These associations were observed in both the no cancer group and breast cancer group (poor general health with psychological distress r=0.47, p<0.001 and r=0.31, p<0.001; optimism with psychological distress r=-0.25, p<0.001 and r=-0.24, p<0.001, respectively).

Logistic regression results are presented in Table 2. In Model 1, it was observed that higher levels of optimism were significantly associated with lower odds of psychological distress (not distressed as referent category) in both the no cancer control group (OR=0.57, 95%CI=0.54-0.60) and breast cancer group (OR=0.64, 95%CI=0.47-0.88). In Model 2, after adjusting for general health, optimism remained significantly associated with psychological distress in the no cancer control group (OR=0.50, 95%CI=0.44-0.57). However, the same observation was not so for those in the breast cancer group, for whom optimism was not significantly associated with psychological distress after adjusting for general health (OR=1.15, 95%CI=0.32-4.11). Higher levels of poor general health were associated with higher odds of psychological distress in both the no cancer control group (OR=1.47, 95%CI=1.25-1.72) and the breast cancer group, with a very strong effect in the breast cancer group (OR=4.98, 95%CI=1.32-18.75). The results held after adjusting for age, socio-economic status, education, marital status, body mass index, smoking status, and alcohol consumption.

<Please insert Table 2 about here>

# Discussion

Our study is to our knowledge the first to examine the effects of optimism on symptoms of psychological distress in breast cancer survivors, after taking into consideration the effects of general health. We found that after adjusting for general health, optimism was associated with reduced psychological distress in the general cancer-free population, but not in breast cancer survivors. In women with breast cancer, general health was a more important factor that determined levels of psychological distress. Our results suggest that psychological interventions that promote optimism for women living with breast cancer need to incorporate components that can address the women’s general health, as optimism alone did not appear to be much help among women living with breast cancer.

If optimism has limited ability to help breast cancer survivors, then questions arise as to what supportive care factors can help them better cope with psychological distress and improve quality of life. A recent study found that breast cancer survivors with higher levels of social support reported better physical and mental quality of life [[34](#_ENREF_34)]. Therefore, promoting the importance of social support may help improve mental well-being in breast cancer survivors. In relation to this, another study found that social support mediated the association between optimism and psychological distress in breast cancer survivors [[35](#_ENREF_35)]. The study was based on women with early-stage breast cancer, with relatively good health compared to women with late-stage breast cancer. From these studies, it is reasonable to conclude that social support is an effective protective factor for psychological well-being in breast cancer survivors with early-stage disease. This finding is valuable given that the majority of women with breast cancer are now diagnosed at an early stage, due to the availability of mammography breast screening leading to early detection of breast cancer [[36](#_ENREF_36)]. Further research is required to examine the protective factors for psychological well-being in breast cancer survivors with poorer health and more severe disease.

Our findings should be interpreted in light of a number of study limitations. First, the data were cross-sectional and therefore temporal effects cannot be determined. However, existing psychology theories and literature based on longitudinal studies supports the role of optimism in leading to better mental well-being [[7](#_ENREF_7)]. Therefore, it is supported that optimism is a relatively stable personal attribute that is the explanatory factor in its relationship with psychological distress.

Second, survival bias may have influenced our results. The study was based on cross-sectional data thus women who have very poor health are likely to be under-represented in this study assuming their life expectancy is shorter. Bias might, for example, be introduced if those with severe cancer died particularly prematurely and were thus under-represented.

Third, reliance on self-reported measures on psychological distress may have introduced a second source of bias. Overall levels of psychological distress are likely to have been under-reported [[37](#_ENREF_37)]. However, because of our large sample size, we were able to have an adequate number of participants in the psychologically distressed group for well-powered statistical analyses. It is also possible that participants who were psychologically distressed could have a pessimistic reporting bias, and therefore may be likely to under-report levels of general health. Therefore, the association between psychological distress and optimism with general health could have been inflated. Indeed, previous research on the association between optimism and physical health have shown that the associations were stronger when the measures of physical health were subjective rather than objective [[38](#_ENREF_38)]. However, given that overall levels of psychological distress in the current sample was not very high, general health’s association with optimism and psychological distress were unlikely to be greatly affected.

Fourth, we do not have information on what treatment the breast cancer patients received. A previous study found that chemotherapy patients had higher levels of psychological distress compared to radiotherapy or surgery patients [[39](#_ENREF_39)]. With the increasing consideration of patients’ choice in treatments, this area requires future research. Fifth, the study examined optimism in general, which was the aim of the study. The study did not examine specific aspects of optimism. It is possible that specific aspects of optimism could be associated with breast cancer patients’ level of psychological distress differently, and this may be a possible future research direction.

Finally, our analyses were limited by the available variables in the SHeS data. The available measure of optimism was a single-item measure. Therefore we were unable to examine what specific aspects the women were optimism about. Similarly, general health was also broad and non-specific. Poor psychological health could bias participant response to the general health item, with psychologically distressed participants more likely to rate their general health as lower than non-distressed participants. This could result in over-adjusting and lead to the non-significant result of optimism on psychological distress. However, we found that the associations between optimism and general health were only weak. In addition, the presence of a no cancer control group in our study enabled a comparison, in which results indicated that there was an optimism effect in this group. Therefore, the absence of an optimism effect on psychological distress in the breast cancer group is unlikely to be due to the problem of over-adjusting, and rather our results indicated that the effects of optimism on psychological distress is health-specific.

In conclusion, in contrast to women in the general population without cancer, optimism was not associated with mental well-being after adjusting for the effects of poorer general health in breast cancer survivors. The study identified that general health is an important predictor of psychological distress among women with a breast cancer diagnosis. Hence, this research confirms the value of multicomponent supportive care interventions for women with breast cancer. Specifically, it suggests that following breast cancer diagnosis, healthcare professionals need to provide advice and signpost to services that assist women to maintain or improve both their psychological and general health.

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# Conflict of interest

The authors declare that they have no conflict of interest.

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