ORIGINAL ARTICLE

CONTENTS

Psychological well–being in breast cancer patients: the role of social support in managing anxiety and depression

Nataliia V. Zaviazkina, Tetiana Nefedova
KYIV INSTITUTE OF MODERN PSYCHOLOGY AND PSYCHOTHERAPY, KYIV, UKRAINE

ABSTRACT

Aim: To investigate the role of social support in the relationship between psychological well-being, anxiety, and depression among breast cancer patients.

Materials and Methods: A cross-sectional study included 98 women with breast cancer. Measures used were the Psychological General Well-being Index (PGWBI), the Hospital Anxiety and Depression Scale (HADS), the Multidimensional Scale of Perceived Social Support (MSPSS), and a sociodemographic questionnaire. Descriptive statistics, Cronbach's alpha, and regression analyses with moderation and mediation were conducted. T-tests estimated statistical significance in regression. Mediation effects were assessed using the quasi-Bayesian Monte Carlo method with bootstrapping.

Results: The initial linear regression analysis showed a strong negative relationship between anxiety/depression (HADS) and psychological well-being (PGWBI), with higher HADS scores were linked to lower psychological well-being. The regression analysis for social support (MSPSS) indicated a positive but small effect on psychological well-being. The moderation analysis showed no significant interaction between social support and anxiety/depression on psychological well-being. However, the mediation analysis demonstrated that social support significantly improves psychological well-being by reducing anxiety and depression, with a substantial proportion of the effect mediated.

Conclusions: The study found that while social support does not moderate the relationship between anxiety, depression and psychological well-being, it significantly enhances psychological well-being by reducing anxiety and depression.

KEY WORDS: breast cancer, psychological well-being, anxiety, depression, social support, psychodiagnostics

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INTRODUCTION

Breast cancer diagnosis can have significant negative impact on mental health, causing problems like psychological distress, anxiety, post-traumatic stress, and depression [1]. At the same time, it remains one of the most common types of cancer in women worldwide. The diagnosis and treatment process may provoke substantial challenges that can persist even after remission [2].

Research indicates that anxiety and depression are among the most common psychological symptoms experienced by women at all stages of breast cancer [3]. These symptoms can severely undermine psychological well-being, affecting the quality of life and, in many cases, treatment outcomes [4,5].

Social support, in its turn, plays a crucial role in the experience of breast cancer patients. Research has shown that higher levels of emotional support are associated with lower levels of fatigue, pain interference, depressive symptoms and anxiety [6,7]. Moreover, social support has been studied as a mediator in the relationship between resilience and quality of life [8], between optimism and distress in early-stage breast cancer survivors [9], and between body image and depressive symptoms and post-traumatic growth (PTG) in breast cancer patients [10]. However, the role of social support as a mediator between anxiety, depression and well-being in breast cancer patients has not been sufficiently explored.

AIM

Thus, the aims of the study are:

1. Examine whether social support moderates the relationship between psychological well-being (PGWBI) and anxiety/depression (HADS) in breast cancer patients.
2. Determine whether social support enhances psychological well-being (PGWBI) by reducing anxiety and depression (HADS), thereby serving as a mediator in this relationship.

MATERIALS AND METHODS

SAMPLE

The study involved 98 female breast cancer patients from Ukraine, recruited through specialized thematic groups for cancer patients on the social network Facebook, including the groups "Athena. Women against cancer" and "Inspiration family. All about cancer", as well as among women undergoing psychotherapy using transactional analysis. Inclusion criteria were: (1) diagnosis of breast cancer within the last five years (including those currently in remission), (2) age between 18 and 70 years, and (3) willingness to participate in the study and provide informed consent. Exclusion criteria included: (1) diagnosis of any major psychiatric disorder, (2) inability to complete the questionnaires due to cognitive impairment or language barriers.

The inclusion of participants who had been diagnosed with breast cancer within the last five years, including those currently in remission, was intentional to capture a comprehensive range of psychological experiences and states. Breast cancer diagnosis and treatment significantly impact psychological well-being, and these effects can persist long after treatment has concluded [11].

The final sample consisted of 98 participants (Table 1) with a mean age of M = 43.19 (SD = 8.05).

Demographic data collected included:

- Age;
- Marital status;
- Presence of children;
- Financial status;
- Stage of cancer;
- Presence of breast reconstruction;
- Presence of somatic diseases.

MEASURES

Psychological well-being, anxiety, depression, and perceived social support were assessed using several validated scales:

PSYCHOLOGICAL WELL-BEING

Psychological well-being was assessed using the Psychological General Well-being Index (PGWBI) [12]. This

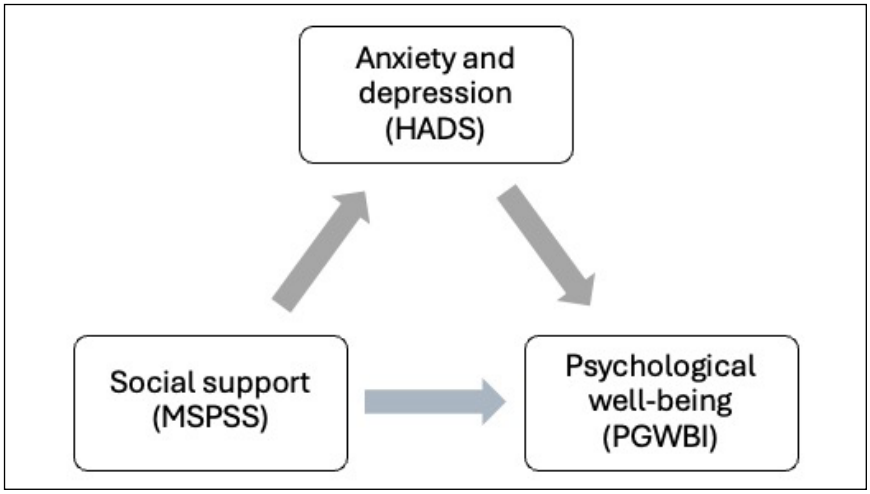

Fig. 1. Model illustrating the moderating role of social support (MSPSS) on the relationship between anxiety/depression (HADS) and psychological well-being (PGWBI) in breast cancer patients.

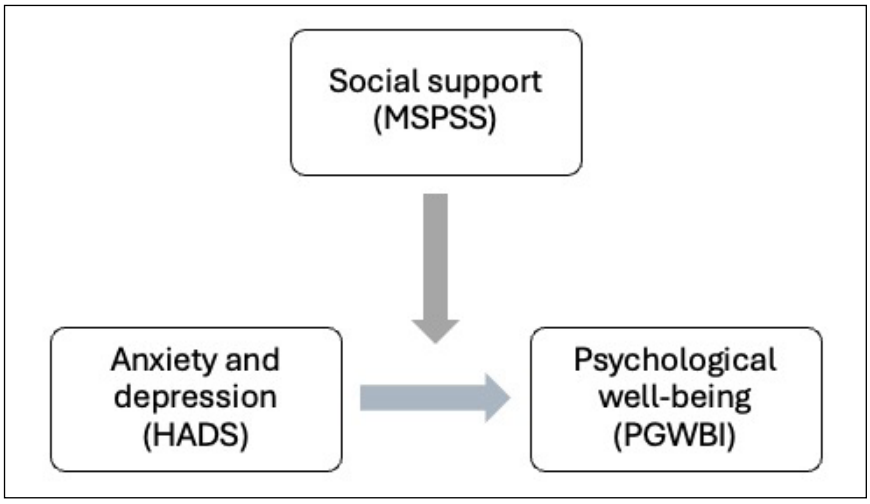

Fig. 2. Model illustrating the mediating role of anxiety and depression (HADS) in the relationship between social support (MSPSS) and psychological well-being (PGWBI) in breast cancer patients.

Table 1. Sample characteristics

Age	**M = 43.19, SD = 8.05**
Marital Status	
Single	16,33%
Married	62,24%
Living together/civil union	7,14%
Divorced	9,18%
Widowed	5,10%
Children	
None	28,57%
One	40,82%
Two	22,45%
Three or more	8,16%
Financial status	
1 (the poorest)	8,16%
2	35,71%
3	33,67%
4 (the richest)	22,45%
The stage of the disease	
Stage 0	13,27%
Stage IA / IB	9,18%
Stage IIA / IIB	17,35%
Stage IIIA / IIIB / IIIC	11,22%
Stage IV	15,31%
Recurrence	10,20%
Remission	33,67%
Breast reconstruction	
Yes	33,67%
No	66,33%
Somatic diseases	
Yes	32,65%
No	67,35%

scale includes questions covering six domains: general state of health, anxiety, depressive symptoms, positive well-being, self-control, and viability. Respondents were asked to rate the extent to which each statement applies to them on a scale from 0 (always) to 5 (never). When summed, the possible range of scores can range from 0 to 110, with higher values indicating higher psychological well-being.

ANXIETY AND DEPRESSION

The Hospital Anxiety and Depression Scale (HADS) was used to assess anxiety (HADS-A) and depression (HADS-D) levels [13]. The scale contains 14 items, of which 7 are designed to assess anxiety and the other 7 are depression. Responses are provided on a 4-point scale, with scores ranging from 0 to 21 for each subscale, with higher values indicating higher levels of anxiety or depression.

SOCIAL SUPPORT

The perception of social support was assessed using the Multidimensional Scale of Perceived Social Support (MSPSS) [14]. The scale contains 12 items divided into three subscales: support from family, friends, and a significant other. Respondents answered the questions on a 7-point scale from 1 (very weak) to 7 (very strong), where higher values indicate a higher level of perceived support.

The reliability of the scales used was assessed using Cronbach's α internal consistency index (Table 2).

Table 2. Reliability of the psychodiagnostic measures used

Scale/subscales	Cronbach's alpha (α)
PGWBI	0,95
Positive well-being	0,86
Anxiety	0,89
Depression	0,86
Self-control	0,67
General state of health	0,72
Viability	0,86
HADS	0,84
Depression	0,75
Anxiety	0,78
MSPSS	0,92
Significant Other	0,91
Family	0,91
Friends	0,92

Table 3. Linear regression analysis results for the effect of anxiety/depression on psychological well-being

Measure	Estimate	Std. Error	t-value	p-value	Significance
Intercept	96.91	2.53	38.35	<2e-16	***
HADS	-2.43	0.14	-17.01	<2e-16	***

Multiple $R^2 = 0.7509$
Adjusted $R^2 = 0.7483$

Notes: $p \leq 0$ '***', $p \leq 0.001$ '**', $p \leq 0.01$ '*', $p \leq 0.05$ '', $p \leq 0.1$, '-' 1.

Table 4. Linear regression analysis results for the effect of social support on psychological well-being

Measure	Estimate	Std. Error	t-value	p-value	Significance
Intercept	33.72	7.55	4.47	2.15e-05	***
MSPSS	0.39	0.12	3.24	0.00162	**

Multiple $R^2 = 0.09878$
Adjusted $R^2 = 0.0894$

Notes: $p \leq 0$ '***', $p \leq 0.001$ '**', $p \leq 0.01$ '*', $p \leq 0.05$ '', $p \leq 0.1$, '-' 1.

PROCEDURE

Data collection conducted in August 2022 via SurveyMonkey. Participants were informed about the study's purpose and procedures, and informed consent was obtained from all participants prior to data collection. The questionnaires were administered online, and all data were anonymized to ensure confidentiality.

HYPOTHESES

1. Social support (MSPSS) moderates the relationship between psychological well-being (PGWBI) and anxiety/depression (HADS) in breast cancer patients (Fig. 1).
2. Social support (MSPSS) enhances psychological well-being (PGWBI) by reducing anxiety and depression (HADS), thereby serving as a mediator in this relationship (Fig. 2).

MODERATION ANALYSIS

As illustrated in Fig. 1., to examine whether social support moderates the relationship between psychological well-being (PGWBI) and anxiety/depression (HADS), moderation analyses were conducted using the 'interaction' term between social support and psychological well-being. In these analyses, PGWBI served as the dependent variable (DV), HADS (anxiety and depression) as the independent variable (IV), and MSPSS as the moderator (M). Regression analyses were used to test these relationships, and t-tests were employed to estimate the statistical significance of the regression coefficients.

The model was specified as follows:

$$PGWBI = \beta_0 + \beta_1 HADS + \beta_2 MSPSS + \beta_3 (HADS \times MSPSS) + \epsilon.$$

Table 5. Moderation analysis results for the effect of anxiety/depression on psychological well-being with social support as a moderator

Measure	Estimate	Std. Error	t- value	p-value	Significance
Intercept	96.99	9.79	9.91	2.88e-16	***
HADS	-2.56	0.47	-5.42	4.60e-07	***
MSPSS	-0.01	0.15	-0.07	0.95	-
Interaction: HADS*MSPSS	0.002	0.008	0.37	0.71	-
Multiple R^2 = 0.7522 Adjusted R^2 = 0.7443					

Notes: p ≤ 0 '***', p ≤ 0.001 '**', p ≤ 0.01 '*', p ≤ 0.05 '', p ≤ 0.1, '-' 1.

Table 6. Mediation analysis results for the effect of social support on psychological well-being through anxiety/depression as a mediator

Measure	Estimate	95% CI Lower	95% CI Upper	p-value	Significance
ACME	0.35	0.15	0.56	<2e-16	***
ADE	0.04	-0.09	0.16	0.57	-
Total effect	0.38	0.15	0.62	<2e-16	***
Proportion Mediated	0.90	0.59	1.39	<2e-16	***
Sample Size Used			98		
Simulations			1000		

Notes: p ≤ 0 '***', p ≤ 0.001 '**', p ≤ 0.01 '*', p ≤ 0.05 '', p ≤ 0.1, '-' 1.

MEDIATION ANALYSIS

To investigate whether social support mediates the relationship between psychological well-being and anxiety/depression (Fig. 2), mediation analyses were performed. In these analyses, PGWBI was the independent variable (IV), HADS (anxiety and depression) were the dependent variables (DV), and MSPSS was the mediator (M). The mediation effect was assessed using the quasi-Bayesian Monte Carlo method with bootstrapping (5,000 resamples). The indirect effect was considered significant if the 95% confidence interval did not include zero.

The mediation model was specified with three steps:

1. The effect of MSPSS on the mediator (HADS):

$$HADS = \beta_0 + \beta_1 MSPSS + \epsilon$$

2. The effect of the mediator (HADS) on the dependent variable (PGWBI), including the independent variable (MSPSS):

$$PGWBI = \beta_0 + \beta_1 HADS + \beta_2 MSPSS + \epsilon$$

3. The total effect of MSPSS on PGWBI (without including HADS in the model):

$$PGWBI = \beta_0 MSPSS + \epsilon.$$

DATA CLEANING AND PREPARATION

Data cleaning and preparation were performed using Microsoft Excel (version 16.70). This included handling missing data, checking for outliers, and ensuring the accuracy of data entry. Descriptive statistics and reliability analyses (Cronbach's alpha) were conducted to evaluate the internal consistency of the measures.

STATISTICAL ANALYSIS

All statistical analyses were conducted using RStudio (version 2022.07.1). including descriptive statistics (means, standard deviations, frequencies), reliability analysis (Cronbach's alpha), simple linear regression (using '*lm*' function with t-tests for significance), moderation analysis (interaction terms and regression analysis using '*lm*' function with t-tests for significance), mediation analysis (quasi-Bayesian Monte Carlo method with bootstrapping using the '*mediation*' package with significance testing), and significance testing (two-tailed tests with p-value < 0.05).

RESULTS

Initially, simple linear regression analyses were performed to evaluate the individual contributions of anxiety/depression and social support to psychological well-being. These models aimed to understand the direct impact of each predictor on the dependent variable. The regression analysis results for the effect of anxiety/depression on psychological well-being are summarized in Table 3 below.

The model demonstrates that higher scores on the Hospital Anxiety and Depression Scale (HADS) are associated with lower levels of psychological well-being (PGWBI), as indicated by the regression coefficient for HADS (-2.43, p < 2e-16). Specifically, each one-unit increase in the HADS score corresponds to a 2.43-unit decrease in psychological well-being. The intercept (96.91, p < 2e-16) suggests that in the absence of

anxiety and depression symptoms, individuals have high psychological well-being. The model explains approximately 75.09% of the variance in psychological well-being (Multiple $R^2 = 0.7509$, Adjusted $R^2 = 0.7483$), indicating a strong fit and robustness of the findings. These results underscore the substantial impact of anxiety and depression on psychological well-being, emphasizing the necessity for effective interventions to address these mental health issues.

As a next step, a simple linear regression analysis was conducted to evaluate the impact of social support on psychological well-being (Table 4).

This analysis revealed a positive relationship between these variables. The results indicate that higher levels of social support, as measured by the Multidimensional Scale of Perceived Social Support (MSPSS), are significantly associated with increased psychological well-being (PGWBI). Specifically, the regression coefficient for MSPSS is 0.39 ($p = 0.00162$), suggesting that for each one-unit increase in social support, psychological well-being improves by 0.39 units. The intercept of the model is 33.72 ($p = 2.15e-05$), indicating the baseline level of psychological well-being when social support is absent. Although the relationship between social support and psychological well-being is statistically significant, the model explains a relatively modest portion of the variance in psychological well-being, with Multiple $R^2 = 0.09878$ and Adjusted $R^2 = 0.0894$.

As a further step, a moderation analysis was conducted to evaluate the effect of anxiety/depression on psychological well-being with social support as a potential moderator. This analysis sought to understand whether social support influences the strength or direction of the relationship between anxiety/depression and psychological well-being (Hypothesis I). The results are presented in Table 5 below.

The regression analysis revealed that anxiety/depression, as measured by the Hospital Anxiety and Depression Scale (HADS), continues to have a significant negative impact on psychological well-being (Estimate = -2.56, $p = 4.60e-07$). The intercept (96.99, $p = 2.88e-16$) indicates the baseline level of psychological well-being in the absence of anxiety/depression and social support influences. Social support (MSPSS) alone did not show a significant main effect on psychological well-being (Estimate = -0.01, $p = 0.95$). Importantly, the interaction term between HADS and MSPSS (Estimate = 0.002, $p = 0.71$) was also not significant, suggesting that social support does not moderate the relationship between anxiety/depression and psychological well-being.

The model explains a substantial portion of the variance in psychological well-being, with Multiple $R^2 = 0.7522$ and Adjusted $R^2 = 0.7443$, indicating that approximately 75.22% of the variance is accounted for by the predictors and their interaction. These findings suggest that while anxiety/depression significantly affects psychological well-being, the level of social support does not alter this relationship.

To further explore the relationship between social support and psychological well-being, a mediation analysis was performed to determine whether the effect of social support on psychological well-being is mediated by anxiety/depression (Table 6).

The Average Causal Mediation Effect (ACME) was found to be significant (Estimate = 0.35, 95% CI [0.15, 0.56], $p < 2e-16$), indicating that anxiety/depression mediates the relationship between social support and psychological well-being. This suggests that a portion of the effect of social support on psychological well-being operates through its impact on anxiety/depression. Specifically, as social support increases, it reduces anxiety/depression, which in turn enhances psychological well-being.

The Average Direct Effect (ADE) of social support on psychological well-being, excluding the mediation effect, was not significant (Estimate = 0.04, 95% CI [-0.09, 0.16], $p = 0.57$), indicating that social support does not directly affect psychological well-being when controlling for anxiety/depression.

The total effect of social support on psychological well-being was significant (Estimate = 0.38, 95% CI [0.15, 0.62], $p < 2e-16$), confirming that social support positively impacts psychological well-being, and this effect is largely mediated by anxiety/depression.

The proportion of the effect mediated was very high (Proportion Mediated = 0.90, 95% CI [0.59, 1.39], $p < 2e-16$), indicating that approximately 90% of the total effect of social support on psychological well-being is mediated through its effect on anxiety/depression.

In summary, while social support does not moderate the impact of anxiety/depression on psychological well-being, it significantly enhances psychological well-being by acting as a mediator, reducing anxiety and depression among breast cancer patients.

DISCUSSION

The results of this study add to the growing amount of research examining the relationships between social support, anxiety, depression, and psychological well-being in breast cancer patients. The initial hypothesis posited that social support (as measured by the MSPSS) would moderate the relationship between psychological well-being (PGWBI) and anxiety/depression (HADS). However, the results from the moderation analysis did not support this hypothesis. In particular,

social support did not show a significant impact on the strength or direction of the relationship between anxiety/depression and psychological well-being. This finding contrasts with some existing studies that suggest a buffering role of social support in mitigating the adverse effects of psychological distress [15].

At the same time, the mediation analysis strongly supported the second hypothesis, showing a significant indirect pathway through which social support improves psychological well-being by reducing anxiety and depression. The significant Average Causal Mediation Effect (ACME) indicates that social support positively impacts psychological well-being by lowering symptoms of anxiety and depression. This finding aligns with previous research that indicates the role of social support in enhancing quality of life [7,8]. The high proportion of the effect mediated (90%) emphasizes that social support mostly reduces anxiety and depression, rather than having direct effects, leading to improved psychological well-being.

These findings emphasize the critical role of social support in the mental health framework of breast cancer patients. Specifically, interventions aimed at enhancing social support should focus not only on providing emotional and practical assistance but also on strategies that specifically target anxiety and depression.

CONCLUSIONS

This study explored the role of social support in moderating and mediating the relationship between anxiety, depression and psychological well-being in breast cancer patients. The findings did not support the hypothesis that social support moderates this relationship between anxiety, depression and psychological well-being. However, the mediation analysis revealed that social support significantly enhances psychological well-being by reducing anxiety and depression, with a substantial portion of its effect operating through this indirect pathway.

These results underscore the importance of addressing mental health symptoms in interventions designed to enhance social support for breast cancer patients. While social support may not buffer the direct impact of anxiety and depression, it significantly improves psychological well-being by alleviating these symptoms.

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CONFLICT OF INTEREST
The Authors declare no conflict of interest

CORRESPONDING AUTHOR
Nataliia V. Zaviazkina
Kyiv Institute of Modern Psychology and Psychotherapy
34 Lesi Ukrainki boulevard, 01133 Kyiv, Ukraine
e-mail: nmuz@ukr.net

ORCID AND CONTRIBUTIONSHIP
Nataliia V. Zaviazkina: 0000-0001-5565-8959 A B C D E F
Tetiana Nefedova: 0000-0003-2714-9975 A B C D

A – Work concept and design, B – Data collection and analysis, C – Responsibility for statistical analysis, D – Writing the article, E – Critical review, F – Final approval of the article

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