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ORIGINAL RESEARCH

Model of Health-Related Quality of Life in Breast Cancer Patients Using Cross-Sectional Data: The Role of Resilience

Katarina Velickovic[1], Ulrika Olsson Möller[1–3], Lisa Ryden[4,5], Pär-Ola Bendahl[4], Marlene Malmström[1,3]

[1]Department of Health Sciences, Lund University, Lund, Sweden; [2]Department of Nursing and Integrated Health Sciences, Kristianstad University, Kristianstad, Sweden; [3]Institute for Palliative Care, Lund University and Region Skåne, Lund, Sweden; [4]Department of Clinical Sciences Lund, Lund University, Lund, Sweden; [5]Department of Surgery and Gastroenterology, Skåne University Hospital, Lund, Sweden

Correspondence: Katarina Velickovic, Department of Health Sciences, Lund University, Sölvegatan 19, Lund, 223 62, Sweden, Email katarina.velickovic@med.lu.se

Purpose: Resilience has been suggested as an important predictor of both physical and mental health-related quality of life in breast cancer patients. However, it is unclear why resilient women handle their diagnosis better, not only mentally, but also physically. The aim of this study was to investigate paths between resilience, physical activity, and mental, physical, and global health-related quality of life in breast cancer patients.

Patients and Methods: Structural equation modeling was conducted to evaluate the proposed structural paths using a sample of 638 women with newly diagnosed breast cancer patients from Sweden.

Results: Resilience was directly associated with physical activity and mental health-related quality of life. It was indirectly associated with physical functioning, through mental health-related quality of life and physical activity. Resilience was also indirectly associated with global quality of life, through mental health-related quality of life.

Conclusion: Mental health support and encouraging physical activity may be especially relevant to enhance all aspects of health-related quality of life early in the breast cancer process. Results should be replicated longitudinally.

Plain Language Summary: Receiving a breast cancer diagnosis can be highly disruptive to one's worldview and sense of normalcy. Many women with breast cancer describe the diagnostic period as even more stressful than receiving treatment. However, some women handle their breast cancer diagnosis better than others. Resilience is a psychological trait that refers to one's ability to cope with highly stressful events and maintain good wellbeing despite adversity. More resilient women were shown to handle a breast cancer diagnosis better, not only mentally, but also physically. They also describe their quality of life as higher than low resilient women. However, it is unclear why resilient women have not only better mental health, but also physical health. In this study, we addressed this question by examining the relationships between resilience, mental health, physical functioning, physical activity, and patients' self-reported quality of life. We found that mental health and physical activity explained the relationship between resilience and physical functioning and self-reported quality of life. This suggests that highly resilient women experience less psychological distress following a breast cancer diagnosis and are more inclined to maintain physical activity during this stressful period. Consequently, they may manage to have better physical functioning and evaluate their quality of life as better. This study highlights the importance of psychosocial support and encouraging physical activity in women with breast cancer who may struggle to cope with their diagnosis. This study implies that this can not only alleviate psychological distress, but also aid one's physical functioning and overall quality of life.

Keywords: structural equation modeling, psychological distress, physical activity, newly diagnosed breast cancer, health-related quality of life

Introduction

Breast cancer (BC) encompasses many challenges for women's physical and mental health. Lymphedema, pain,[1] hot flashes, loss of sexual function,[2] and fatigue[3] are commonly experienced, and depressive symptoms are more prevalent in

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women with BC as compared to age-matched women without BC.[4] Women with BC commonly experience fears of recurrence[5] and evaluate their health-related quality of life (HRQoL) as lower than women without BC.[6] Although consequences of BC on mental and physical HRQoL are well-established, it remains unclear how these may affect one another. The present study addresses this gap by evaluating a model of HRQoL in women with BC, focusing on the role of resilience.

Resilience has been found to be a strong predictor of HRQoL in women with BC. It relates to a set of characteristics that enables one to maintain good functioning in face of adversity,[7] such as a BC diagnosis. Resilient women with BC experience less distress,[8] fatigue,[9] depressive and anxiety symptoms, have higher physical functioning,[10] and need less social support.[11] Thus, resilience seems to be an important factor for both mental and physical HRQoL, although associations with psychological factors are stronger.[12] There is a lack of understanding of why resilient women seem to handle their BC better, not only mentally, but also physically. Moreover, resilience seems to be an especially strong predictor of global health and quality of life (QoL), ie women's self-evaluations of their health and QoL.[13] It remains unclear why this may be the case. A recent study in lung cancer suggested that resilience may influence symptom burden through reduced psychological distress.[14] It is thus possible that mental HRQoL is a mechanism through which resilience affects physical HRQoL. Another potential mechanism through which resilience may affect both physical and mental HRQoL is increased physical activity. Resilient women may have higher self-efficacy in relation to managing their health,[10] which may result in increased physical activity aimed at managing their symptoms and wellbeing. Physical activity during adjuvant treatment has been linked with improved physical functioning and decreased symptoms.[15]

Several models of resilience and HRQoL in cancer patients have been proposed[14,16] but they did not distinguish between mental and physical HRQoL, as well as global QoL. We aimed to separate psychological from physical and global HRQoL components to differentiate their associations with resilience. Mental HRQoL can be defined as consisting of cognitive and emotional components.[17] Cognitive functioning relates to memory and focus, whereas emotional functioning relates to the experience of psychological distress, ie symptoms of depression and anxiety.[18] In BC, physical HRQoL consists of physical functioning (ie ability to carry out physical tasks) and cancer-specific symptoms.[17] Global QoL relates to respondents' evaluations of health and QoL in general, rather than of specific elements.[19]

One way of investigating the relationships between resilience, physical HRQoL, mental HRQoL, and global QoL in unison is Structural Equation Modelling (SEM), which allows for a simultaneous analysis of multiple direct and indirect effects. The term "effect" is in this paper used in a statistical, not causal manner.

Aims

The main aim of this study was to investigate the relationships between resilience, physical activity, mental HRQoL, physical HRQoL, and global QoL.

Previous research has found that resilience is a predictor of mental,[8,10,13] physical,[10,13] and global HRQoL,[13] and that physical activity is beneficial for symptom reduction during adjuvant treatment.[15] Resilient women have also been found to have higher self-efficacy for managing their health during treatment.[10] We therefore propose physical activity could be a mechanism through which resilience affects mental and physical HRQoL. In addition, a recent model of HRQoL in lung cancer found that reduced distress may be a mechanism through which resilience influences symptom burden.[14] We thus further propose resilience may affect physical and global QoL through mental HRQoL.

We thus hypothesize the following paths:

1. Resilience has a direct positive effect on physical activity.
2. Physical activity positively affects both physical and mental HRQoL.
3. Resilience positively affects mental HRQoL directly, and indirectly, via increased physical activity.
4. Resilience positively affects physical HRQoL directly, and indirectly, via increased mental HRQoL and physical activity.
5. Resilience has a direct positive effect on global QoL and an indirect effect through increased mental HRQoL.
6. Mental and physical HRQoL have a direct positive effect on global QoL.

Materials and Methods

Participants and Procedure

The sample consisted of 638 women with newly diagnosed primary BC residing in southern Sweden. The sample was collected within the ReScreen project, a complex RCT study aimed at enhancing individualized rehabilitation for BC (NCT03434717).[20] Patients were allocated to the intervention group, control group or observational group, based on their score on the Distress Thermometer[21] at diagnosis. Patients with high distress (≥5) were randomized 1:1 to the intervention or control group, whereas the patients with low distress formed the observational group.[20] Primary endpoints include HRQoL, resilience, and distress.[21] Sample size evaluation was conducted for the RCT considering distress as the primary outcome. Assuming the same standard deviation (SD), 2.9 units, of the Distress Thermometer scores at the follow-up visit in the two randomized groups, 266 patients, ie 133 per group, were required for a two-sided two-sample *t*-test to have 80% power to detect a 1.0 unit mean difference. By further assuming that the observation group (distress <5) accounts for 60% of the patients in the study, the required sample size increased to 665.

Data collection for this study was conducted as the baseline measurement for ReScreen. Inclusion was conducted between 2019 and 2022 at the local University and a county hospital. Inclusion criteria were primary BC diagnosis, age ≥ 18, knowledge of Swedish, and cognitive ability to participate. Exclusion criteria were recurrent disease, pregnancy, cognitive impairment, substance abuse, and severe mental illness. Patients who met the inclusion criteria were contacted by the contact nurse at the hospital one to two weeks after diagnosis. The contact nurse provided written and oral information about the study and informed them that participation is voluntary, and that they can withdraw from the study without it affecting their treatment, after which patients signed the consent document. Patients filled in the baseline instruments at the outpatient center. Clinical data were collected from patients' medical records. Data quality control was conducted according to a predefined monitoring plan.

Measures

Resilience

A latent variable representing resilience was constructed using the items from the Swedish version of the Connor-Davidson Resilience Scale (CD-RISC).[22] Both a 25-item and a brief (10-item) form[23] of CD-RISC were evaluated. CD-RISC assesses various components of resilience. A summary score is calculated by summarizing scores on all items.[24] Participants indicate whether they agree with each statement on a Likert scale from 0 ("Not true at all") to 4 ("True nearly all the time"). Internal consistency of the 10-item CD-RISC was high (α = 0.88).

Physical Activity

Physical activity is a latent variable measured using five Likert-based items. Two items assess time one spends weekly doing vigorous and mild exercise on a 6-point and 7-point Likert scale, ranging from "Zero minutes" to "More than 300 minutes" for mild and "More than 120 minutes" for vigorous activity. One item assesses the extent to which one's work is physically demanding on a 5-point Likert scale. Two items assess time spent on rest during weekdays and the weekend on a 5-point Likert scale, ranging from "Zero to two hours" to "More than eight hours".

Mental HRQoL

A latent variable representing mental HRQoL was constructed using the emotional functioning (EF) and cognitive functioning (CF) subscales from the EORTC Quality of Life Questionnaire-Core 30 (QLQ-C30 version 3.0),[25] as well as the future perspective (FP) subscale from the breast cancer module of QLQ (QLQ-BR23)[26] and distress thermometer (DT).[21] The EF subscale contains four items, assessing how worried, irritable, depressed, and tense one felt during the week prior, whereas the CF subscale contains two items relating to focusing and memory problems. FP includes one item, measuring worry about future health. Items are rated on a 4-point Likert scale. DT contains one item, measuring amount of experienced psychological distress. Internal consistency of EF was high (α = 0.82), and of CF acceptable (α = 0.77).

Physical HRQoL

Subscales of QLQ-C30[25] were examined to avoid confounding between psychological and physical components of HRQoL. The physical functioning subscale (PF) is the only subscale that relates only to the physical health factor, unlike role functioning (RF) and social functioning (SF), which relate to both physical and mental HRQoL.[17] PF is assessed with five

items. Participants report on a 4-point Likert scale whether they have trouble performing various physical activities. Internal consistency of PF was acceptable (α = 0.77). From the symptom subscales, nausea and vomiting, dyspnoea, appetite loss, constipation, and diarrhea correspond only to physical health, whereas pain, fatigue, and insomnia correspond to both physical and mental HRQoL.[17] Therefore, only the former five symptom subscales were retained.

Global QoL

A latent variable representing global QoL was constructed from two items from QLQ-C30[25] pertaining to global health status and global QoL. Participants report how they would rate their health and QoL on a 7-point Likert scale. Internal consistency was high (α = 0.88).

Statistical Analysis

First, the measurement model containing the specified latent variables was assessed using Confirmatory Factor Analysis (CFA). Next, SEM was used to assess the structural model, including the overall fit of the model and strength of the hypothesized direct and indirect paths. The Yuan-Bentler scaled test statistic was employed as a correction for non-normal distribution of variables. Robust standard errors are reported. The $\chi 2$ and incremental (CFI and TLI >.9) and absolute (RMSEA < 0.06 and SRMR < 0.08) goodness-of-fit indices were employed to evaluate model fit.[27] Criterion for factor loadings in the measurement model was ≥ 0.4, ie items with at least 16% of the variance explained by the factor were retained. Missing data were handled using Full Information Maximum Likelihood estimation. Overall, participants with missing data (< 5%) were not significantly different on other variables included in the model, indicating data were missing at random (MAR), conditional on the variables included in the model (see Supplementary Tables 1–6). Modification Indices were inspected to guide model refinement. All reported β coefficients are standardized. Software employed to perform the analyses was R version 4.2.2[28] using the lavaan package.[29] Internal consistency was measured by Cronbach's alpha (α).

Results

Sample Characteristics

A total of 784 patients were asked to participate, out of which 643 gave their consent. However, three participants were excluded due to not fitting inclusion criteria and two patients withdrew their consent. Participants were women with primary BC aged between 25 and 90. Clinical and sociodemographic characteristics of the sample are presented in Table 1.

Table 1 Socio-Demographic and Clinical Characteristics of the Sample (N = 638)

	Mean (SD)
Age	61.6 (12.1)
BMI	26.7 (6.8)
	Number (%)
Type of cancer	
BC in situ	49 (7.8)
Invasive BC	583 (92.2)
Missing (*n*)	6
Mode of detection	
Screening	392 (62)
Symptomatic	240 (38)
Missing (*n*)	6
Menstrual status	
Premenopausal	135 (23.5)
Postmenopausal	439 (76.5)
Cannot be determined or missing (*n*)	64

(*Continued*)

Table 1 (Continued).

	Mean (SD)
Histologic grade	
Grade I	185 (31)
Grade II	324 (54.4)
Grade III	87 (14.6)
Cannot be determined or missing (*n*)	42
Type of surgery	
Full mastectomy	122 (19.3)
Partial mastectomy	510 (80.7)
Missing (*n*)	6
Type of axillary surgery	
Only sentinel node biopsy	542 (88.4%)
Only axillary dissection	30 (4.9%)
Sentinel node biopsy and axillary dissection	41 (6.7%)
Missing (*n*)	25
Civil status	
Married	365 (57.6)
Cohabiting partner	80 (12.6)
Living apart from partner	27 (4.3)
Single	152 (24)
Other	10 (1.6)
Missing (*n*)	4
Self-assessed financial situation	
Very bad	8 (1.3)
Bad	23 (3.7)
Neither good nor bad	75 (11.9)
Good	306 (48.6)
Very good	218 (34.6)
Missing (*n*)	8
Highest level of education	
Primary school (9 years)	72 (11.5)
Upper secondary school (2 or 3 years)	114 (18)
Higher vocational school	118 (18.6)
Undergraduate, basic level	221 (34.9)
Undergraduate, advanced level	94 (14.8)
Doctoral level	14 (2.2)
Missing (*n*)	5
Smoking	
Regularly	36 (5.7)
In special situations	16 (2.5)
Quit smoking	289 (45.6)
Never smoked	293 (46.2)
Missing (*n*)	4
Alcohol consumption (weekly)	
0–4 standard glasses	484 (78.4)
5–8 standard glasses	96 (15.6)
9–12 standard glasses	24 (3.9)
13–16 standard glasses	10 (1.6)
17–20 standard glasses	3 (0.5)
Missing (*n*)	21

Abbreviation: SD, Standard deviation.

The Measurement Model

The prespecified measurement model failed to converge due to negative variances. After inspecting the variables, three items from the physical activity construct were removed as they did not correlate with other physical activity items (see Supplementary Table 7). Items representing amount of mild and vigorous exercise were retained as they were deemed more central to the construct of physical activity than amount of rest. After removing these items, the model converged, but the model fit was poor ($\chi^2(1070) = 3328$, $p < 0.001$; CFI = 0.82, TLI = 0.81, RMSEA = 0.06, SRMR = 0.08). Moreover, some items had factor loadings < 0.4, not meeting the pre-established criterion for factor loadings, namely items 2, 3, and 9 for CD-RISC and items 3, 5, 8, 13, 14, 15 16, and 17 for physical HRQoL. These HRQoL items correspond to cancer-related symptoms that few patients experienced, hence likely not having much clinical value at this stage of the cancer process, prior to treatment. These items were removed. Thus, only physical functioning (PF) items were retained for physical HRQoL. Subsequently, the overall model fit was better but still not satisfactory ($\chi^2(619) = 1974$, $p < 0.001$; CFI = 0.87, TLI = 0.86, RMSEA = 0.06, SRMR = 0.06). After inspecting Modification Indices, it was noted that many of the CD-RISC items correlated very highly, suggesting redundancy in the items. The measurement model with the ten-item form of CD-RISC[23] was tested, as it is a validated and authorized form of the instrument, with value for clinical use due to its brevity. This model had a good model fit ($\chi^2(265) = 678$, $p < 0.001$; CFI = 0.93 (>.9), TLI = 0.93, RMSEA = 0.05, SRMR = 0.04) and all items had loadings > 0.4. Means, standard deviations, and correlations between all subscales are presented in Table 2.

The Structural Model

The hypothesized structural model achieved good fit ($\chi^2(266) = 678$, $p < 0.001$; CFI = 0.93, TLI = 0.93, RMSEA = 0.05, SRMR = 0.05). However, examination of the structural paths suggested that physical activity did not have a direct effect on mental HRQoL ($\beta = 0.07$, $p = 0.22$), and resilience did not have an indirect effect on mental HRQoL via physical activity ($\beta = 0.02$, $p = 0.23$). Resilience also did not have a direct effect on global QoL ($\beta = 0.07$, $p = 0.10$) or PF ($\beta = -0.06$, $p = 0.38$).

The non-significant structural paths were removed to maximize fit and parsimony of the model. This simplified model was tested and had good model fit ($\chi^2(269) = 684$, $p < 0.001$; CFI = 0.93, TLI = 0.93, RMSEA = 0.05, SRMR = 0.05). Resilience had a moderate positive effect on physical activity and a moderate-to-strong positive effect on mental HRQoL. Physical activity had a moderate-to-strong positive effect on PF. Mental HRQoL had a weak positive effect on PF. PF had a moderate positive effect on global QoL, whereas mental HRQoL had a strong positive effect on global QoL (Table 3).

The final model is presented in Figure 1 where rectangles represent manifest variables, circles latent variables, and single-headed arrows significant direct effects of one variable on another. Although resilience did not have a direct effect on PF and global QoL, it had a small positive indirect effect on PF via increased mental HRQoL and increased physical

Table 2 Means, Standard Deviations, and Pearson Correlations Between the Subscales and Scales Included in the Model (N = 638)

	1	2	3	4	5	6	7	8
1. Phys activity	–							
2. CD-RISC10	**0.17**	–						
3. EF	0.02	**0.38**	–					
4. CF	0.07	**0.30**	**0.65**	–				
5. FP	−0.01	**0.31**	**0.64**	**0.43**	–			
6. Dis Therm	−0.04	**−0.37**	**−0.69**	**−0.43**	**−0.56**	–		
7. PF	**0.35**	**0.18**	**0.14**	**0.20**	**0.11**	−0.04	–	
8. Global QoL	**0.17**	**0.38**	**0.62**	**0.55**	**0.45**	**−0.48**	**0.40**	–
Mean	3.07	28.58	72.51	83.89	55.59	4.53	90.77	70.39
SD	1.32	6.07	20.61	21.37	30.18	2.64	14.84	21.37

Notes: Numbers in bold are statistically significant ($p < 0.05$).
Abbreviations: CD-RISC10, Brief form of the Connor Davidson Resilience Scale; EF, Emotional Functioning; CF, Cognitive Functioning; FP, Future Perspective; Dis Therm, Distress Thermometer; PF, Physical Functioning; Global QoL, Global Quality of Life; SD, Standard deviation.

Table 3 Indirect and Direct Effects of Independent Variables (Columns) on the Outcome Variables (Rows) in the Final Model

	Resilience			Phys Activity	M HRQoL	Phys Funct
	Direct	Indirect				
		via M HRQoL	via Phys Activity			
Phys Activity	0.30***	/	/	/	/	/
M HRQoL	0.46***	/	/	/	/	/
Phys Funct	/	0.06*	0.17*	0.57***	0.13*	/
Global QoL	/	0.30***	/	/	0.66***	0.37***

Notes: *$p < 0.05$. ***$p < 0.001$. Effects of Physical Activity, Mental HRQoL, and Physical Functioning on outcome variables are direct.
Abbreviations: Phys Activity, Physical Activity; M HRQoL, Mental Health-related Quality of Life; Phys Funct, Physical Functioning; Global QoL, Global Quality of Life.

activity, as well as a moderate positive indirect effect on global QoL via increased mental HRQoL (Table 3). The model explained 67% of the variance in global QoL.

Discussion

The aim of this study was to evaluate a model of HRQoL in women with newly diagnosed BC. To our knowledge, this is the first study that elucidates the potential pathways through which resilience may influence mental HRQoL, physical functioning, and global QoL in women with primary BC at diagnosis. Previous research has highlighted resilience as a predictor of psychological components such as psychological distress,[8] depressive and anxiety symptoms,[10] and mental HRQoL[13] in women with BC. In this study, the relationship between resilience and mental HRQoL was direct and moderate-to-strong, in line with previous research.[30] Highly resilient women seem more likely to maintain high mental HRQoL after receiving a BC diagnosis, either due to perceiving the situation as less stressful, or by utilizing effective coping mechanisms to manage the stress.[31]

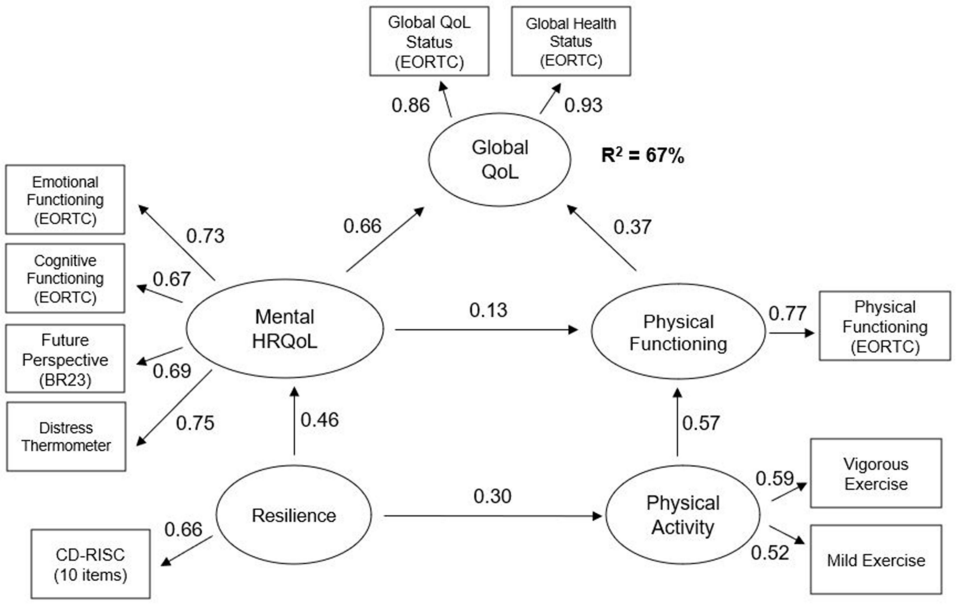

Figure 1 Structural equation model of HRQoL in a sample of newly diagnosed breast cancer patients.
Note: All coefficients are standardized.
Abbreviations: EORTC, European Organization for Research and Treatment of Cancer; CD-RISC, Connor-Davidson Resilience Scale; BR23, Breast Cancer Module.

We also found that resilience was positively associated with physical activity, supporting the hypothesis that resilient women may be more motivated to be physically active, possibly due to higher self-efficacy.[10] Surprisingly, physical activity was not associated with mental HRQoL in our sample, unlike in previous research in women with BC[30] and healthy individuals.[32] It is possible this is due to the specific time frame in which the data were collected, ie right after diagnosis. While it is likely that physical activity plays a role in mental HRQoL during BC treatment and survivorship, it is possible that physical activity does not attenuate the emotional impact of receiving the diagnosis in the short term. It would be of interest to investigate this relationship longitudinally. As hypothesized, physical activity had a moderate-to-strong effect on physical functioning.

Further, we found no direct relationship between resilience and physical functioning, nor between resilience and global QoL. These associations were found in previous research.[10,13] Nevertheless, we found indirect relationships between resilience and physical functioning (via physical activity and mental HRQoL) and resilience and global QoL (via MHRQoL). This suggests that resilient women with BC may experience better physical functioning due to increased physical activity and increased mental HRQoL, and evaluate their health and QoL as higher due to experiencing better mental HRQoL, as hypothesized. Therefore, this study expands on previous research by suggesting potential mechanisms that may explain previously reported associations between resilience and physical functioning as well as global QoL in BC patients.

We tried to distinguish between physical and psychological components of HRQoL to differentiate the nature of the relationship between resilience and these outcomes in BC. Doing so, we excluded role functioning, which is in some studies considered a physical HRQoL component,[33] and in others both psychological and physical.[17] In QLQ-C30, role functioning encompasses one's ability to pursue work and leisure time activities.[25] As this ability can be restricted by psychological difficulties as well as physical, we adopted the more conservative interpretation of role functioning.[17] Role functioning was previously found to be associated with resilience[13] in BC patients. It would thus be of interest to further explore the factors that may impact this relationship. Furthermore, the symptom subscales did not load on the same factor, probably due to the participants not yet experiencing treatment side-effects, resulting in very few patients reporting any symptoms. It is possible that the symptom items would load on the same factor if measured after treatment, as suggested by a study on more advanced lung cancer patients.[14] In that study, resilience was found to affect symptom burden via distress, and it would be beneficial to explore this further in later stages of BC when symptoms are more prominent. Further, including only the ten items from the brief version of CD-RISC[23] resulted in a better model fit. This is in line with some previous investigations that suggested that shorter versions of the scale perform just as well or better than the 25-item version.[34,35] The ten-item version of CD-RISC has been validated and authorized.[24]

The study had several limitations. It is impossible to make inferences about causal effects between the study variables as the sample was cross-sectional and SEM does not allow for making causal inferences. Further, the time right after diagnosis is important as women experience shock and high uncertainty,[36] but the chosen time frame of data collection implies that the findings cannot be generalized to women in later stages of their BC experience. Both of these limitations can be addressed to an extent by replicating the study longitudinally in order to encompass all stages of the BC continuum. Further, HRQoL is a complex construct. Social and clinical factors such as financial status and BC stage likely play a role in the HRQoL. The relatively small sample size of the study did not permit investigating all potential factors of HRQoL. However, comprehensive models of HRQoL should include a combination of biopsychosocial factors. Future research should focus on later stages of BC, allowing for inclusion of symptom burden, as well as socio-economic factors, treatment modalities, and tumor characteristics in a broader model of HRQoL. The findings on the relationship between mental HRQoL, physical activity, and resilience should be further explored longitudinally.

Clinical Implications

The study findings can help enhance rehabilitation for BC patients by illuminating areas which need to be prioritized. In rehabilitation, it is often difficult to target the main issues that patients report. This study proposes potential precursors to these issues which could be targeted, namely resilience, physical activity, and mental HRQoL. The study suggests that support aimed at the reduction of psychological distress may be beneficial in managing not only distress, but ultimately physical functioning and global QoL.

Conclusion

This study provided further evidence for the importance of resilience as a protective factor for maintaining high HRQoL right after receiving a BC diagnosis. Resilience can be easily assessed, and women who may not be highly resilient can be identified early in the BC process and provided appropriate support, mainly focusing on managing emotional distress and encouraging physical activity, which may have an ensuing effect on other aspects of HRQoL. The study should be replicated in longitudinal samples.

Data Sharing Statement

The datasets generated and analysed during this study are not publicly available due to privacy restrictions made by the Ethical Review Authority but are available from the corresponding author on reasonable request.

Ethics Approval and Informed Consent

An ethical approval was obtained for the study from the Swedish Ethical Review Authority (Dnr 2015/505). The study was conducted in accordance with the ethical guidelines established in the Helsinki Declaration. All participants provided written informed consent.

Consent for Publication

Distress Thermometer referenced with permission from the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) for Distress Management V.1.2024. © National Comprehensive Cancer Network, Inc. 2023. All rights reserved. Accessed [January 15, 2024]. To view the most recent and complete version of the guidelines, go online to NCCN.org. NCCN makes no warranties of any kind whatsoever regarding their content, use or application and disclaims any responsibility for their application or use in any way.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors report no conflicts of interest in this work.

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