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Factors predicting health-related quality of life in breast cancer survivors: the role of sense of coherence

Czynniki wpływające na jakość życia kobiet chorujących na raka piersi: rola poczucia koherencji

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Abstract

Aim: The prospective analysis of sense of coherence (SOC) and health-related quality of life (HRQOL) correlations in breast cancer survivors in the first year after surgery and the evaluation of the prognostic value of SOC for HRQOL. **Method:** Thirty-nine women aged from 34 to 68 years (mean = 55.92, standard deviation, *SD* = 8.84) completed the following surveys: the core European Organisation for Research and Treatment of Cancer (EORTC) QLQ-C30 and the supplement BR23 for HRQOL, and the Life Orientation Questionnaire, SOC-29 for SOC. Data were collected twice: once in the third month after breast surgery (t1: sociodemographic, SOC and HRQOL), and once nine months later (t2: HRQOL). **Results:** The mean SOC was 141.13 (*SD* 24.17). The average global health status and overall quality of life (GHS/QOL) was 59.82 (*SD* 23.47) in t1 and 55.36 (*SD* 22.93) in t2. A significant decrease in cognitive functioning and an increase in the severity of breast symptoms between t1 and t2 were reported. The results showed several positive correlations between SOC and functional scales of EORTC QOL questionnaires, suggesting the predictive value of meaningfulness for cognitive and emotional functioning of breast cancer survivors. **Conclusion:** The data obtained give a new insight into the issue of adaptation to cancer and suggest that sense of coherence may play a role in cognitive and emotional functioning in the first year of cancer treatment. **Implications for psychosocial care providers:** The results suggest the need for active screening and management of cognitive impairments and emotional problems as well as for breast-related symptoms in the first year of cancer therapy. All psychosocial interventions that can empower generalised resistance resources, which are mediated by SOC, may be recommended for better HRQOL in breast cancer survivors.

Keywords: sense of coherence, quality of life, breast cancer, cognitive functioning of cancer survivors

Streszczenie

Cel: Analiza prospektywna korelacji zachodzących pomiędzy poczuciem koherencji (*sense of coherence*, SOC) i jakością życia kobiet, które przeżyły raka piersi (*health-related quality of life*, HRQOL), przeprowadzona w pierwszym roku po operacji, oraz ocena znaczenia prognostycznego SOC względem HRQOL. **Metoda:** Do badania zakwalifikowano 39 kobiet w wieku od 34 do 68 lat (średnia = 55,92, odchylenie standardowe, *standard deviation*, *SD* = 8,84). Oceniano HRQOL – za pomocą kwestionariuszy European Organisation for Research and Treatment of Cancer (EORTC) QLQ-C30 i BR23 oraz SOC – za pomocą Kwestionariusza Orientacji Życiowej (Life Orientation Questionnaire) SOC-29. Badania przeprowadzono dwukrotnie: w trzecim miesiącu po operacji piersi (t1: dane socjodemograficzne, SOC i HRQOL) oraz powtórnie dziewięć miesięcy później (t2: HRQOL). **Wyniki:** Średnie SOC wynosiło 141,13 (*SD* 24,17). Średnia wartość GHS/QOL (*global health status and overall quality of life*) to 59,82 (*SD* 23,47) w t1 i 55,36 (*SD* 22,93) w t2. Stwierdzono istotne pogorszenie funkcjonowania poznawczego badanych kobiet oraz istotne nasilenie dolegliwości ze strony piersi między t1 a t2. Analiza wykazała szereg pozytywnych korelacji pomiędzy SOC a skalami funkcjonalnymi kwestionariuszy jakości życia, wskazując na znaczenie prognostyczne składowej „sensowność" poczucia koherencji dla funkcjonowania poznawczego i emocjonalnego kobiet, które przeżyły raka. **Wnioski:** Uzyskane dane przyczyniają się do lepszego zrozumienia procesów adaptacji do choroby nowotworowej, wskazując na potencjalne znaczenie poczucia koherencji dla funkcjonowania poznawczego i emocjonalnego osób w pierwszym roku leczenia onkologicznego. **Implikacje praktyczne dla osób wspierających:** Wyniki badania wskazują

na potrzebę aktywnego wykrywania i profilaktyki zaburzeń poznawczych, problemów emocjonalnych oraz dolegliwości ze strony piersi u kobiet z rakiem piersi w pierwszym roku leczenia onkologicznego. Wszelkie interwencje psychospołeczne, ukierunkowane na wzmocnienie tzw. uogólnionych zasobów odpornościowych (wg Antonovsky'ego), w których wykorzystaniu pośredniczy SOC, mogą okazać się korzystne dla poprawy jakości życia kobiet z rakiem piersi.

Słowa kluczowe: poczucie koherencji, jakość życia, rak piersi, funkcjonowanie poznawcze osób, które przeżyły raka

AIM

Previous research has shown that cancer diagnosis and oncological treatment are associated with marked psychological distress and a negative impact on the psychosocial functioning and health-related quality of life (HRQOL) of breast cancer survivors (Begovic-Juhant et al., 2012; Bruscia et al., 2008a; Helms et al., 2008; Nowicki et al., 2015; Rosenberg et al., 2013;). Commonly, HRQOL is defined as a multidimensional, contextual, dynamic, and subjective concept related to a medical condition (Rohani et al., 2015; The World Health Organization Quality of Life assessment (WHOQOL): position paper from the World Health Organization, 1995). HRQOL questions are also considered valid indicators of unmet needs and intervention outcomes in specific medical conditions (Moriarty et al., 2003). Moreover, the definition of the World Health Organization Quality of Life Assessment Group captures physical and mental health in terms of positive aspects, such as coping, resilience, satisfaction and autonomy (The World Health Organization Quality of Life assessment (WHOQOL): position paper from the World Health Organization, 1995). This approach encourages the study of quality of life not only in terms of seeking negative factors, but also in the context of the proposed salutogenic constructs, such as sense of coherence (SOC).

The concept of SOC was proposed by Aaron Antonovsky (Antonovsky and Sagy, 1986). It is based on the salutogenesis theory, which analyses the psychosocial preconditions of health. SOC is understood as an individualised way of being, thinking and acting connected with an inner confidence which leads an individual to identify, take advantage of, use, and re-use the available resources. SOC consists of three components: comprehensibility, meaningfulness, and manageability (Antonovsky and Sagy, 1986). Comprehensibility refers to the cognitive functions of an individual. It is a measure of one's ability to perceive incoming information as structured and coherent. Meaningfulness refers to the ability of an individual to attribute meaning to events, together with the tendency to understand them and experience them more as a challenge than a threat. Manageability manifests itself in an individual's belief about their capacity to cope with difficult situations, to have an active and effective influence on their own life situation, and to draw conclusions from past experiences (Antonovsky and Sagy, 1986). Sense of coherence is significantly associated with health, especially psychological health, and is reported to promote the development of a subjective state of health (Eriksson et al., 2007; Kenne Sarenmalm et al., 2013). Moreover, many studies have found that higher sense of coherence scores are correlated with greater psychological well-being, more sufficient coping strategies for stress, a higher level of quality of life and better body image in breast cancer patients (Gana, 2001; Gerasimčik-Pulko et al., 2009; Jabłoński et al., 2018; Lindblad, 2016; Rohani et al., 2015). The value of SOC as an important predictor of HRQOL has been supported by the results of several studies (Bruscia et al., 2008a; Eriksson and Lindström, 2007; Kenne Sarenmalm et al., 2013; Rohani et al., 2015), including those in which women with breast cancer were participants (Kenne Sarenmalm et al., 2013; Kulik and Kronfeld, 2005; Rohani et al., 2015). Regardless of the method used, the results showed that stronger SOC correlates with better quality of life in breast cancer survivors (Kenne Sarenmalm et al., 2013; Rohani et al., 2015).

THE RATIONALE FOR THIS STUDY

Although, as mentioned above, the SOC and HRQOL correlations have been evaluated in many studies, their examinations in cancer survivors are usually cross-sectional and often based on small sample sizes (Eriksson and Lindström, 2007). Additionally, authors use different assessment methods for HRQOL, and only individual studies use complete surveys recommended by the European Organisation for Research and Treatment of Cancer Quality of Life Group (EORTC-QLG) for breast cancer survivors. These surveys take the form of questionnaire QLQ-C30 and its supplementary module BR23 (Gerasimčik-Pulko et al., 2009). Moreover, many studies use a shorter version (13 items) of the Life Orientation Questionnaire (SOC-13), the reliability and predictive validity of which are not as high or well-established as those of the original 29-item version (Eriksson and Lindström, 2007; Rohani et al., 2015). Finally, health is defined negatively in many studies, and a pathogenetic approach is used (Eriksson and Lindström, 2007; Jakobsson, 2002).

In connection with the above, the aim of this study is the prospective analysis of correlations between SOC and HRQOL in breast cancer survivors during the first year after breast surgery, and the assessment of the prognostic significance of SOC for HRQOL. HRQOL was measured with QLQ-C30 and its supplementary module BR23, recommended by EORTC-QLG for breast cancer survivors, and the original 29-item form of

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Age	M_{age} = 55.92, *SD* = 8.84
	n (%)
Place of residence	
City (above 100,000 inhabitants)	23 (59)
Town (up to 100,000 inhabitants)	7 (17.9)
Village	9 (23.1)
Personal relationship status	
Currently in a relationship	33 (84.6)
Currently not in a relationship	6 (15.4)
Education	
University	11 (28.2)
High school	15 (38.5)
Vocational	9 (23.1)
Elementary	3 (7.7)
Kind of surgery	
Mastectomy	21 (53.8)
Breast conserving therapy	18 (46.2)
M – mean; ***SD*** – standard deviation.	

*Tab. 1. Sociodemographic variables of women in the study group (*n *= 39)*

A. Antonovsky's Life Orientation Questionnaire (SOC-29) (Eriksson and Lindström, 2007). We hypothesised, in line with the findings of other authors, that SOC could correlate positively with HRQOL, but the details of this correlation and potential predictive value of SOC on HRQOL in breast cancer survivors should be more precisely evaluated.

METHOD

Data were collected at the Department of Oncology of the Jagiellonian University, Medical College in Krakow between January 2017 and June 2018. After providing written consent, the respondents completed paper surveys used in the study (described below). Data were collected twice. The first observation (t1) was in the third month after surgery (sociodemographic data, SOC and QOL-1), and the second one (t2) was performed nine months after the first observation (QOL-2). The attending physician provided the Eastern Cooperative Oncology Group (ECOG) performance status and information on cancer treatment.

PARTICIPANTS

The inclusion criterion for the study was women aged 18 to 68, admitted to the oncology department not longer than three months after surgical treatment for breast cancer (mastectomy or breast-conserving treatment, BCT), and in good global condition (ECOG: 0–1 point). All patients included in the study also received adjuvant chemotherapy based on regimens containing anthracyclines in a similar dose range and non-differentiating profile of potential side effects. The exclusion criteria were patients with metastasis and those who were not candidates for surgical treatment. Finally, the inclusion criteria for the study were fulfilled by 39 women aged from 34 to 68 years old (mean age = 55.92, standard deviation, *SD* = 8.84). The advantage of this study was the stability of the number of the respondents in the two consecutive (t1 and t2) observations. The sociodemographic characteristics of the study group are shown in Tab. 1.

INSTRUMENTS

The HRQOL was evaluated with the Polish version of QLQ-C30 v. 3.0 in conjunction with the breast cancer-specific module QLQ-BR23 (Osoba et al., 1994; Zawisza et al., 2010). QLQ-C30 is composed of both multi-item scales and single-item measures. It comprises five functional scales (physical, role, cognitive, emotional and social), three symptom scales (fatigue, pain as well as nausea and vomiting), and six single-item symptom measures (dyspnoea, insomnia, loss of appetite, constipation, diarrhoea and financial difficulties). The last two general questions are related to the global health status (GHS) and overall quality of life (QOL). The breast cancer-specific module (BR23) is meant for use among breast cancer patients varying in disease stage and treatment modality. It includes four functional scales (body image, sexual functioning, sexual enjoyment and future perspective) and four symptom scales (systemic therapy side effects, breast symptoms, arm symptoms and upset caused by hair loss) (Sprangers et al., 1996). The final scoring in all scales of both core and specific modules range from 0 to 100. For functional scales and global quality of life (GHS/QOL) scales, higher scores mean a better level of functioning. For symptom-oriented scales, a higher score means more severe symptoms (Fayers et al., 2001). EORTC consent to the use of the standardised questionnaires was obtained.

The SOC analysis was carried out using the Polish adaptation of the Life Orientation Questionnaire (SOC-29) designed by A. Antonovsky. The evaluation of the Polish version of the SOC-29 questionnaire showed high reliability of the tool. The internal consistency coefficient, calculated using Guttman's method (Guttman Split-Half) and the Spearman–Brown Unequal Length method, was distributed as follows: for the sense of coherence 0.92, for comprehensibility 0.78, for manageability 0.72 and for meaningfulness 0.68. Cronbach's alpha was 0.78 (Koniarek et al., 1993).

STATISTICS

The study results were statistically analysed using the IBM Statistical Package for the Social Sciences (SPSS) Statistics software (IBM Corp. Released 2017. IBM SPSS Statistics for

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	t1				t2			
QLQ-C30	SOC	Co	Ma	Me	SOC	Co	Ma	Me
GHS/QOL	0.30	0.23	0.28	0.27	−0.17	−0.25	−0.09	−0.05
Physical functioning	0.31	0.14	0.27	0.43**	−0.17	−0.29	−0.07	−0.24
Role functioning	0.15	0.15	0.10	0.14	−0.05	−0.10	−0.03	0.03
Cognitive functioning	0.52**	0.38*	0.39*	0.59**	0.53**	0.36	0.46*	0.61**
Emotional functioning	0.55**	0.53**	0.38*	0.49**	0.19	−0.04	0.20	0.44*
Social functioning	0.55**	0.48**	0.51**	0.40*	0.44*	0.34	0.40*	0.42*
Fatigue	−0.35*	−0.25	−0.31	−0.35*	−0.40*	−0.26	−0.48*	−0.33
Nausea and vomiting	−0.42**	−0.36*	−0.35*	−0.34*	−0.29	−0.25	−0.05	−0.52**
Pain	−0.19	−0.11	−0.19	−0.21	0.15	0.23	0.05	0.06
Dyspnoea	−0.08	−0.06	−0.01	−0.14	0.13	0.34	0.08	−0.19
Insomnia	−0.28	−0.18	−0.24	−0.31	−0.14	0.04	−0.14	−0.33
Loss of appetite	−0.25	−0.32	−0.02	−0.28	−0.18	−0.11	−0.04	−0.35
Constipation	−0.27	−0.18	−0.32	−0.19	−0.04	0.17	−0.10	−0.29
Diarrhoea	−0.19	−0.08	−0.20	−0.24	0.11	0.19	0.18	−0.14
Financial difficulties	−0.14	−0.12	−0.01	−0.26	0.25	0.42*	0.29	−0.18
BR23								
Body image	0.41*	0.40*	0.21	0.42**	0.59**	0.50*	0.51**	0.49*
Sexual functioning	0.47**	0.36*	0.44*	0.39*	−0.23	−0.32	−0.09	−0.15
Sexual enjoyment	0.21	0.09	0.23	0.25	0.02	−0.16	0.21	0.05
Future perspectives	0.16	0.09	0.08	0.26	0.32	0.37	0.29	0.10
Systemic therapy side effects	−0.45**	−0.30	−0.38*	−0.49**	−0.31	−0.10	−0.19	−0.57**
Breast symptoms	−0.07	−0.06	0.15	−0.32	−0.47*	−0.29	−0.27	−0.69**
Arm symptoms	−0.18	−0.11	−0.06	−0.34*	−0.07	−0.03	0.01	−0.21
Upset caused by hair lost	−0.49**	−0.42**	−0.37*	−0.48**	−0.33	−0.20	−0.31	−0.41

* $p < 0.05$, ** $p < 0.01$.
SOC – sense of coherence; **Co** – comprehensibility; **Ma** – manageability; **Me** – meaningfulness; **GHS/QOL** – global health status/quality of life;
QLQ-C30 and BR23 – EORTC quality of life questionnaires for breast cancer survivors.

Tab. 2. Correlations between the SOC and HRQOL dimensions in breast cancer patients in the third (t1) and 12th (t2) month after diagnosis: correlation analysis

Windows, Version 25.0. IBM Corp., Armonk, NY, USA). Correlation analysis, Student's *t*-test for dependent groups, Fisher *z*-transformation and multi-variable regression analysis were carried out.

RESULTS

Global SOC measured once in the third month after breast surgery (t1) reached a mean value of 141.13 (*SD* 24.17). The average GHS/QOL results amounted to 59.82 (*SD* 23.47) in the third month (t1) and 55.36 (*SD* 22.93) in the 12th month (t2), and the difference between t1 and t2 was statistically insignificant. Between t1 and t2, a significant decrease in the cognitive scale of QLQ-C30 (t1: mean value: 69.87, *SD* 31.63; t2: mean value: 58.65, *SD* 27.23, $p < 0.01$) was observed. A decrease was also noted in the systemic therapy side effects of QLQ-BR23 (t1: mean value: 42.86, *SD* 20.56; t2: mean value: 32.87, *SD* 21.52, $p < 0.01$). At the same time, despite the kind of surgery, higher severity of breast symptoms in BR23 was reported (t1: mean value: 22.68, *SD* 21.14; t2: mean value: 30.45, *SD* 22.64, $p < 0.05$). There were no statistical differences in GHS/QOL and SOC between t1 and t2. The correlation analysis between SOC and functional scales of QLQ-C30/BR23 in t1 and t2

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	t1				t2			
i.v.	***B***	***Beta***	***t***	***p***	***B***	***Beta***	***t***	***p***
Model: Cognitive functioning (d.v.1)								
Co	0.35	0.15	0.78	0.44	−0.02	−0.1	−0.04	0.97
Ma	−0.03	−0.01	−0.05	0.96	0.41	0.14	0.55	0.59
Me	1.96	0.54	3.22	0.01	1.78	0.53	2.54	0.05
Model: Emotional functioning (d.v.2)								
Co	0.97	0.47	2.46	0.05	−1.12	−0.46	−1.77	0.09
Ma	−0.37	−0.15	−0.70	0.49	0.68	0.21	0.74	0.47
Me	1.14	0.36	2.15	0.05	2.10	0.55	2.44	0.05

N = 39.
i.v. – independent variable; **d.v.** – dependent variable; **Co** – comprehensibility; **Ma** – manageability; **Me** – meaningfulness; **t1** – third month after diagnosis; **t2** – 12th month after diagnosis.

Tab. 3. Regression coefficients in a model with dependent variables: cognitive functioning and emotional functioning, a multi-variable regression

is presented in Tab. 2. The results in t1 showed several positive correlations between global SOC and its components, and better physical, cognitive, emotional, social and sexual functioning of breast cancer survivors. A significant decrease in many correlations between SOC and the quality of life components in t2 was also visible. However, a Fisher *z*-transformation allowed us to determine that the differences between t1 and t2 were actually of the highest significance ($p < 0.01$) only for three sets of variables: meaningfulness and physical functioning, comprehensibility and emotional functioning, and global SOC and comprehensibility alone, and sexual functioning (Tab. 3). Moreover, as shown in Tab. 4, multi-variable regression demonstrated that the variance of the cognitive functioning variable can be best explained by the meaningfulness in both t1 and t2 (for t1 in 32%, R^2 corrected = 0.32, with the prediction model significance on the level of $p < 0.001$, $F(3, 33) = 6.62$, and for t2 in 31%, R^2 corrected = 0.31, $F(3, 33) = 4.68$; $p < 0.001$). In terms of another dependent variable, i.e. emotional functioning, the proposed model explained 31% of the variance in t1 (R^2 corrected = 0.31). The model was well-suited to the data, $F(2, 33) = 6.39$; $p < 0.01$. The greatest predictive power was revealed by two dimensions of SOC: meaningfulness and comprehensibility (Tab. 4). However, in t2 SOC explained only 21% of the variance of emotional functioning. The prediction model was still well-suited to the data [$F(3, 33) = 3.18$; $p < 0.05$]. Out of the three independent variables, only meaningfulness maintained a strong, significant relation to emotional functioning. Interestingly, the potential predictive value of SOC and its components for the physical, social and sexual functioning of women with breast cancer turned out to be irrelevant.

DISCUSSION AND CONCLUSIONS

The mean SOC in our study group was similar to other studies (Bruscia et al., 2008a, 2008b). Similarly, the mean GHS/QOL results from our study are comparable to the data reported by other researchers (Rohani et al., 2015). Eriksson and Lindström (2007) presented a systematic review of the correlations between SOC and HRQOL performed on various samples of patients with different somatic illnesses. They concluded that stronger SOC is associated with better GHS and HRQOL. The data from our study also

	SOC	**Co**	**Ma**	**Me**
QLQ-C30				
Physical functioning	1.86	1.66	1.31	**2.66****
Cognitive functioning	−0.05	0.09	−0.32	−0.06
Emotional functioning	**1.61***	**2.38****	0.74	0.24
Social functioning	0.55	0.64	0.52	−0.09
Fatigue functioning	0.22	0.04	0.76	−0.09
Nausea and vomiting	−0.56	−0.46	−0.19	0.84
Financial difficulties	−1.5	**−2.14***	−1.16	−0.32
QLQ-BR23				
Body image	−0.89	−0.46	−1.28	−0.32
Sexual functioning	**2.74****	**2.6****	**2.07***	**2.07***
Systemic therapy side effects	−0.6	−0.77	−0.76	0.41
Breast symptoms	1.62	0.88	1.57	**1.9***
Arm symptoms	−0.41	−0.3	−0.26	−0.52
Upset caused by hair lost	−0.71	−0.9	−0.25	−0.32

Statistical significance: * $p < 0.05$, ** $p < 0.01$.
SOC – sense of coherence; **Co** – comprehensibility; **Ma** – manageability; **Me** – meaningfulness.

Tab. 4. Significance of the difference between Pearson correlation coefficients: r_{3m} and r_{12m} in the study group: Fisher's r *to* z *transformation*

confirm and complement these findings. The strong correlations between SOC and numerous dimensions of HRQOL in the third month of cancer treatment appear to be the first interesting result. The statistical analysis also revealed significant differences in both measurement points in correlations between meaningfulness and physical functioning, comprehensibility and emotional functioning, and between global SOC and comprehensibility alone and sexual functioning of breast cancer survivors. These latter findings seem to be of particular interest in light of data published in a recent study by Quintard et al. (2014), which showed that only manageability was significantly related to sexual functioning in breast cancer survivors. Additionally, this model, as opposed to that presented in our study, was statistically insignificant. Moreover, our study has shown a high and relatively stable correlation observed in the first year after breast cancer surgical treatment between global SOC and meaningfulness alone, and cognitive functioning of breast cancer survivors. These data could give a new insight into the issue of potentially protective factors for cognitive impairments in breast cancer survivors.

Gerasimčik-Pulko et al. (2009) used QLQ-C30/BR23, but only SOC-13 in their breast cancer study. They reported that females with a higher global SOC after breast surgery showed better emotional, physical, cognitive and social functioning, suffered less from fatigue, pain and loss of appetite, had rarer systemic therapy side effects, breast and arm symptoms, and rarely reported financial difficulties and future perspective changes. Breast cancer patients with a higher SOC seem to experience fewer side effects of treatment and have a higher HRQOL in the early postoperative period (Gerasimčik-Pulko et al., 2009). Kenne Sarenmalm et al. (2013) used the short form SOC-13 and only the GHS/QOL index from QLQ-C30 to assess the QOL in their study. These researchers described a significant correlation of SOC and GHS/QOL, with a linear relationship between them, illustrating that the stronger the SOC, the more enhanced the QOL. The observed correlations were not associated with the stage of disease or treatment (Kenne Sarenmalm et al., 2013). Our study did not provide similar results in regard to correlations between the GHS/QOL and global SOC values in longitudinal observation, but did yield more detailed data on the correlations between particular components of SOC and respective dimensions of HRQOL in the prospective observation. This may also suggest lower significance of the GHS/QOL index in the prospective assessment of HRQOL compared to the analysis of changes in selected functional scales in breast cancer survivors.

In order to establish a potential predictive value of SOC for HRQOL, Rohani et al. (2015) compared QLQ-C30 and SOC in a longitudinal study among breast cancer patients. The degree of SOC and baseline ratings of several dimensions of HRQOL were the most important predictors of HRQOL changes. The authors found a potentially predictive value of the global SOC-29 score for functional dimensions of QLQ-C30 (physical, role, cognitive, and social functioning) and symptom scales (fatigue, nausea/vomiting, pain, constipation, and financial difficulties) (Rohani et al., 2015). Conversely, the statistical analysis in our study showed only a potential predictive value of meaningfulness for cognitive and emotional functioning of breast cancer survivors. These findings seem to be in line with both Antonovsky's original concept and recent observations of other authors (Antonovsky, 1987; Eriksson and Lindström, 2007; Gerasimčik-Pulko et al., 2009; Wiesmann U, Hannich, 2011). Antonovsky understood meaningfulness in the emotional sense as a way of looking at life as worth living, providing a motivational force "which leads one to seek to order the world and to transform resources from potential to actuality" (Antonovsky, 1987). Wiesmann and Hannich (2011) examined salutogenic predictors of multiple health behaviours in a sample of healthy individuals and, in accordance with Antonovsky's hypothesis, found that meaningfulness was the most distinguishing among the SOC components. Although the above data and our results are consistent and encouraging, the potentially predictive value of meaningfulness for cognitive and emotional functioning of breast cancer survivors requires further assessment in larger groups.

Summarising the conclusions, it is worth remembering that SOC seems to be a resource that enhances HRQOL either directly or when mediated by perceived good health (Eriksson and Lindström, 2007). This interaction could be interpreted in accordance with Antonovsky's concept of generalised resistance resources (GRRs), where SOC is of high importance for health stability in the face of severe stress (Antonovsky and Sagy, 1986). The other studies suggest that the SOC scale may also be a useful screening tool to identify individuals particularly vulnerable to distress and unable to cope adequately. Assessing SOC strength may assist healthcare professionals in providing individualised patient interventions (Kenne Sarenmalm et al., 2013).

THE LIMITATION OF THE STUDY

Due to the relatively small number of participants, the results of this study cannot be said to be representative for the population as a whole, and should be considered only as preliminary results. Thus, further research in a larger group will be necessary.

IMPLICATIONS FOR PSYCHOSOCIAL CARE PROVIDERS

1. The results suggest the need for active screening of cognitive functioning impairments in the first year of breast cancer treatment.
2. Lower HRQOL of women with breast cancer at the end of the first year of the treatment is related significantly with persistent, postoperative, breast-related complaints. Therefore, rehabilitation, physiotherapy and prophylaxis of late complications of the surgical procedure become important.

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3. All psychosocial interventions which can empower the GRRs may be recommended for better HRQOL of breast cancer survivors.
4. Assessing global SOC and especially its component of meaningfulness may assist healthcare professionals in providing better interventions, especially in regard of cognitive and emotional functioning problems of breast cancer survivors.
5. The correlations between both global SOC, comprehensibility alone and sexual functioning of breast cancer survivors in the first three months after breast surgery need further investigation.

Conflict of interest

The authors declare that they have no competing interests.

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Informed consent

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