Personality predicts perceived availability of social support and satisfaction with social support in women with early stage breast cancer

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Abstract

Goals of work This study examines the relationships between personality, on the one hand, and perceived availability of social support (PASS) and satisfaction with received social support (SRSS), on the other hand, in women with early stage breast cancer (BC). In addition, this study examined whether a stressful event (i.e., diagnosis) is associated with quality of life (QOL), when controlling for PASS and SRSS.

Patients and method Women were assessed on PASS and SRSS (World Health Organization QOL assessment instrument-100) before diagnosis (time 1) and 1 (time 2), 3 (time 3), 6 (time 4), 12 (time 5), and 24 months (time 6)

after surgical treatment. Personality (neuroticism extraversion openness five-factor inventory and state trait anxiety inventory-trait scale) and fatigue (fatigue assessment scale) were assessed at time 1.

Main results Agreeableness and fatigue predicted PASS and SRSS at time 5 and time 6. Trait anxiety had a negative effect on SRSS ($\beta = -0.22$, $p < .05$). In addition, having a job was negatively associated with SRSS (time 6, $\beta = -0.28$, $p < .05$). Across time, women reported a decrease in PASS and SRSS. Path models, used to test whether PASS and/or SRSS functioned as mediators of the link between diagnosis and QOL, reached adequate fit.

Conclusions Besides factors, like fatigue and having a job, personality factors substantially influence the way women with early stage BC perceive social support. Knowledge about these underlying mechanisms of social support is useful for the development of tailor-made interventions. Professionals should be aware of the importance of social support. They should check whether patients have sufficient significant others in their social environment and be sensitive to potential discrepancies patients might experience between availability and adequacy of social support.

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Introduction

In the Netherlands, over 11,500 women received breast cancer (BC) diagnosis in 2003 [1]. In 2005, there were an estimated number of 119,000 BC patients or survivors in the Netherlands. Due to advances in cancer screening and medical treatment, this number might increase to about 194,000 within 10 years [2]. In spite of these better

prospects, receiving a BC diagnosis is still very stressful. For instance, BC patients have a high risk of developing mood disorders [3]. Therefore, social support from a partner, family, and/or friends is of the utmost importance for women with BC [4].

Despite a growing interest in social support, a precise definition is currently lacking. In general, there are two broad ideas: social support concerns (1) the support that is actually received (i.e., structural support and functional support) or (2) the individual's subjective appraisal of the social support (perceived social support). Structural support refers to the amount of persons or the amount of contact an individual has within the social environment, while functional support is reflecting the types of support the persons within the social network provide (e.g., providing emotional support or practical assistance) [5]. Perceived social support can be divided into the perception that social support is available when needed (perceived availability of social support (PASS)) [5] and the satisfaction with received social support (SRSS). This approach is used in the current study.

Several studies have examined perceived social support in cancer. For instance, Hann et al. [6] reported that greater perceived adequacy of social support among cancer patients was negatively related to depression. With regard to the relationship between perceived social support and survival, findings are rather inconclusive. Whereas some studies [7–9] found a positive relationship between perceived social support and survival, others did not [10]. Social support is also associated with quality of life (QOL) in BC patients [11–17]. Socially isolated women reported more problems compared with women who were socially integrated with regard to physical role functioning, vitality, and physical functioning [16]. Thus, social support seems to fulfill an important role in adaptation efforts of cancer patients.

In order to understand the underlying mechanisms of the protective role of perceived social support, it is important to examine its determinants or the factors associated with it. Few studies have tested those determinants longitudinally [18]. Objective determinants, such as network size or the frequency of contact with network members, explained about 30% of the variance of perceived social support in a non-cancer population [17]. In addition, perceived social support may also be associated with other factors, for instance, personality. Few studies, however, have examined this particular relationship [19]. Research has shown that extraverts report higher scores on satisfaction with the social support they receive compared with introverts [20, 21]. A longitudinal study among alcoholics [22] found that extraversion and neuroticism were indirectly related to perceived social support through their effects on structural support during treatment. Furthermore, it was demonstrated that agreeableness, i.e., the tendency towards interpersonal

trust and consideration of others, predicts actual support from others [21]. Recently, Hoth et al. [23] studied agreeableness in persons with chronic kidney disease. Persons high on agreeableness showed a substantial decrease in depressive symptoms across time, while support had little effect for low-scorers. In another study [4], dispositional optimism and perceived social support were substantially related to well-being in women with BC. In addition, women who were not treated yet and scored low on dispositional optimism experienced more cancer-specific distress. Persons high on trait anxiety were inclined to seek more support from others, while they also tended to be dissatisfied with the received social support [24, 25]. Several studies found that network size decreased due to fatigue [26, 27] or to the fact that persons were due to their illness less able to provide support to their social network, which caused an imbalance between the amount of support given to others and the amount of help received by the network [18]. Presumably, this imbalance had a negative impact on their social network. However, there is still a limited body of knowledge regarding the question whether, in line with a decreasing social network, perceived social support also diminishes across time, since the remaining support providers may give the support patients need.

Therefore, the aim of this prospective longitudinal follow-up study was to examine the relationships between personality and PASS and SRSS in early stage BC patients. In addition, we examined whether PASS and/or SRSS mediates the link between diagnosis and QOL. Based on earlier findings, it was hypothesized that women scoring high on extraversion and agreeableness would experience higher perceived availability and higher scores on satisfaction compared with women scoring low or moderately on these traits. Furthermore, it was expected that high scores on neuroticism and trait anxiety would be negatively associated with PASS and SRSS. Moreover, it was hypothesized that the levels of PASS and SRSS would be high in the period around surgical treatment and then, subsequently, would decline. It was expected that women scoring high on trait anxiety would be less satisfied with their social support at all time points compared to women with low or moderate scores. Finally, it was expected that PASS and SRSS are mediators of the link between diagnosis and QOL.

Patients and methods

Participants

Women with a palpable lump in the breast or an abnormality on a screening mammography were referred by their general practitioner to the surgical outpatient clinics of the St. Elisabeth

Hospital (Tilburg, The Netherlands), the Maasland Hospital (Sittard, The Netherlands; since August 2004), or the Jeroen Bosch Hospital (Den Bosch, The Netherlands; since January 2006). The data were collected from September 2002 until September 2006. Of the 799 eligible women, 604 (75.6%) completed the first set of questionnaires. The main reasons for not participating were the length of the test battery and the amount of stress women experienced at their first visit to the hospital. Of these 604 women, 223 were diagnosed with early stage BC (see Fig. 1). A substantial number of women had benign breast problems (BBP; $n=381$). Women who had a history of abnormalities in the breast, benign or malignant, or had a breast tumor that was too large (>5 cm) for breast conserving therapy were excluded from the study ($n=4$). In order to participate, the women had to have sufficient knowledge of the Dutch language. The questionnaires were completed before the women visited the surgeon or radiologist, i.e., *before* the diagnosis, benign or malignant, was known. After the baseline measurement (time 1), women completed questionnaires at 1 (time 2), 3 (time 3), 6 (time 4), 12 (time 5), and 24 months (time 6) after surgical treatment. The reference point was surgical treatment, because otherwise, follow-up measures would interfere with the timing of treatment modalities. Participation in the study was not known to the surgeon in attendance and, therefore, could not effect treatment and clinical follow-up. All participants gave written informed consent.

Measures

Women completed the following questionnaires: World Health Organization QOL assessment instrument-100 (WHOQOL-100; [28, 29]) at all time points. The Center for Epidemiological Studies depression scale (CES-D; [30]), the fatigue assessment scale (FAS; [31]), the neuroticism extraversion openness five-factor inventory (NEO-FFI; [32, 33]), and the state trait anxiety inventory (STAI; [34]) were assessed at time 1.

Social support and general health and overall QOL were measured using the WHOQOL-100 [29] (Dutch version [35]). Each facet is measured with four items with a five-point Likert scale. High scores on these facets indicate good QOL. Reliability and validity [35–37] are adequate, and sensitivity [38] of the instrument is high. For instance, Cronbach's alpha for the facet social support exceeds 0.80 [37]. This facet consists of four items: (1) Do you get the kind of support from others that you need? (item 43), (2) To what extent can you count on your friends when you need them? (item 44), (3) How satisfied are you with the support you receive from your family? (item 66), and (4) How satisfied are you with the support you receive from your friends (item 67)? In this study, we calculated two subscores by adding the scores of the first two items in order to measure PASS ($\alpha=0.68$) and the total scores of the last two items in order to measure SRSS ($\alpha=0.73$). The time frame of reference is the previous 2 weeks.

Fig. 1 Flow chart for the recruitment of women with breast problems. BBP benign breast problems, BC breast cancer

The CES-D [30] is a 20-item self-report scale designed to measure the presence and degree of depressive symptoms over the past week. The rating scale ranges from 0 (*seldom or never*) to 3 (*(almost) always*). Scores can range from 0 to 60. The CES-D has been established as a valid and reliable measure of depressive symptoms in BC patients [39]. For the Dutch population, reliability and criterion validity are good [40, 41].

The FAS [31] is a ten-item questionnaire assessing a unidimensional construct of perceived fatigue and exhaustion. The response scale is a five-point rating scale ranging from 1 (*never*) to 5 (*always*). Scores on the FAS range from 10 to 50. The psychometric properties are good [42–44].

Personality was assessed with the NEO-FFI [32, 33] and the state trait anxiety inventory (STAI [34], Dutch version by [45]). The NEO-FFI has been translated into Dutch [46]. This self-report questionnaire consists of 60 statements covering five basic dimensions of personality: neuroticism, extraversion, openness to new experiences, agreeableness, and conscientiousness. Each statement is rated on a five-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), resulting in dimension scores between 12 and 60. The psychometrics of the NEO-FFI has been extensively examined. The internal consistency and test-retest reliability, as well as the convergent validity, are acceptable to good [46].

The STAI [34] (Dutch version by [45]) consists of two 20-item scales for measuring state anxiety and trait anxiety. In this study, the STAI trait scale was used. This scale describes how persons *generally* feel and refers to their inclination to experience anxiety in stressful times. The STAI has a four-point rating scale ranging from 1 (*not at all/almost never*) to 4 (*very much so/almost always*). The Dutch version of the STAI has good reliability and validity [45].

Sociodemographic and clinical variables

Patients were asked to report age, marital status, education, and paid work (*yes/no*). Clinical variables, for instance, adjuvant therapy, were retrieved from medical files.

Statistical procedure

Multiple linear regression analyses were performed to identify factors associated with PASS and SRSS at time 5 and time 6. First, the sets of sociodemographic (age, having children, having a partner, years of education, and having a paid job), clinical (tumor stage, type of surgery, chemotherapy, radiotherapy, and hormone therapy), personality (trait anxiety, neuroticism, extraversion, openness to new experience, agreeableness, and conscientiousness), and psychological characteristics (fatigue and depressive symptoms) were entered separately in the regression analyses. For each group of variables (e.g., sociodemographics), all

variables were entered at the same time without making decisions about the order in which variables were put in (i.e., full model). This procedure was employed to minimize the number of independent variables in the final regression analysis preserving statistical power. Subsequently, only those factors that significantly ($p < .05$) predicted the dependent variables were entered in the final analyses. Multicollinearity was assessed by calculating the variation inflation factor (VIF) for each factor in the regression analyses. A $VIF \geq 2.5$ indicates that multicollinearity is affecting the estimated beta parameter [47]. VIFs did not exceed the cut point. In addition, residual and diagnostic analyses were checked with respect to the assumptions underlying linear regression analyses. Inspection of residuals revealed that the distribution could be considered as fairly normal. General linear model analysis was used to examine PASS and SRSS across time. This was done until time 5, due to the rather limited sample size at time 6. However, this limited sample size was not a problem in the regression analysis. Partial eta squared (effect size) was derived from the general linear model. An effect size between 0.01 and 0.06 is considered as a small effect, while effect sizes between 0.06 and 0.13 and greater than 0.14 are considered as moderate and strong effect sizes, respectively [48]. Multiple post hoc comparisons were corrected with the Bonferroni method. Path analyses were conducted to test whether PASS and/or SRSS are mediators of the relationship between stress and QOL [49]. In this study, the hypothesized models were tested at each measurement point (time 2 to time 5). In the model, the latent variable “stress” was linked to the diagnosis women had received. Therefore, only in these analyses women with BC and BBP were used. As outlined above, the PASS and SRSS latent variables were both measured with two observed indicators. In the hypothesized models, stress was specified as the predictor, PASS and SRSS were conceived as mediators, and QOL was specified as the outcome. To evaluate the model, multiple indices of fit were used, including an overall chi-square statistic, the comparative fit index (CFI), and the root mean square error approximation (RMSEA). The models have a satisfactory to good fit when $CFI > 0.90$ and $RMSEA < 0.06$ [50]. All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS, Chicago, IL, USA; version 14.0), except for the path analyses. These analyses were performed using Analysis of Moment Structures (version 7.0).

Results

In total, 799 patients were eligible for this study. Before diagnosis was known, 609 (76.2%) completed the first set of questionnaires before they visited the surgeon or radiologist.

Participants were significantly younger compared with non-participants ($p=.002$). Participants and non-participants did not differ on other sociodemographic or clinical characteristics. Figure 1 shows the flow chart of this study. The outcomes regarding the sociodemographic, clinical, and psychological characteristics are presented in Table 1. Women with BBP were younger [$t(1, 603)=-6.81, p<.001$] and more often employed ($\chi^2=11.46, p=.001$) compared with the BC group.

The preliminary regression analyses can be found in Table 2. Trait anxiety ($\beta=-0.22, p=.021$), agreeableness ($\beta=0.29, p<.0001$), and fatigue ($\beta=-0.21, p<.008$) predicted SRSS at time 5. These factors also contributed significantly to the prediction of PASS at time 5, except for trait anxiety. At time 6, agreeableness as well as fatigue predicted PASS and SRSS. In addition, having a job was negatively associated with SRSS ($\beta=-0.28, p<.05$; Table 3).

There was no effect of time on PASS scores for women scoring low or moderately on agreeableness versus high-scorers on this trait ($p=.28$). In addition, no interaction effect was found between time $\times$ agreeableness, showing that agreeableness exerted a stable effect on PASS over time ($p=.73$). However, low-scorers on agreeableness reported significantly poorer PASS ($p=.001$) compared to high-scorers (Fig. 2).

In contrast, a significant effect across time was found with regard to SRSS scores and agreeableness (Wilks' lambda=0.88, $F(4,93)=3.16, p=.017$, multivariate partial eta squared=0.12; see Fig. 3). No interaction effect was found between time $\times$ agreeableness, showing that agreeableness exerted a stable effect on SRSS over time ($p=.47$). The mean scores of social support at time 2 were statistically different from the scores obtained at time 4 ($p=.027$), indicating a significant decline. Women high on agreeableness had significantly higher scores on SRSS compared with women low or moderately on this trait ($F=9.24, p=.003$, partial eta squared=0.088).

Concerning trait anxiety, there was also a significant effect across time, indicating that SRSS decreased over time (Wilks' lambda=0.86, $F(4,137)=4.14, p=.004$, multivariate partial eta squared=0.14; see Fig. 4). The mean scores of SRSS at time 2 were statistically different from the scores obtained at time 4 ($p=.008$) and time 5 ($p=.005$), indicating a sizeable decline. In addition, women high on trait anxiety had significantly lower scores on SRSS compared with women low or moderately on trait anxiety ($F=34.66, p<.0001$, partial eta squared=0.25).

Figure 5 presents the path diagrams of the mediational models. These models were used to test whether PASS and/or SRSS functioned as a mediator of the relationship between

Table 1 Demographic, clinical, personality, and psychological characteristics at baseline

	BC group ($n=223$)
Sociodemographic factors	
Age at diagnosis (mean $\pm$ SD)	58.7 (9.4)
Living with a partner (yes/no/missing)	179 (80.3)/37 (16.6)/3 (1.3)
Having children (yes/no/missing)	191 (85.7)/29 (13.0)/3 (1.3)
Education level (0–9 years/10–14 years/>14 years/missing)	85 (38.1)/95 (42.6)/37 (16.6) 2 (0.9)
Paid work (yes/no/missing)	85 (38.1)/135 (60.5)/1 (0.4)
Disease stage	
Stage 0/stage I	24 (10.8)/93 (41.7)
Stage IIa/stage IIb	69 (30.9)/35 (15.7)
Undefinable	2 (0.9)
Type of surgery	
BCT/MTC/No surgical treatment	107 (48.0)/114 (51.1)/2 (0.9)
Adjuvant therapy	
Yes/No	169 (75.8)/54 (24.2)
Personality factors	
Neuroticism	30.2 (7.0)
Extraversion	41.1 (5.5)
Openness to new experiences	35.4 (6.0)
Agreeableness	43.5 (4.1)
Conscientiousness	45.5 (5.4)
Trait anxiety	39.4 (11.0)
Depressive symptoms	14.9 (9.5)
Fatigue	19.8 (9.5)

For the sociodemographics, percentages are presented between brackets (except for age). For the personality and psychological factors, the means and standard deviations (SD) are presented

MTC modified radical mastectomy, BCT breast conserving therapy

Table 2 Preliminary regression analyses

		PASS		SRSS		PASS		SRSS	
		Time 5		Time 5		Time 6		Time 6	
	Predictors	Beta	<i>p</i> value	Beta	<i>p</i> value	Beta	<i>p</i> value	Beta	<i>p</i> value
Demographics	Age	0.06	.555	0.11	.328	−0.17	.221	−0.24	.074
	Children	−0.05	.571	−0.06	.470	−0.09	.441	−0.07	.528
	Years of education	−0.05	.588	−0.06	.515	−0.07	.505	−0.12	.291
	Paid job	0.06	.582	0.05	.618	−0.12	.365	−0.30	.025
	Partner	0.01	.899	0.02	.874	0.06	.606	0.01	.939
Clinical	Tumor stage	0.16	.124	0.09	.400	0.04	.764	0.03	.838
	Type of surgery	0.09	.502	0.19	.151	0.10	.542	0.17	.307
	Chemotherapy	0.03	.703	0.06	.481	0.12	.260	0.05	.669
	Radiotherapy	−0.03	.846	0.05	.676	0.07	.672	0.18	.274
	Hormone therapy	−0.04	.693	−0.05	.656	0.07	.565	0.01	.937
Personality	Neuroticism	0.12	.265	0.13	.211	0.02	.885	−0.04	.749
	Extraversion	−0.06	.500	−0.09	.312	0.16	.157	0.16	.137
	Openness	0.06	.486	0.12	.132	−0.06	.546	−0.21	.031
	Agreeableness	0.31	.001	0.30	<.0001	0.34	.002	0.37	<.0001
	Conscientiousness	0.06	.509	0.12	.189	−0.09	.429	−0.06	.549
Psychological	Trait anxiety	−0.32	.001	−0.40	<.0001	−0.29	.015	−0.31	.007
	Fatigue	−0.39	<.0001	−0.32	.002	−0.37	.004	−0.36	.004
	Depressive symptoms	−0.01	.941	−0.16	.104	−0.10	.415	−0.20	.099

PASS perceived availability of social support, SRSS satisfaction with received social support

diagnosis and overall QOL at different time points. To reach a better fit, the model required two correlations of two error terms for PASS from time 2 to time 4 (“estimation of QOL” with “stress” and “satisfaction with health” with “stress”). Adding constrains was not necessary for reaching an adequate fit with regard to PASS at time 5. To reach a better fit, the SRSS model required at least two correlations of two error terms (time 2: “estimation of QOL” with “stress”, “satisfac-

tion with health” with “stress”, and “satisfaction with QOL” with “satisfaction with support from family”; time 3: “satisfaction with life in general” with “satisfaction with health”, “satisfaction with health” with “stress”, “satisfaction with QOL” with “stress”, and “diagnosis” with “satisfaction with support from friends”; “time 4: satisfaction with QOL” with “stress” and “satisfaction with health” with “stress”; time 5: “satisfaction with health” with “satisfaction with support

Table 3 Significant predictors of perceived availability of social support and satisfaction with received social support at time 5 and time 6

	Predictors	Beta	<i>p</i> value	Adjusted R^2	<i>F</i> (<i>p</i> value)
PASS (time 5)	Trait anxiety	−0.10	.316	0.22	13.59 (<.0001)
	Agreeableness	0.27	.001		
	Fatigue	−0.26	.008		
SRSS (time 5)	Trait anxiety	−0.22	.021	0.28	18.35 (<.0001)
	Agreeableness	0.29	<.0001		
	Fatigue	−0.21	.031		
PASS (time 6)	Trait anxiety	−0.14	.236	0.28	12.14 (<.0001)
	Agreeableness	0.31	.001		
	Fatigue	−0.27	.024		
SRSS (time 6)	Trait anxiety	−0.18	.138	0.34	8.94 (<.0001)
	Agreeableness	0.30	.005		
	Openness to experience	−0.06	.550		
	Paid job	−0.28	.024		
	Fatigue	−0.21	.028		

PASS perceived availability of social support, SRSS satisfaction with received social support

Fig. 2 Perceived availability of social support scores of patients before diagnosis and 1, 3, 6, and 12 months after surgical treatment. Women with early stage breast cancer were divided in two groups, according to their scores on agreeableness (low or moderate versus high)

from family” and “satisfaction with health” with “satisfaction with support from friends”). A summary of the overall goodness-of-fit statistics of the path models and the added error variances are presented in Table 4. These models have a satisfactory fit.

Fig. 3 Satisfaction with received social support scores of patients before diagnosis and 1, 3, 6, and 12 months after surgical treatment. Women with early stage breast cancer were divided in two groups, according to their scores on agreeableness (low or moderate versus high)

Fig. 4 Satisfaction with received social support scores of patients before diagnosis and 1, 3, 6, and 12 months after surgical treatment. Women with early stage breast cancer were divided in two groups, according to their scores on trait anxiety (low or moderate versus high)

Discussion

The aim of this study was to examine the role of personality factors in PASS and SRSS in BC patients. Agreeableness was positively associated with perceived social support at time 5 and time 6. Several explanations can be given for this finding: (1) persons who are more agreeable may be more strongly motivated to maintain positive relationships with others compared with persons who are less agreeable [51]; (2) high-scorers on agreeableness tend to interpret the

Fig. 5 The path models for perceived availability of social support and satisfaction with received social support as mediator variables in the link between stress at diagnosis of early stage breast cancer and general quality of life across time. Ovals represent latent variables. In the interest of clarity, error terms are not shown. PASS perceived availability of social support, SRSS satisfaction with social support, QOL quality of life. Stress was measured with the diagnosis women had received

Table 4 Longitudinal path model statistics

	Model	Chi-square	<i>p</i> value	<i>df</i>	CFI	RMSEA	Number of constraints
<i>PASS</i> perceived availability of social support, <i>SRSS</i> satisfaction with received social support, <i>df</i> degrees of freedom, <i>CFI</i> comparative fit index, <i>RMSEA</i> root mean square residuals	PASS, time 1 to time 2	8.877	.449	9	1.000	0.000	2
	PASS, time 1 to time 3	8.877	.449	9	1.000	0.000	2
	PASS, time 1 to time 4	9.483	.394	9	1.000	0.000	2
	PASS, time 1 to time 5	11.567	.481	12	1.000	0.000	0
	SRSS, time 1 to time 2	11.404	.180	8	0.997	0.038	3
	SRSS, time 1 to time 3	12.132	.096	7	0.995	0.053	4
	SRSS, time 1 to time 4	6.087	.731	9	1.000	0.000	2
	SRSS, time 1 to time 5	16.912	.076	10	0.992	0.054	2

behaviors of others more positively and also tend to react more positively upon them [52]. A consequence could be that persons scoring high on agreeableness tend to receive more support from others [53] compared with persons scoring low on this trait. At time 5 and time 6, trait anxiety was negatively associated with perceived social support. Persons scoring high on trait anxiety in general are more anxious. As a result, high-scorers will presumably seek more support from significant others [24]. However, Hobson et al. [25] found that persons scoring high on trait anxiety tend to score lower on perceived social support compared with persons scoring low on trait anxiety. In contrast with persons scoring high on agreeableness, persons scoring high on trait anxiety might interpret the behaviors of others more negatively and also tend to react more negatively upon others. Another explanation may be that highly anxious women are not easily reassured by others. Therefore, they never receive enough social support to feel at ease. At first glance, it seems a paradox that having a job (time 6) is negatively associated with perceived social support, because women who work are usually surrounded by others. An explanation for this finding, however, may be that the environment tends to provide less support or provide support differently due to the fact that women who are working after 2 years of surgical treatment seem to pick up their “normal” life. In this way, women with (former) BC present themselves to others as “doing fine”. Although it may seem that women are fully functioning, they perceive the regular check-ups as stressful [54]. Across time, women with early stage BC report a decrease in perceived social support. Women scoring low or moderately on agreeableness or high on trait anxiety tend to score lower on perceived social support compared with women scoring high on agreeableness or low or moderately on trait anxiety across all time points.

Across time, scores of perceived social support significantly declined with respect to trait anxiety and agreeableness. High-scorers on trait anxiety or low-scorers on agreeableness tend to score lower on perceived social support. To what extent, however, social support is actually lower is not clear. To the best of our knowledge, no studies

have related personality characteristics to perceived social support longitudinally. However, Courten et al. studied social support across time and found that the size of the networks as well as the amount of emotional support showed some decrease over time [18].

The path models reached an adequate fit when examining the role of PASS and SRSS as mediating variables of the link between diagnosis and QOL. To the best of our knowledge, no existing studies examined the abovementioned relationship. In fact, few studies have examined relationships between social support and QOL. Recently, Lim and Zebrack [55] found that network diversity indirectly affected QOL through perceived social support. In the past, different hypotheses have been posed to explain the relationship between social support and QOL: the main effects hypothesis and the stress-buffering hypothesis [56]. The main effects hypothesis is referring to a linear relationship between the amount of support and QOL, while the stress-buffering hypothesis states that this relationship is also affected by the level of stress individuals are experiencing [5, 56]. Studies have been conducted on both models. Recently, Helgeson [5] has made clear that type of support was an important issue. In many studies, emotional support showed the strongest relationship with QOL. However, it should be kept in mind that other types of support, for instance, informational support provided by health professionals or peers is helpful in particular circumstances, i.e., when an individual starts problem-oriented coping with stressful situations.

As social support is an aspect of QOL, it seems important to try to increase its level or to improve the fit between the needs of women and the actual type of support provided to women. Potential problems with regard to perceived social support could be improved by, for instance, trying to involve the partner or family in the treatment plan. In this way, significant others are aware of the problems women with early stage BC are facing during and after the treatment process. Another option is to try to educate women with early stage BC and their families about the importance of social support, i.e., to teach women to ask for help, when they need support, or to learn how

they can best discuss their needs, when they are not satisfied. Nevertheless, it is important to keep in mind that personality traits are quite stable. Also, the way persons encounter and perceive social situations is not easily altered. However, while personality traits were significantly associated with social support, they only accounted for a proportion of the variance in perceived social support. Intervention strategies should focus on the more dynamic changeable personality characteristics, like poor coping skills and poor psychosocial resources, instead of the more static dispositional traits [57].

The current study has some limitations. For instance, the study population at time 6 was rather small ($n=92$). In addition, our study sample was somewhat younger compared with the non-participants. Therefore, we should be careful when interpreting and generalizing the results based on this particular sample. Another limitation is that we only assessed perceived social support. As a consequence, it was not possible to examine whether the same or other socio-demographic and personality factors were related to more quantitative aspects of social support, for instance, network size or frequency of appointments. Information concerning the type of support (i.e., instrumental support and emotional support) women received and needed from significant others was also lacking. Thus, future studies should further examine the role of potential factors which play a role in social support and combine these findings with assessing the needs of women with early stage BC. In this way, screening and treatment can be geared to one another.

In conclusion, personality traits are important determinants of perceived social support. Understanding the underlying mechanisms of perceived social support will be useful in the development of interventions for women with BC.

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