



# Coping with breast cancer and relapse: Stability of coping and long-term outcomes in an observational study over 10 years



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## ABSTRACT

Many studies dealing with relationships between coping and breast cancer were based on a single measurement of coping behaviour. Assessments were taking place soon after surgery of primary breast cancer, and effects on long-term outcomes were considered. In our study it was examined whether coping behaviours are stable over time and whether they were associated with breast cancer recurrence.

The analyses were based on a long-term study with initially 254 patients with three interviews and an outcome assessment within a total study period of 10 years. Data were collected by means of qualitative interviews and standardized questionnaires. Ways of coping in terms of helplessness, denial, mastery, and hope/optimism were classified by interviewer-based ratings within the framework of a standardized rating procedure. The reliability of rating standards was assured by continuous training and by estimating inter-rater agreements. Outcome measures were drawn from registries and patients' files.

Coping behaviours over three interviews within six years after surgery turned out to be highly variable, and the respective correlations were low. For none of the four ways of coping associations with recurrence emerged.

Coping in response to breast cancer was not stable over time, so we may conclude that the results of one measurement assessed early in the disease course should not be considered as constant over longer time periods. Coping behaviours were unrelated with recurrence, a finding that might be relieving from a patient perspective.

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## 1. Introduction

Individuals encountering adverse events such as a breast cancer diagnosis are responding with emotional, behavioural and cognitive attempts for managing event-related distress. Reactions to events that are appraised as taxing or exceeding the resources of individuals are subsumed under the notion of coping (Lazarus and Folkman, 1984; Taylor and Stanton, 2007). It can be adaptive or maladaptive, and the success of coping behaviours often depends on particular properties of the situation or on the resilience of the affected individuals. Beginning with Richard Lazarus' work in the 1960s (Lazarus, 1966), a large number of studies have been conducted on coping behaviours (Skinner et al., 2003) of which there are more than 100 category systems summarizing over 400 ways of

coping. Subsets of these systems emerged rather quickly and frequently appeared in empirical studies with *problem solving*, *seeking support*, *avoidance*, *distraction*, and *positive cognitive restructuring* as the most prominent group. The second group of frequently occurring categories was made up of rumination, helplessness, social withdrawal and emotion regulation. It also included information seeking, negotiation, and opposition (Skinner et al., 2003).

Research on coping with breast cancer does not cover the full range of coping reactions as the disease leaves only limited options to exercise direct behavioural control over its stressful concomitants. This refers to prognosis, the risk of recurrence, the side effects of primary and secondary treatments, or the reactions of the environment, thus the predominating ways of coping are cognitive and emotion-focused. In 1979 Greer and colleagues published a study on coping among breast cancer patients (Greer et al., 1979). Based on interviews they classified their patients' reactions by a "fighting spirit", "helplessness/hopelessness", "denial", or as "fatalistic" (Greer et al., 1990, 1979). Data on disease outcomes were

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collected 5, 10, and 15 years later (Greer et al., 1979, 1990). After an observation period of 15 years, patients who had responded to their cancer with a “fighting spirit” or with “denial” were more likely to survive or to be free of recurrence. This study started with a sample of 69 patients that became smaller over the years due to breast cancer mortality. Coping categories of the early studies by Greer and colleagues were based on qualitative interviews with patients, and these were the basis for the development of the Mental Adjustment to Cancer-Scale (MAC) (Watson et al., 1988), a standardized instrument for assessing coping behaviour.

The work conducted by Greer and colleagues triggered a number of successor studies. In 2002, Petticrew, Bell and Hunter published a review paper with rather pessimistic conclusions (Petticrew et al., 2002) by contending that there was no consistent evidence that coping might affect the course of cancers. These conclusions were supported by a large study that used the MAC for assessing coping patterns. The MAC was examined whether disease-free survival was associated with particular coping patterns among 708 Australian women (Phillips et al., 2008). The authors failed to find associations between coping and disease-free survival within an observation period of more than eight years (Median = 8.2 yrs.). Watson et al. (2005) reported that breast cancer patients reacting to their disease with “helplessness/hopelessness” had higher mortality rates and shorter disease-free intervals. In a recent study, Watson and colleagues examined associations between negative adjustment and breast cancer outcomes. Negative adjustment is a newly introduced scale of the MAC that has been shown to be highly correlated with anxiety and depression. In this study, Watson et al. found negative adjustment was associated with the risk of relapse and with increased mortality rates after a follow-up of five years (Watson et al., 2012).

Another recent study by Astin et al. (2013) examined psychological control as measured by the Shapiro Control Inventory (SCI) with respect to morbidity and mortality due to breast cancer. They included 58 women and took three measurements within six weeks after breast cancer diagnosis, then again at four and eight months after diagnosis, and endpoint data were collected after 20 years. The authors failed to find any meaningful relationship between psychological control and relapse of breast cancer as well as for breast cancer-related deaths.

The designs of the studies described above have one common feature: coping patterns were either assessed immediately or several months after patients were diagnosed, e.g., three months (Greer et al., 1979), less than four months (Greer et al., 1979), four to eight months (Astin et al., 2013), or 11 months (Phillips et al., 2008) after diagnoses. Associations of coping responses with outcomes were collected after very long follow-up periods ranging from five (Greer et al., 1979), 10 (Astin et al., 2013; Phillips et al., 2008) up to 15 (Greer et al., 1990) or 20 years (Astin et al., 2013) after primary surgery. If coping is only assessed at one time point, close to surgery, and if it is related to outcomes occurring up to 20 years later, coping has to be assumed as stable over longer periods of time, yet cancer patients are facing different challenges over the disease process. At the time of surgery, cancer patients have to deal with the diagnosis and associated prospects. One year later, post-operative treatments and their side-effects may be in the focus of their attention, and beyond that, reintegration into daily routines is pending or has already taken place. Nevertheless, this phase, e.g., reintegration, is still accompanied by the risk of recurrence. In the literature, coping is considered to be strongly dependent on the requirements of situations (Lazarus and Folkman, 1984; Folkman and Lazarus, 1980). Thus, coping should rather be situation-specific and variable rather than temporarily stable. In some studies this issue was explicitly dealt with, and variability over time was reported (Al-Azri et al., 2009). As a result, a single assessment

does not suffice, and multiple measurements are essential. This is also an important consideration when examining the pathways between coping and breast cancer progression. Studies from psychoneuroimmunology suggest that dysfunctional coping strategies can lead to increased levels of distress, which in turn, may cause neuro-hormonal and immune system dysfunctions, ultimately contributing to cancer growth (Green McDonald et al., 2013; Kiecolt-Glaser et al., 2002).

In addition to the methodological concerns regarding when and how frequently coping is assessed, the type of assessment tool has also been widely discussed in the coping literature. Some researchers in psycho-oncology criticized the use of standardized coping questionnaires. They contended that closed-ended questions may fail to account for the variability of coping behaviour, increasing the risk of biases and misclassifications (Tschuschke, 2011; Folkman and Moskowitz, 2004). As a consequence, some authors have recommended qualitative approaches that involve personal interviews (Tschuschke, 2011; Folkman and Moskowitz, 2004), and when conducted by trained personnel, interview ratings had higher correlations with patients' genuine behaviour than standardized measures (Tschuschke et al., 2001). Qualitative approaches are more holistic and should be preferred because they account for individual living conditions, but they are time-consuming and costly (Brown and Harris, 1978; Harris, 2001), two disadvantages that prevent researchers from choosing such an approach.

In our study, we used a flexible instrument based on qualitative interviews. It accounts for coping behaviour and contextual information, and does not require respondents to answer long lists of coping behaviours. The following categories were used for detailed analyses and were chosen based on the above mentioned breast cancer studies conducted by Greer and colleagues: **Helplessness** was chosen because it has been shown repeatedly to be negatively associated with survival and quality of life (Watson et al., 2005; Shou et al., 2005). In their review, Skinner et al. identified it as one of the core categories of coping (Skinner et al., 2003), and its relevance had also been pointed out in Folkman's earlier work (Folkman, 1984). **Mastery/sense of control** was chosen because it may reduce distress, and may exert positive effects on psychological as well as physical health. **Denial** was chosen because it may lead to maladjusted coping by preventing the activation of personal resources and by reducing adherence to treatment. **Hope/optimism** was chosen because it may have opposing effects to **Denial** by activating one's resources. In earlier studies it was also associated with improved health and increased survival rates (Al-Azri et al., 2009; Taylor and Stanton, 2007; Grulke et al., 2005). Consistent with the coping categories above, **Hope/optimism** has been subject to examination in a number of empirical studies (Skinner et al., 2003).

We examined coping behaviours and breast cancer using the following research questions:

- 1) Are coping reactions of breast cancer stable over time?  
Stability and variability will be examined using the above-mentioned four coping dimensions over three different time points. The temporal distances between them are longer than in earlier studies. This question tackles the critical silent assumption of stability over time. It refers to a core issue raised already in the early studies relating coping behaviours with long-term outcomes in breast cancer patients.
- 2) Are coping reactions associated with disease outcomes in terms of relapse?  
The association between increased risk of recurrence and the four coping reactions will be examined. A separate analysis

will be performed for each coping dimension (helplessness, mastery/sense of control, denial, and hope/optimism).

## 2. Methods

The following analyses are based on a panel study examining the effects of social and psychological factors on the course of breast cancer.

**Study population:** Patients were invited to participate if they had a diagnosis of primary breast cancer. They were included if the tumour size did not exceed five cm (T-stages T1 to T2), later also cases with tumours larger than five cm (T-stage T3) were included. Patients were also included if lymph nodes were involved (stage N1 and N2). Cases with metastases, multiple cancers and patients with psychiatric diagnoses were excluded. The minimum age for inclusion was 25 years of age, and the maximum age was 70 years. This age limitation was introduced because the study was designed to follow patients for a total of 10 years; including patients over 70 years of age would have increased the likelihood of dementia and premature death due to a large variety of diseases, making follow-up assessments and the interpretation of outcome data difficult. Consecutively admitted patients from three hospitals in Hannover were invited to participate: the gynaecology units of the Oststadt Hospital/Hannover Medical School, the Nordstadt Clinic and the Henrietten Foundation.

Baseline assessments ( $T_0$ ) started in 2002, and the follow-up interviews ( $T_0 + 1$  year) began in 2003; the last wave of interviews ( $T_0 + 6$  years) started in 2008 and ended in 2010. Endpoint measures, recurrences and breast cancer deaths, were collected in 2010/2011.

Coping data were assessed by use of semi-structured interviews and interviewer-based ratings according to the work of Brown and Harris (1978), Harris (2001). This approach permits a better understanding of the respondents compared to standardized instruments, reactions can be interpreted and understood out of their contexts and behaviours can be classified more precisely (Brown, 1974).

A maximum of three interviews was conducted for each patient, with long time periods elapsing between assessments. This design allowed for coping measures to be assessed immediately after surgery, when post-operative/follow-up treatments took place, and after patients' return to their normal daily routine.

**Data collection and interpretation:** The data are based on ratings of qualitative interviews according to the **Hannover Coping Inventory (HCI)**, which is based on the Bedford College Coping Inventory (Bifulco and Brown, 1996). The Bedford College Coping Inventory was developed in studies examining depression (Bifulco and Brown, 1996) and incorporated the same methodological principles as Brown and Harris' Life Events and Difficulties Schedule (Brown and Harris, 1978). The Bedford College Coping Inventory in its original form was incomplete as the number of examples was too small for obtaining satisfactory inter-rater reliabilities. Thus a new instrument was constructed by keeping the basic principles and the coping dimensions of the original. Descriptions and definitions of the ways of coping were completed or newly formulated, and data from three projects were used for collecting the anchoring examples. Finally a rating manual of 110 pages was developed, consisting of coping behaviour descriptions, several hundred case examples of coping dimensions and rating categories, and a documentation sheet. The instrument development started in 2002, and the first usable version was available in 2008 (Geyer et al., 2009); the present version used in this study, was available in 2012 (Koch-Giesselmann, 2012).

The data were collected in a semi-structured interview consisting of open-ended questions pertaining to: the socio-economic background of a respondent, the patient history, including a narrative of her experiences concerning the present stay in hospital, and how she was coping with the current situation. All interviews were tape-recorded and rated according to standardized rules for rating coping behaviour; the interviews and coping ratings were performed by different persons. To determine the coping rating, individuals wrote down as much information as possible in order to extract the maximum amount of contextual data in order to do justice to the particular case. Coping behaviours were then evaluated by writing down the relevant information and classifying it according to several ways of coping (inferred denial, helplessness, mastery, hope/optimism, minimizing, positive appraisal, cognitive avoidance, rumination, restructuring of meaning, self-blame, blame of others, distress, anger, shame, information seeking, and practical resources); behaviours were rated as "marked", "moderate", "some", or "none". If the rating dimension was irrelevant for a particular case or a situation, "not applicable" was assigned.

Classifications were made according to the similarities with examples listed in the manual. A description of all ways of coping covered by the inventory was published in an earlier paper (Hervatin et al., 2012).

Based on the considerations in the introduction, the following analyses will focus on helplessness, denial, mastery/sense of control, and hope/optimism.

**Helplessness** was rated on the basis of respondents' feelings about opportunities to influence, to overlook things and to have things under one's control. It refers to the degree of being at someone's mercy or to be out of control.

**"Marked":** "One day you will wake up and the nightmare comes to an end, but it doesn't. I cannot take it any longer to have lost a part of the body. I cannot exercise control any longer. I have always lived a self-determined life, but now I am at the mercy of physicians and at the administrative machinery."

**"Moderate":** "After diagnosis of breast cancer I felt helpless, but not as if I had lost control. When I was brought to the operating theatre I asked a doctor to call my husband."

**"Some":** (Father's illness and death) "While he was in hospital you do [feel helpless]. You don't know what you can do, but one thing was he refused to eat and if you tried to force him, he refused."

**"None":** (Partner's heart attack) Patient thinks that there will always be help. She had a strong feeling that everything is under control because she "can trust the doctors".

**Denial** refers to explicitly ignored information, suppressed affect and the unwillingness to perceive the significance or the threat of situations.

**"Marked":** A diagnosed breast cancer patient insists on not having cancer or claiming that there was an error that led to her breast surgery while attending chemotherapy.

**"Moderate":** A patient is aware of having breast cancer, but she denies a description of her situation, potentially difficult details are omitted, and her descriptions are superficial.

**"Some":** The breast cancer patient thought that her cancer was a bad dream, "it's not me, you will wake up, and it is gone." It was rated "some" because it lasted only a few days.

**"None":** No examples listed.

**Mastery/sense of control** refers to respondents' conviction to be able to cope with a crisis. It will be rated whether she has the conviction to cope as well as active attempts to master a particular

situation.

**“Marked”:** A cancer patient is satisfied with the way how she has coped with the disease. “It is part of my life. I have put it away now. I didn’t let it get me down and I have continued with my life, read books and looked for alternatives. There is nothing what I haven’t tried, and nobody has realized that I was ill.”

**“Moderate”:** After her chemotherapy the patient was always hungry. Two to three days afterwards she always felt ill, but she spoke to herself: “You have to go through it, and you will make it.”

**“Some”:** The breast cancer patient believes that she will be facing new tasks and problems after surgery, and she will have to come to terms with them.

**“None”:** The breast cancer patient does not feel strong enough to master the situation. She is overburdened with her family life and she has not enough time for her own needs.

**Hope/optimism** refers to respondents’ appraisal of their prospects concerning a positive outcome of a crisis.

**“Marked”:** “I am optimistic to having coped with the disease. After the surgery I was sure that the cancer is away now. I am not afraid, not of a recurrence, and not of the follow-up check-ups. I am still convinced to live until the age of 90.”

**“Moderate”:** Respondent hopes that her situation will improve slowly. She often thinks to the future, but she is reluctant, because there may be a recurrence. Although she thinks that it is necessary to be prepared for dying, she also develops perspectives of her future life.

**“Some”:** Breast cancer patient cannot say whether she is optimistic, but she can live with her disease. She wants to travel and thinks that life is worth living because of her children.

**“None”:** One year after the death of her husband the breast cancer patient cannot imagine the future. She doubts that there will be a future at the age of 78.

The manual with rules of interpretation and case examples is the core element of the procedure, and all interviewers and raters were trained in how to use the interview schedule and manual. Ratings were performed by interviewers and by trained raters who did not conduct interviews; 20% of the interviews were rated by several raters, and in all cases no interviewer rated her own interviews (i.e., the functions were kept separate, and raters had no information on outcomes).

Coping ratings started in 2006, and the ratings of the first and second wave were reviewed again from 2009 to 2013 after the final version of the instrument was available. The inter-rater reliabilities (Cohen’s Kappa) for three independent raters were  $K = 0.65$  for denial,  $K = 0.70$  for helplessness,  $K = 0.69$  for mastery, and  $K = 0.72$  for hope/optimism. The average inter-rater agreement over all coping dimensions was  $K = 0.67$  indicating “substantial or good correspondence”. Agreement was only counted if the raters assigned the same score, i.e., all deviations from a score were counted as disagreements. This strict procedure was also applied to the estimations of coping consistency, thus leading to lower alpha-scores than under conditions of deviations.

**Demographic** data were collected by means of standardized interviews as derived from the German Standard Demography (Statistisches Bundesamt, 2004).

**Breast cancer diagnoses** with TNM-status and receptor status were obtained from the patient records within one week after surgery. TNM-status takes into account the size of the tumour (T),

whether it has spread to the lymph glands or lymph nodes (N) and whether it has metastasized (M), i.e., spread to other parts of the body.

**Recurrences and deaths** as outcomes were obtained from patient records at hospital, from medical practices outside hospitals, from cancer documentation centres, from the local cancer registry and from the residents’ registration office.

The study was approved by the ethics committee of Hannover Medical School in 2000 and 2002 under register number 2475, and in 2006 under register number 4342. The links between individual respondents and the data were deleted after having collected the outcomes in order to obtain an anonymized dataset.

### 3. Statistical procedures

Intra-individual associations of rating dimensions over the three interviews are displayed by cross-tables.

In order to estimate intra-individual consistencies of coping behaviours, Cronbach’s alpha was computed for the four ways of coping. The coefficients were calculated for each pair of successive surveys, i.e., from the first to the second ( $T_0 - T_1$ ), and from the second to the third survey ( $T_1 - T_2$ ).

Finally, effects of coping on recurrence were estimated by means of proportional hazards regression. For every dimension a separate analysis was performed. Coping was entered into the analyses as a time-varying covariate, age and tumour size were entered as additional time-invariant covariate.

All analyses were performed with STATA version 13 (Stata Corp., 2013).

### 4. Results

At baseline 355 consecutively admitted women with breast cancer were invited to participate. Of those, 82 (23%) refused and 17 (5%) were excluded due to being outside the inclusion criteria. Two interviews were lost due to technical problems, thus the final sample comprised 254 patients with a mean age of  $53.6 \pm 9.6$  years. A total of 237 women participated in the second interview, 197 women were in the second and last follow-up, and 15 women died within the observation period. Finally, 38 patients had at least one recurrence (Table 1), and this has to be interpreted against the backdrop of the more favourable prognoses of the early cancer stages.

The distribution of coping ratings across the four dimensions were skewed (Table 2). Marked denial was rare across all three interview waves. At baseline 37 patients were rated “marked” on helplessness, and 32 of them participated in the second survey. In the follow-up interview, only five were rated “marked”, and three in the second follow-up. The distribution of mastery was also skewed towards the positive side, indicating that most women could cope with the concomitants of their cancer. Optimism appeared to be normally distributed, but the correlations between the ratings and the interviews indicate that, in spite of similar overall distributions, there was intra-individual variability over time. This also applied to the other coping dimensions. If there was stability, it occurred in the rather positive categories indicating low helplessness, low denial, high mastery and hope. The weak correlations in Table 3 confirm these findings (Table 3).

The association between coping and outcomes are presented in Table 4 and were estimated using proportional hazards-regression. These findings have to be considered against the backdrop of a relatively low number of recurrences (38 total). These findings suggest that the relative risk for recurrence increases with



**Table 1**

A summary of the basic demographic characteristics of the study sample.

Characteristics	Assessment time points		
	T0	T1	T2
Age in years (mean $\pm$ SD)	53.1 $\pm$ 9.6	54.4 $\pm$ 9.4	59.4 $\pm$ 9.6
Status of cohabitation, n (%)			
Married/living with a partner	191 (75.2)	177 (74.7)	146 (74.1)
Solitary	63 (24.8)	60 (25.3)	51 (25.9)
Educational status, n (%)			
Low (8, 9, or 10 years of schooling) <sup>a</sup>	100 (39.4)	92 (38.8)	77 (39.1)
Intermediate (10 years of schooling)	90 (35.4)	89 (37.6)	74 (37.6)
High (12 or 13 years of schooling)	59 (23.2)	56 (23.6)	46 (23.4)
Missing/Other	5 (2.0)	–	–
Radiotherapy, n (%)			
No	44 (17.3)	40 (16.9)	33 (16.8)
Yes	205 (75.8)	196 (82.7)	163 (83.2)
Missing	108 (47.0)	1 (0.4)	–
Chemotherapy, n (%)			
No	114 (44.9)	104 (43.9)	86 (43.7)
Yes	134 (42.8)	133 (56.1)	111 (56.3)
Missing	6 (2.4)	–	–
Tumour stage, n (%)			
T <sub>1</sub>	172 (67.7)	163 (68.8)	141 (71.6)
T above 1	81 (31.9)	74 (31.2)	56 (28.4)
Missing	1 (0.4)	–	–
Recurrences (T1 + T2)		38	
Deaths		17	
Clinic, n (%)			
Clinic of the Henrietten Foundation	80 (31.5)	76 (32.1)	67 (34.0)
Clinic Nordstadt	59 (23.2)	57 (24.1)	48 (37.6)
Oststadt Hospital (Medical School)	98 (38.6)	91 (38.4)	74 (37.6)
Medical school	15 (5.9)	13 (5.5)	8 (4.1)
Missing	2 (0.8)	–	–
Total number of women	254 (100)	237 (100)	197 (100)

Note. T0 = Baseline assessment. T1 = First follow-up assessment. T2 = Second follow-up assessment. SD = Standard deviation.

<sup>a</sup> Years of schooling varied for Low Educational status depending on the type of school.

**Table 3**Intra-individual comparisons for the four coping dimensions over three surveys as correlations.<sup>a</sup>

Coping dimension	Assessment time points	
	T0 – T1	T1 – T2
Helplessness	0.29	0.28
Mastery/sense of control	0.16	0.28
Hope/optimism	0.25	0.39
Denial	0.16	0.42

Note. T0 = Baseline assessment. T1 = First follow-up assessment. T2 = Second follow-up assessment.

<sup>a</sup> Correlations are presented as Cronbach's alpha.

decreasing **helplessness**, but the effects are far from being statistically significant. These estimates are lacking sufficient precision to interpret the effect of helplessness. The effects for **mastery** are also statistically insignificant. In regard to the finding “mastery: none”, this is explained by the fact that we had no women with recurrence that were rated “none”. For **hope/optimism**, the results were also statistically insignificant, and no patient was rated “none”. A similar outcome was observed for **denial**; at the third interview series no respondent with recurrence was rated “marked”.

## 5. Discussion

The first research question examined the stability of coping over time. The general answer to the question is straightforward, as there is no stability, and this refers to all coping dimensions considered in this paper. Folkman and Lazarus (1980) assumed that coping was highly specific to situations, i.e., usually individuals are reacting in a flexible way so that their ways of coping match the perceived requirements of situations. If coping was understood as personality disposition, individuals would react in stereotyped ways, acting in the same or similar ways even when situations were different (Folkman and Moskowitz, 2004). Beyond this rather

**Table 2**

The distribution of the ratings for helplessness, mastery, hope/optimism and denial for the baseline and first follow-up assessments (T0 – T1) and for the first and second follow-up assessments (T1 – T2).

Rating		T0 – T1				N	T1 – T2				N
		Marked T0	Moderate T0	Some T0	None T0		Marked T1	Moderate T1	Some T1	None T1	
<b>Helplessness</b>											
Marked	T1	0	1	3	1	5	T2	0	1	2	5
Moderate	T1	6	5	1	7	19	T2	1	2	2	7
Some	T1	12	7	13	24	56	T2	0	3	4	20
None	T1	14	18	33	86	151	T2	2	12	37	106
N		32	31	50	118	231		3	18	45	123
<b>Mastery</b>											
Marked	T1	33	46	14	1	94	T2	35	38	5	78
Moderate	T1	30	55	22	2	109	T2	30	38	12	81
Some	T1	8	10	7	1	26	T2	1	10	2	13
None	T1	1	0	0	0	1	T2	1	0	0	1
N		72	111	43	4	230		67	86	19	173
<b>Hope/optimism</b>											
Marked	T1	25	38	8	3	74	T2	20	19	3	42
Moderate	T1	31	54	20	4	109	T2	43	63	18	125
Some	T1	7	13	13	1	34	T2	6	8	7	24
None	T1	1	3	1	0	5	T2	0	0	0	0
N		64	108	42	8	222		69	90	28	191
<b>Denial</b>											
Marked	T1	0	1	0	0	1	T2	1	0	1	3
Moderate	T1	0	2	3	15	20	T2	0	6	2	20
Some	T1	1	5	3	22	31	T2	0	3	3	18
None	T1	4	10	28	139	181	T2	0	8	19	144
N		5	18	34	176	233		1	17	25	148

Note. Differences between the number of respondents interviewed at a particular wave and the numbers in the tables are due to missing information or cases where the rating dimension was not applicable. N = Total number of respondents. T0 = Baseline assessment. T1 = First follow-up assessment. T2 = Second follow-up assessment.

**Table 4**

The effects of coping on recurrences of breast cancer: Proportional hazards regression models with separate analyses for all four coping dimensions.

	Hazard ratio	95% CI	p
<i>Helplessness/hopelessness</i>			
Helplessness: Marked	1 (reference)	—	—
Helplessness: Moderate	1.51	0.40–5.68	0.54
Helplessness: Some	1.44	0.43–4.83	0.55
Helplessness: None	1.81	0.60–5.48	0.29
T-Stage (overall effect)	1.66	0.92–3.01	0.09
Age (years)	0.956	0.936–0.997	0.03
<i>Mastery</i>			
Mastery: Marked	1 (reference)	—	—
Mastery: Moderate	1.07	0.48–2.50	0.88
Mastery: Some	1.15	0.42–3.15	0.78
Mastery: None	7.54e <sup>-20</sup>	—	—
T-Stage (overall effect)	1.62	0.89–2.92	0.11
Age (years)	0.970	0.939–1.000	0.05
<i>Hope/optimism</i>			
Hope/optimism: Marked	1 (reference)	—	—
Hope/optimism: Moderate	0.60	0.28–1.29	0.19
Hope/optimism: Some	0.67	0.26–1.71	0.40
Hope/optimism: None	No cases in this category	—	—
T-Stage (overall effect)	1.81	0.99–3.34	0.05
Age (years)	0.969	0.938–1.000	0.06
<i>Denial</i>			
Denial: None	1 (reference)	—	—
Denial: Some	0.33	0.08–1.37	0.13
Denial: Moderate	1.33	0.40–4.42	0.64
Denial: Marked	5.03e <sup>-15</sup>	—	—
T-Stage (overall effect)	1.69	0.94–3.04	0.08
Age (years)	0.969	0.939–0.999	0.05

Note. T-Stage represents tumour size, and age (years) represents a time-invariant covariate. CI = Confidence interval.

conceptual issue, studies have shown that flexible coping is associated with better overall health (Taylor and Stanton, 2007; Lester et al., 1994). Of course this does not mean that coping behaviours do not show individual-specific patterns, but the largest part should be determined by the properties of situations. Individuals typically differentiate between them, and react appropriately. From this perspective, the stability of coping over years is unlikely, and it can be shown with helplessness as an example. At the first interview 37 women were rated “marked”, 32 of them participated in the follow-up, but only five were rated “marked” at that time; none of the patients with “marked” in the first interview got the same rating in the second interview.

Marked denial was uncommon in all three interviews, and the majority of patients were classified into categories that indicated a low level of denial or no denial at all. Nevertheless, the correlations between the interviews were small, suggesting that many changes occurred over time. For optimism and mastery the same applies, as the correlations between the three measurements were rather low. The finding of coping variability is also supported by the challenges the women are facing in the different time periods after diagnosis: immediately after surgery patients have to deal with the diagnosis and with changed prospects of life due to a potentially life-threatening disease. One year later, they have to cope with the aftercare or with the aftermaths of chemotherapy and/or radiotherapy, and years later they may have developed new daily routines or their life may have returned back to normal.

These findings do not preclude that coping reactions are associated with recurrences, which was the aim of the second research question. No associations emerged between the four coping dimensions and relapse as the outcome. From this we may conclude that coping reactions do not influence the course of breast cancer.

The potential reasons as to why our study failed to find any association between ways of coping and outcome needs to be discussed. Inappropriate coping dimensions might have been

considered, but this is unlikely for several reasons. The two dimensions, helplessness and mastery, were chosen because they are strongly related to concepts of stress and low control has been associated with worse health status (Chandola et al., 2004; Steptoe et al., 2003). The four dimensions in our study were selected in accordance with the work by Greer and colleagues (Greer et al., 1990). Another reason might be that we did not cover the same contents as with the MAC, but using this instrument has not always yielded consistent results. Although some studies have reported associations between the MAC-sub scales and the risk of relapse (Watson et al., 2005), others have failed to find them (Watson et al., 2012). The present study followed earlier study approaches by considering only one coping dimension per analysis. A promising direction for future research may be to combine coping dimensions, as coping is not only active cognitive or emotion-focused. And while this approach is not new (Lazarus, 2006, 1999; Folkman and Moskowitz, 2004), it has rarely been realized in empirical studies.

## 6. Limitations of the study

The discussion so far has been confined to coping, and the absence of effects on the course of disease which may be seen as a limitation of the study. Future research should consider what potential frame conditions are taxing the adaptive resources of individuals beyond coping with a severe disease. These conditions could also refer to sudden, stressful life events such as the loss of a job or the health of another family member, or chronic conditions such as enduring problems at the workplace or unemployment (Bifulco et al., 1998; Brown and Harris, 1989). Studies examining other diseases reported that adverse events increased the risk of disease progression (Leserman, 2008). In addition to directly stressful conditions, vulnerability factors (Brown and Harris, 1989) may also influence the adaptive resources of individuals by increasing the efforts needed to meet everyday requirements. Vulnerability factors alone are not a source of perceived distress, but if adverse events or stressful conditions are chronically occurring, the adaptive capacities will soon be exceeded. Apart from psychological and social conditions, lifestyle factors such as smoking may also have mediating effects (Bennett et al., 2013) and should be examined in future research. Another useful extension of the present study would be the inclusion of immunological and hormonal measures in order to study further mediating factors (Kiecolt-Glaser et al., 2002; Green McDonald et al., 2013). However, this will not be possible without increasing sample sizes. One might also maintain that our sample was already too small to detect coping effects, and that the number of cases with relapse were insufficient. Despite this possibility, there have been studies with smaller samples than ours that detected coping effects, and studies with large samples where effects were absent (Phillips et al., 2008). If the argument of large samples applies, then the effects of coping may be small and thus difficult to detect with statistical significance.

In summary, we found that coping was variable over time, but it was not associated with the risk of relapse, a finding that might be considered as relieving from a patient perspective.

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## References

- Al-Azri, M., Al-Awisi, H., Al-Moundhri, M., 2009. Coping with a diagnosis of breast cancer – literature review and implications for developing countries. *Breast J.* 15, 615–622.
- Astin, J.A., Shapiro, J., Shapiro, D., 2013. Psychological control and morbidity/mortality in breast cancer patients: a 20-year follow-up study. *Behav. Med.* 39, 7–10.
- Bennett, J.M., Glaser, R., Andridge, R.R., Peng, J., Malarkey, W.B., Kiecolt-Glaser, J.K., 2013. Long lasting effects of smoking: breast cancer survivors' inflammatory responses to acute stress differ by smoking history. *Psychoneuroendocrinology* 38, 179–187.
- Bifulco, A., Brown, G.W., 1996. Cognitive coping response to crisis and onset of depression. *Soc. Psychiatry Psychiatr. Epidemiol.* 31, 163–172.
- Bifulco, A., Brown, G.W., Moran, P., Ball, C., Campbell, C., 1998. Predicting depression in women: the role of past and present vulnerability. *Psychol. Med.* 28, 39–50.
- Brown, G.W., 1974. Meaning, measurement and stress of life events. In: Dohrenwend, B.S., Dohrenwend, B.P. (Eds.), *Stressful Life Events: Their Nature and Effects*. Wiley, New York, pp. 217–244.
- Brown, G.W., Harris, T., 1978. *Social Origins of Depression*. Tavistock, London.
- Brown, G.W., Harris, T., 1989. *Life Events and Illness*. Unwin Hyman, London.
- Chandola, T., Kuper, H., Singh-Manoux, A., Bartley, M., Marmot, M., 2004. The effect of control at home on CHD events in the Whitehall II study: gender differences in psychosocial domestic pathways to social inequalities in CHD. *Soc. Sci. Med.* 58, 1501–1509.
- Folkman, S., 1984. Personal control and stress and coping processes: a theoretical analysis. *J. Personal. Soc. Psychol.* 46, 839–859.
- Folkman, S., Lazarus, R.S., 1980. An analysis of coping in a middle-aged community sample. *J. Health Soc. Behav.* 21, 219–239.
- Folkman, S., Moskowitz, J.T., 2004. Coping: pitfalls and promise. *Annu. Rev. Psychol.* 55, 745–774.
- Geyer, S., Ellis, R., Koch-Giesselmann, H., 2009. Das Hannoversche Copinginventar: Ein qualitatives Verfahren zur Untersuchung der Problembewältigung bei Frauen mit Mammakarzinom. In: Neises, M., Weidner, K. (Eds.), *Qualitative Forschungsansätze und Ergebnisse in der psychosomatischen Frauenheilkunde*. Pabst Science Publisher, Lengerich, pp. 169–189.
- Green McDonald, P., O'Connell, M., Lutgendorf, S.K., 2013. Psychoneuroimmunology and cancer: a decade of discovery, paradigm shifts, and methodological innovations. *Brain Behav. Immun.* 30 (Suppl.), S1–S9.
- Greer, S., Morris, T., Pettingale, K.W., Haybittle, J.L., 1990. Psychological response to breast cancer and 15-year outcome. *Lancet* 335, 49–50.
- Greer, S., Morris, T., Pettingale, K.W., 1979. Psychological response to breast cancer: effect on outcome. *Lancet* 314, 785–787.
- Grukke, N., Bailer, H., Hertenstein, B., Kächele, H., Arnold, R., Tschuschke, V., et al., 2005. Coping and survival in patients with leukemia undergoing allogeneic bone marrow transplantation – long-term follow-up of a prospective study. *J. Psychosom. Res.* 59, 337–346.
- Harris, T., 2001. *Where Inner and Outer Worlds Meet: Psychosocial Research in the Tradition of George Brown*. Routledge, London.
- Hervatin, R., Sperlich, S., Koch-Giesselmann, H., Geyer, S., 2012. Variability and stability of coping in women with breast cancer. *Support. Care Cancer* 20, 2277–2285.
- Kiecolt-Glaser, J.K., Robles, T.F., Heffner, K.L., Loving, T.J., Glaser, R., 2002. Psychoneuroimmunology and cancer: psychoneuroimmunology and cancer. *Ann. Oncol.* 13, 165–169.
- Koch-Giesselmann, H., 2012. *Das Hannoversche Copinginventar. Manual zur Bewertung von Bewältigungsreaktionen (The Hannover Coping Inventory. Manual for evaluating coping reactions)*. Medical Sociology Unit, Hannover Medical School, Hannover.
- Lazarus, R.S., 1999. *Stress and Emotion*. Springer Publishing, New York.
- Lazarus, R.S., 2006. Emotions and interpersonal relationships: toward a person-centered conceptualization of emotions and coping. *J. Personal.* 74, 9–46.
- Lazarus, R.S., Folkman, S., 1984. *Stress, Appraisal and Coping*. Springer, New York.
- Lazarus, R.S., 1966. *Psychological Stress and the Coping Process*. McGraw-Hill, New York.
- Leserman, J., 2008. Role of depression, stress, and trauma in HIV disease progression. *Psychosom. Med.* 70, 539–545.
- Lester, N., Smart, L., Baum, A., 1994. Measuring coping flexibility. *Psychol. Health* 409–424.
- Petticrew, M., Bell, R., Hunter, D., 2002. Influence of psychological coping on survival and recurrence in people with cancer: systematic review. *BMJ* 325, 1066.
- Phillips, K.A., Osborne, R.H., Giles, G.G., Dite, G.S., Apicella, C., Hopper, J.L., et al., 2008. Psychosocial factors and survival of young women with breast Cancer: a population-based prospective cohort study. *J. Clin. Oncol.* 26, 4666–4671.
- Shou, I., Ekeberg, Ø., Ruland, C.M., 2005. The mediating role of appraisal and coping in the relationship between optimism–pessimism and quality of life. *Psycho-Oncol.* 14, 718–727.
- Skinner, E.A., Edge, K., Altman, J., Sherwood, H., 2003. Searching for the structure of coping: a review and critique of category systems for classifying ways of coping. *Psychol. Bull.* 129, 216–269.
- Stata Corp., 2013. *Stata Statistical Software: Release 13*. Stata Corp, College Station, TX.
- Statistisches Bundesamt, 2004. *Demographische Standards*, Ausgabe 2004. Statistisches Bundesamt, Wiesbaden.
- Steptoe, A., Kunz-Ebrecht, S., Owen, N., Feldman, P.J., Rumley, A., Lowe, G.D.O., et al., 2003. Influence of socioeconomic status and job control on plasma fibrinogen responses to acute mental stress. *Psychosom. Med.* 65, 137–144.
- Taylor, S.E., Stanton, A.L., 2007. Coping resources, coping processes, and mental health. *Annu. Rev. Clin. Psychol.* 3, 377–401.
- Tschuschke, V., 2011. *Psychoonkologie: Psychologische Aspekte der Entstehung und Bewältigung von Krebs*, 3. Auflage. Schattauer, Stuttgart.
- Tschuschke, V., Hertenstein, B., Arnold, R., Bunjes, D., Denzinger, R., Kächele, H., 2001. Associations between coping and survival time of adult leukemia patients receiving allogeneic bone marrow transplantation: results of a prospective study. *J. Psychosom. Res.* 50, 277–285.
- Watson, M., Greer, S., Young, J., Inayat, Q., Burgess, C., Robertson, B., 1988. Development of a questionnaire measure of adjustment to cancer: the MAC scale. *Psychol. Med.* 18, 203–209.
- Watson, M., Homewood, J., Haviland, J.S., 2012. Coping response and survival in breast cancer patients: a new analysis. *Stress Health* 28, 376–380.
- Watson, M., Homewood, J., Haviland, J., Bliss, J.M., 2005. Influence of psychological response on breast cancer survival: 10-year follow-up of a population-based cohort. *Eur. J. Cancer* 41, 1710–1714.