

## 4. Method

This chapter describes the procedure used to select patients participated in this study. Method of recruitment and patients' participation from different hospital and clinics in Berlin are reported, and the rate and reasons of attrition are also analyzed.

This chapter also describes the sample of the study according to some demographic (e.g., age, sex), medical (e.g., site of cancer, type of surgery), and psychological characteristics (e.g., negative affect, quality of life). In addition it compares patients who managed to complete all the assessments (the five measurement points in time) with those who participated only in some of the assessments (t1-t4). Biases due to the rate of attrition, at the different measurement points in time, are explored in all demographic, medical, and major variables of the study by means of different statistical tests (e.g., Chi square test, ANOVA, and MANOVA).

### 4.1. Participants

Participants were 589 patients recruited from different hospitals and clinics in Berlin including the Charite` clinic, Benjamin Franklin University clinic, the hospital of Neuköln, and the Virchow clinic. Table 1 shows frequencies and percents of participants from the different clinics and hospitals.

Table1  
*Participation of Patients from the Different Hospitals and Clinics*

Hospital/clinic	Number of patients	Percent
Charite`	213	36.2
Virchow	163	27.8
Neuköln	107	18.2
UKBF	103	17.5
Missing value	3	0.5
Total	589	100

## 4.2. Recruitment Procedure and Exclusion Criteria

Undergraduate research assistants collected the data from the patients. The research assistants received extensive training, including reading materials and discussions about the medical, psychological, and social aspects of cancer. They were also engaged in a discussion of the ethical issues of research including confidentiality of data. Patients were approached, in their rooms in the aforementioned hospitals and clinics, by research assistants and fulfilled a questionnaire three to four days before the surgery (t1).

In all cases the study was described as a project on coping with surgery and its effect on the general well being. Criteria for inclusion were (a) diagnosis of cancer, (b) surgery within the coming four days, (c) fluency in German, and (d) agreement to participate in the study. Patients were contacted again by mail seven days post-surgery, one month post-surgery (t2), six months post-surgery (t4), and 12 months post-surgery (t5). Patients who did not mail the questionnaires back were reminded by a letter sent to them one month later with another questionnaire and an addressed envelope.

Medical data were collected twice by the research assistances before and after surgery. This procedure was followed because, for many patients, the diagnosis was not clear whether the tumor was malignant or benign. To avoid analyzing inappropriate data, data collected at the first assessment (t1) were compared with the medical data of the same patients collected again after surgery. The corrected data showed that from 589 patients participated in this study 83 patients were found to have benign tumor (e.g., rectum polyp), 37 patients with previous cancer diagnosis did not undergo surgery because of cancer but due to the presence of other illness (e.g., kidney failure), medical information of 10 patients regarding their diagnosis were missing. Thus, from the 589 participants only 459 are included in this study.

### 4.3 The Sample of the Study

#### 4.3.1 Participation from Different Hospitals and Clinics

The full sample of the present study comprised 459 cancer patients who had undergone cancer surgery and provided data for, at least, one measurement of the five measurements point in time. In all hospitals and clinics the same procedure in approaching patients and explaining the aims of the study, providing patients with questionnaires, and describing how to answer them, was utilized by all research assistances. Statistical analyses (see Table 2) revealed no significant sex differences between patients recruited from the different hospitals and clinics in Berlin ( $X^2(3, N = 456) = .26, p = .26$ ), however, patients recruited from the hospital of Neuköln were significantly older than patients recruited from the Charite` and Virchow clinics, and slightly older than patients recruited from Benjamin Franklin University clinic ( $F(3, 454) = 4.26, p < .01$ ).

Table2  
*Comparisons between Patients Recruited from Different Hospital and Clinics*

	Charite`	Virchow	Neuköln	UKBF	X <sup>2</sup> /F	df	p	Missing
n (%)	161 (35.1)	136 (29.6)	90 (19.6)	72 (15.7)				0
<u>Age (years)</u>								
Mean	61.88	61.74	66.11	64.14	4.26	(3, 454)	.01	1
SD	10.07	9.99	11.50	10.40				
Range	24-85	22-86	22-89	38-87				
<u>Sex</u>								
Male								
n (%)	93 (58.9)	86 (63.2)	57 (63.3)	36 (50)	4.06	3	.26	3
Female								
n (%)	65 (41.1)	50 (36.8)	33 (36.7)	36 (50)				

### 4.3.2. Medical Variables

#### 4.3.2.1. Site of Cancer

The sample of the study was heterogeneous regarding the site of cancer reported. However, colon and rectum cancer were the most frequently reported site of cancer (24.2% and 20% respectively). Although most of the sites of cancer reported could be categorized under gastrointestinal tract cancer (The stomach and intestines), however, the sample also included other types of cancer such as lung and bronchial cancer (44 patients, 9.6%), and kidney and skin cancer categorized as *other cancer* (25 patients, 5.4%). Table 3 provide more information about the frequency and percent of the different sites of cancer reported.

Table 3  
*Frequency and Percent of Site of Cancer Reported*

Diagnosis	Frequency	Percent
Colon/Sigma CA	111	24.2
Rectum CA	92	20
Liver/Gall-bladder CA	55	12
Stomach Ca	53	11.5
Lung/Bronchial CA	44	9.6
Pancreas CA	38	8.3
Oesophageal CA	33	7.2
Intestine CA	5	1.1
Peritoneal CA	3	0.7
Other CA	25	5.4
Total	459	100

#### 4.3.2.2. Time Elapsed Since Diagnosis

Subjective assessment of time elapsed since the initial cancer diagnosis was done by the use of only one item asking the patient to report, in days, how long does she/he know about her/his disease. About 353 patients (76.9%) from the full sample ( $N = 459$ ) provided information and reported time elapsed since diagnosis ranging from one day to 8000 days (22.2 years). Inspecting the overall distribution of the reported time elapsed since the initial diagnosis showed that from the 353 patients 206

(44.9%) were recently diagnosed (time elapsed since diagnosed ranged between 1 and 30 days) and about 147 patients (32%) reported time elapsed since diagnosis ranging from 31 to 8000 days. This distribution resulted in high *skweness* (8.94) and *kurtosis* (104.30; see Appendix A). Accordingly, a dichotomized time elapsed since diagnosis variable that classifies patients into *within-one-month* diagnosed patients (i.e., time elapsed since diagnosed ranged between 1 and 30 days; 206 (44.9%)) and *post-one-month* diagnosed patients (147 patients (32%)) is used in further analyses.

#### **4.3.2.3. Cancer Recurrence**

According to the National Institutes of Health's (NIH, 1997) definition, cancer recurrence refers to the return of cancer, at the same site as the original (i.e., primary) tumor or in another location (i.e., metastasis), after the tumor had disappeared. Medical data collected showed that 105 patients (22.9%) have cancer recurrence whereas most of the patients (290, 63.2%) have primary or new tumor, that is, they are diagnosed with cancer for the first time. Recurrence data was missing for 64 patients (13.9%).

#### **4.3.2.4. Type of Surgery**

The term type of surgery used here refers to whether the cancer surgery was palliative or curative. Palliative surgery is a surgery that aims at relieving the symptoms and reducing the suffering caused by cancer. Curative surgery, on the other hand, aims at completely extricating both the tumor and cancer-related symptoms. Most of the patients included in the sample of the study had undergone curative surgery (338, 73.6%), whereas 60 (13.1%) had undergone palliative surgery. Surgery-related data concerning the rest of the sample was not available (Missing 61, 13.3%).

#### **4.3.2.5. Comorbidity**

Analyses of medical data also showed that beside the cancer diagnosis a significant proportion of patients are diagnosed with other types of illness or symptoms of illness. From the full sample (459 patients), medical data of 110 patients (24%)

revealed that they are also diagnosed with different cardiovascular diseases, 133 patients (29%) with high blood pressure, 65 patients with different pulmonary diseases (14.2%), 49 patients with diabetes (10.7%), 28 patients with a variety of renal diseases (6.1%), 35 patients with liver diseases (7.6%), 12 patients ( 2.6%) with immunosuppression (e.g., HIV), and 203 (44.2%) patients are diagnosed with different categories of illness/symptoms other than the previously mentioned categories (e.g., alcohol abuse).

#### **4.3.2.6. Staging**

The clinical course of cancer disease varies with different types of tumor/carcinoma and usually reflects the stage of disease at the time of diagnosis (Mountain, 1997). Following the staging TNM-based system provided by the American Joint Committee on Cancer (AJCC; 2002) medical data are collected and analyzed to identify the size of primary tumor (T), the involvement of regional lymph nodes (N), and the presence of distant metastasis (M). In addition to that, the National Cancer Institute (NCI, 1998) provides more indicators of cancer stage including the presence of residual tumor, that is, cancer cells that remain after attempts to remove the cancer have been made (R), and grading (G) that refers to the degree of abnormality of cancer cells compared with normal cells. Pathologists usually describe tumor grade by four degree of severity: Grade 1, 2, 3, and 4. The cells of grade one tumors are often well-differentiated indicating low-grade tumors, and are generally considered to be the least aggressive in behavior. On the other hand Grade 3 or 4 are usually poorly or undifferentiated high-grade tumors that are generally the most aggressive in behavior .

According to Table 4, the presence of primary tumor, in different size and degree of invasion (T1, T2, T3, and T4), in 303 patients (66%) is assessed and confirmed. Analyses of data also showed that 133 patients (29%) have no regional lymph nodes metastasis (N0), whereas in 153 patients (32.3%) different stages of involvement of regional and distal lymph nodes (N1, N2, and N3) are detected indicating a developing course of cancer.

Regarding the presence of distant metastases (M), data revealed that in 159 patients (34.6%) no presence of distant metastases are assessed. However, distal metastases

are detected in 68 patients (14.8%) indicating the spread of the primary cancer to other parts of the body (e.g., lung, kidney).

Table 4  
*Tumor Size, Number of Lymph Nodes Involved, and the Presence of Metastases (TNM-based System).*

	T (Tumor size)				N (Number of Lymph Nodes)				M (Metastasis)	
	T1	T2	T3	T4	N0	N1	N2	N3	M0	M1
n	47	89	136	31	133	94	51	8	159	68
%	10.2	19.4	29.6	6.8	29	20.5	10.9	1.7	34.7	14.8
Total	303 (66)				286 (62.2)				227 (49.6)	
n (%)	303 (66)				286 (62.2)				227 (49.6)	
Missing	156 (34.1)				173 (37.8)				232 (50.4)	
n (%)	156 (34.1)				173 (37.8)				232 (50.4)	

*Note.* T1, T2, T3, and T4 = increasing size of tumor and invasion of surrounding tissues, N0= No regional lymph node metastasis, N1=Metastasis in 1 to 3 regional lymph nodes, N2= Metastasis in 4 or more regional lymph nodes, N3= distant lymph nodes involved, M0 = No distant metastasis, M1= Distant metastasis.

Available medical data also indicated a presence of residual tumor in 24 patients (5.2%) resulting from the surgery. Examining medical information concerning tumor grading (G) showed that the tumor grade can not be assessed in only one patient (undetermined grade (GX), .2%), tumors are well-differentiated in 11 patients (Low grade (G1), 2.4%), tumors are moderately well-differentiated in 182 patients (intermediate grade (G2), 39.7%), tumors are poorly differentiated in 104 patients (high grade (G3), 22.7%), and tumors are undifferentiated in only two patients (high grade (G4), .4%). Relative grading data for about 159 patients (34.7%) were missing. Due to the presence of missing data in all indicators of staging (T, N, M, G, and R), patients were not placed in stages according to their collective indicators of cancer. Thus, only the individuals indicators were used in further analyses.

### 4.3.3. Rate of Participation and Attrition in the Five Assessments

From the 459 patients 101 patients (22.1%) participated only in the first assessment (t1), 62 (13.5%) in the first and second assessment (t1 and t2), 37 (8.1%) participated in the first, second and third assessments (t1, t2, and t3), 36 (7.9%) participated in the first, second, third, and fourth assessments, and 97 (21.1%) patients participated in all the five measurements points in time (t1, t2, t3, t4, and t5). Table 5 provide more information about the rate of participation and attrition. At the second assessment (t2) new cancer patients (33, 7.2%), who did not participated in t1 were approached, in hospitals and clinics, and invited to participate in t2 assessment. New 4 patients (0.9%) joined the study at the one-month post-surgery assessment (t3). The reason for this was to increase the sample for cross-sectional analyses as well. In addition to that, it was decided at the beginning of the study to contact patients, who did not returned the questionnaires of one of the assessments, and ask them to participate in the following assessments for the same reason. Thus, the sample not only included patients who participated in all assessment or just the first and second assessment, but also patients who participated in just two or three of the five measurements (e.g., t2-t3, 14 patients; 3.1%). The reasons of the high rate of attrition include death, lack of interest, changing the address, and failure to send back the second questionnaire sent to the patients one month later with a reminding letter.

To investigate any bias in the sample due to the rate of attrition, it was decided to examine only the systematic drop-out through comparing participants in all the five assessments and those who ceased to participate in only one to four assessments. This examination of the rate of drop-out resulted in five groups of patients. Group one includes those who completed only t1 (101, 22%), group two includes those who participated in t1 through t2 (62, 13.5%), group three comprises those who participated from t1 through t3 (37, 8.1%), group four refers to those who participated in t1 through t4 (36, 7.9%), and group five comprises those who completed all the five assessments, that is, from t1 through t5 (97, 21.1%). These groups were compared with each other in all demographic (e.g., age, sex), medical (e.g., site of cancer), and major variables (e.g., social support, meaning).



Table 5  
*Rate of Participation in the Five Assessments*

Participation in the five assessments	Number of patients	Percent
only at T1	101	22
only at T2	33	7.2
only at T3	4	0.9
only at T4	0	0
only at T5	0	0
only at T1 and T2	62	13.5
only at T1 and T3	8	1.7
only at T2 and T3	14	3.1
only at T2 and T4	3	0.7
only at T3 and T4	2	0.4
only at T1, T2 and T3	37	8.1
only at T1, T2 and T4	5	1.1
only at T1, T2 and T5	1	0.2
only at T1, T3 and T4	4	0.9
only at T1, T3 and T5	1	0.2
only at T2, T3 and T4	11	2.4
only at T2, T4 and T5	7	1.5
only at T3, T4 and T5	1	.2
only at T1, T2, T3, and T4	36	7.8
only at T1, T2, T3, and T5	1	0.2
only at T1, T2, T4, and T5	7	1.5
only at T1, T3, T4, and T5	9	2
only at T2, T3, T4, and T5	15	3.3
at all T1, T2, T3, T4, and T5	97	21.1
Total sample	459	100

#### 4.3.3.1. Age and Sex

The full sample of the study (459 patients) included 274 men (59.7%) and 185 women (40.3%). The average chronological age in the whole sample was 63.03 years ( $SD = 10.50$ , range 22 - 89 years). ANOVA was conducted to test age differences

between the above mentioned five groups of participants. Although the groups differed in size, no problem regarding the homogeneity of variance was found (*Levene* test's degree of significant ( $p$ ) = .25). Results also showed a marginally significant association between age and the rate of participation ( $F(4, 328) = 2.06, p = .09$ ), indicating that younger patients rather than older patients are likely to participate in more than one assessment. However, post hoc tests (*Scheffé*) indicated no significant differences between the different groups in age (Table 6). With regard to sex, no significant differences between groups were found ( $X^2(4, N = 330) = 4.81, p = .31$ ).

Table 6  
*Age and Sex Distribution among the Full Sample and Five Groups of Participants*

	Full Sample	Group 1 Only T1	Group 2 T1 through T2	Group 3 T1 through T3	Group 4 T1 through T4	Group 5 T1 through T5	F/X <sup>2</sup>	df	p
<b>N/n</b>	459	101	62	37	36	97			
<b>Age</b>									
M	63.03	65.87	61.42	61.78	63.31	62.81	2.06	(4,328)	.09
SD	10.50	9.69	11.82	14.37	8.87	10.88			
Range (years)	22-89	39-89	22-84	22-86	37-80	24-86			
<b>Male</b>									
n	274	69	34	19	21	60	4.85	4	.30
(%)	(59.7)	(68.3)	(54.8)	(51.4)	(58.3)	(61.9)			
<b>female</b>									
n	185	32	28	18	15	37			
(%)	(40.3)	(31.7)	(45.2)	(48.6)	(41.7)	(38.1)			

*Note.* The full sample is not included in the comparison. *F* test and chi-square test pertain to the five groups of participants.

#### 4.3.3.2. Other Demographic Characteristics of Participants

In the full sample (459 patients), 254 (55.3%) were married, 38 (8.3) were widowed, 33 (7.2%) were divorced, and 23 (5%) were single. Approximately more than 50% of the full sample reported having children (268, 58.4%), 75 patients reported having no children (16.3%), and the rest of patients provided no data (missing = 116, 25.3%). Table 7 provides more information regarding the demographic characteristics of the sample. To investigate whether marital status, having children, and number of

children are associated with the rate of participation, chi-square tests and ANOVA are used.

Regarding marital status, results of chi-square test used to assess the association between rate of participation and marital status was not acceptable because more than 20% of cells have expected frequencies less than 5 (Welkowitz, Ewen, & Cohen, 1971). To solve this problem the marital status variable with its four categories (married/with a partner, divorced, single, and widowed) is recoded in to a new marital status variable with two categories (currently married and currently not married). Chi-square test was applied again to examine the association between the recoded variable and rate of participation. Results revealed no significant association ( $X^2(4, N = 313) = 5.72, p = .22$ ), although, there was a tendency in currently married patients to participate in all the follow-up assessments rather than in only t1 assessment (see Table 7).

No significant differences between the different groups in having children were found ( $X^2(4, N = 307) = 7.5, p = .11$ ). ANOVA used to examine differences between groups in number of children revealed no violation of equal variance hypothesis (*Levene* test ( $p = .54$ )) and no significant differences between the five groups as well ( $F(4, 259) = .57, p = .76$ ).

#### **4.3.3.3. Medical Variables**

Due to the presence of missing values in medical data, empty cells in the cross-tabulated tables resulted. Thus, comparisons between the five groups of participants were done in some of the medical variables including the time elapsed since diagnosis, site of cancer, type of surgery, comorbidity, multimorbidity, cancer recurrence, and type of surgery.

Table 7  
*Marital Status, having Children, and Number of Children among the Full Sample and the Five Groups of Participants*

	Full Sample	Group 1 Only T1	Group 2 T1 through T2	Group 3 T1 through T3	Group 4 T1 through T4	Group 5 T1 through T5	X/F	df	p
<b>N/n</b>	459	101	62	37	36	97			
<b>Marital status</b>									
<b>Married</b>									
n	253	61	43	21	25	75	5.72	4	.22
(%)	(55.2)	(67)	(72.9)	(61.8)	(71.4)	(79.8)			
<b>Non-married</b>									
n	94	30	16	13	10	19			
(%)	(20.5)	(33)	(27.1)	(38.2)	(28.6)	(20.2)			
<b>Having children</b>									
<b>Yes</b>									
n	267	70	39	25	25	79	7.5	4	.11
(%)	(58.3)	(78.7)	(68.4)	(73.5)	(71.4)	(85.9)			
<b>No</b>									
n	75	19	18	9	10	13			
(%)	(16.4)	(21.3)	(31.6)	(26.5)	(28.6)	(14.1)			
<b>Number of children</b>									
M	1.75	1.87	1.72	1.57	1.79	1.69	.47	(4, 259)	.75
SD	1.12	1.45	1.01	.96	1.01	.95			
Range	1-10	0-10	0-5	0-4	0-3	0-5			
	children	children	children	children	children	children			

*Note.* The full sample is not included in the comparison. *F* test and chi-square tests pertain to the five groups of participants.

### Time Since Diagnosis.

Examination of differences between the five groups of participant in the time elapsed since the initial diagnosis using the dichotomised form (i.e., *within-one-month* versus *post-one-month* diagnosis) of this variable revealed no significant differences between the five groups ( $X^2(N = 319) = 6.63, p = .17$ ). Table 8 provide more information about the distributions of the median across the five groups of participants.

**Site of Cancer.**

Investigating differences between the five groups in site of cancer reported by means of chi-square test was not valid due to the presence of more than 20% of cells with expected frequencies less than 5 (Welkowitz, Ewen, & Cohen, 1971). Chi-square test was used again after dichotomising site of cancer into two categories. The first category comprises gastrointestinal tract cancer including esophageal, stomach, pancreas, liver and gallbladder, intestine, colon, and rectum, and the second category includes lung, peritoneal and other cancers. Test results showed a marginally significant association between site of cancer and participation in the different assessments ( $X^2(4, N = 333) = 9.03, p = .06$ ) indicating that gastrointestinal tract cancer patients are more likely to continue participating in the follow-up assessments than the other patients (see Table 8).

**Recurrence.**

With regard to cancer recurrence chi-square test indicated no significant differences between the five groups ( $X^2(4, N = 276) = .27, p = .99$ ).

**Type of surgery.**

Results of chi-square test that examined the association between the type of surgery and participation in the follow-up assessments showed a significant association between these variables. Patients who had undergone curative surgery were more likely to continue participating in the follow-up assessments, whereas those who had undergone palliative surgery tended to participate in the first two assessments of the study rather than in the follow-up ( $X^2(4, N = 276) = 25.31, p < .01$ ).

**Comorbidity.**

With regard to comorbidity, chi-square test used to examine the differences between the five groups in the prevalence of one of the previously mentioned categories of chronic non-cancerous diseases/symptoms (e.g., cardiovascular and pulmonary

diseases). Results showed no significant differences between the five groups in comorbidity.

### **Multimorbidity.**

To investigate the differences between the five groups in multimorbidity, an index of multimorbidity was construed as the number of unweighted non-cancerous medical diagnoses. Patterns of multimorbidity index showed that 96 patients had no chronic diseases other than cancer (20.9%), 102 patients (22.2%) were diagnosed with only one disease/symptom, 103 patients with two diseases/symptoms (22.4%), 65 patients with three diseases/symptoms (14.2%), and 25 patients with four diseases/symptoms (5.4%), and only one patient was diagnosed with all the seven categories of chronic diseases/symptoms included in the study. ANOVA test results indicated no significant differences between the five groups in multimorbidity ( $F(4, 270) = 4.2, p = .79$ ).

To examine the relationships between age, sex, and multimorbidity index, correlational analyses were used. Pearson correlation coefficient between age and the index of multimorbidity showed a positive and significant association ( $r = .28, p < .01$ ) indicating that older patients rather than younger patients carry more chronic diseases, that is, the multimorbidity increases with ascending age. Pearson correlation coefficient also revealed a negative and significant association between sex and the index of multimorbidity indicating that more women than men reported having more than one chronic disease or symptoms ( $r = -.15, p < .01$ ).

#### **4.3.3.4. Emotional and Physical Health Status**

Emotional and physical health status refers to how patients evaluate their affective and physical well being and include patients reports on their global quality of life, level of negative affect, pain, fatigue, and impairment attributed to illness.

Comparing the five groups of participants in quality of life (description of the measures used is written in the next section), by means of ANOVA test, yielded a marginal significant effect of quality of life on the rate of participation. Participation

in the follow-up assessments was associated with slightly higher levels of quality of life ( $F(4, 316) = 2.1, p = .08$ ).

Table 8  
*Physical and Biological Characteristics among the Five Groups of Participants*

	Group 1	Group 2	Group 3	Group 4	Group 5				
	Only T1	T1 through T2	T1 through T3	T1 through T4	T1 through T5	X/F	df	p	
<b>N/n</b>	459	101	62	37	36	97			
<b>Site of Cancer</b>									
Gastrointestinal									
n (%)	387 (84.3)	77 (76.2)	56 (90.3)	31 (83.8)	31 (86.1)	87 (89.7)	9.03	4	.06
Other									
n (%)	72 (15.7)	24 (23.8)	6 (9.7)	6 (16.2)	5 (13.9)	10 (10.3)			
<b>Recurrence</b>									
<b>Yes</b>									
n (%)	105 (22.9)	17 (23)	13 (24.1)	9 (26.5)	8 (24.2)	18 (22.2)	.27	4	.99
<b>No</b>									
n (%)	290 (63.2)	57 (77)	41 (75.9)	25 (73.5)	25 (75.8)	63 (77.8)			
<b>Type of Surgery</b>									
Palliative									
n (%)	60 (13.1)	22 (30.1)	5 (9.3)	6 (17.6)	6 (18.2)	2 (2.4)	25.31	4	<.001
Curative									
n (%)	338 (73.6)	51 (69.9)	49 (90.7)	28 (82.4)	27 (81.8)	80 (97.6)			
<b>Time Since Diagnosis</b>									
Mdn	28	30	21	28	21	24			
Range	1-8000 days	3-2555 days	2-2555 days	5-3650 days	2-1460 days	1-8000 days			
<b>Multimorbidity</b>									
M	1.60	1.76	1.59	1.56	1.88	1.63	.42	(4,270)	.79
SD	1.29	1.45	1.31	1.35	1.04	1.21			
Range	0-7	0-7	0-5	0-4	0-4	0-5			

*Note.* The full sample is not included in the comparison. *F* test and chi-square test pertain to the five groups of participants.

With regard to negative affect (see the related section), ANOVA results showed no significant association between rate of participation and level of negative affect ( $F(4, 315) = .89, p = .47$ ). Close inspection of patients' reports on pain using ANOVA showed marginally significant differences between the five groups in levels of pain reported at t1 ( $F(4, 322) = 2.14, p = .08$ ) indicating that patients who participated at only t1 assessment reported slightly higher level of pain than those who participated in other assessments. Nevertheless, post hoc analyses (Scheffe') revealed no significant differences between the five groups in levels of pain reported.

ANOVA was also used to examine differences between the five groups in impairment due to illness and fatigue. Whereas no significant differences between the five groups of participants in impairment due to illness were found, test results showed a significant effect of fatigue on the rate of participation ( $F(4, 324) = 4.46, p < .01$ ). Post hoc analyses (Scheffe') revealed significant differences between participants in only t1 ( $M = 36.24, SD = 28.99$ ) and those who completed all the assessments (t1-t5;  $M = 21.94, SD = 22.92$ ), and participants in only t2 ( $M = 35.36, SD = 24.68$ ) and those who completed all assessments indicating that continuers have a lower degree of fatigue (see Table 9).

#### **4.3.3.6. Psychological Variables**

This part investigated differences between the five groups of participants in some of the major psychological variables of the study that were measured at the first assessment (t1). These major variables include patients external resources (i.e., functional and structural social support), coping with cancer (i.e., active coping, acceptance and accommodatory coping, and avoidant coping strategies), and finding meaning in the cancer experience.



Table 9  
*Emotional and Physical Health Status for the Full Sample and the Five Groups of Participants*

	Full Sample	Group 1 Only T1	Group 2 T1 through T2	Group 3 T1 through T3	Group 4 T1 through T4	Group 5 T1 through T5	F	df	p
<b>N/n</b>	459	101	62	37	36	97			
<b>Qol.</b>									
M	56.51	52.59	52.25	50.86	57.14	60.38	2.10	(4, 316)	.08
SD	23.50	25.79	24.36	17.36	21.78	21.60			
Range	0-100	0-100	0-100	0-100	0-100	0-100			
<b>Negative Affect</b>									
M	10.64	10.84	11.08	10.53	9.81	10.75	0.73	(4, 315)	.57
SD	3.68	3.87	3.77	3.92	2.68	3.79			
Range	6-23	6-23	6-21	6-22.30	6-16	6-21			
<b>Pain</b>									
M	13.29	16.54	16.42	17.19	10.50	9.23	2.14	(4, 322)	.08
SD	21.36	22.80	25.97	24.45	18.43	16.62			
Range	0-100	0-100	0-97	0-75	0-85	0-60			
<b>Fatigue</b>									
M	30.35	36.24	35.36	31.41	31.25	21.94	4.46	(4, 324)	.002
SD	26.19	28.99	24.68	23.48	27.40	22.92			
Range	0-100	0-100	0-88	0-100	0-85	0-100			
<b>Impairment</b>									
M	53.67	57.59	60	55	55.94	46.44	1.96	(4, 322)	.10
SD	34.39	33,70	34.01	34.87	33.08	34.74			
Range	0-100	0-100	0-100	0-100	0-100	0-100			

*Note.* The full sample is not included in the comparison. *F* tests pertain to the five groups of participants. Sub-groups size involved in the comparison analyses range between 34 – 95 patients.

#### 4.3.3.7. External Resources: Functional and Structural Aspects of Support

The functional aspects of social support was measured by scales assessing received social support (descriptions of the scales will be presented in the following sections). Examining differences between the five groups of participants in received social support reported at t1 by means of ANOVA revealed no violation of homogeneity

assumption (*Levene* test ( $p$ )= .15) and no significant differences between the five groups ( $F(4, 304) = .50, p = .73$ ).

Structural aspects of support were measured by number of resources reported by patients (Descriptive results and definition will be presented in the next section). Examining the differences between the five groups of participants in the number of resources reported at t1 (see Table 10), with the help of ANOVA, revealed no violation of the homogeneity assumption and showed no significant differences between the five groups in the index of resources ( $F(4, 313) = .59, p = .47$ ).

Table 10  
*Received Social Support and Number of Resources for the Full Sample and the Five Groups of Participants*

	Group 1	Group 2	Group 3	Group 4	Group 5	F	df	p
	Full Sample	Only T1	T1 through T2	T1 through T3	T1 through T4			
<b>Received support</b>								
M	3.67	3.68	3.66	3.69	3.76	3.65	.50 (4, 304)	.73
SD	.40	.51	.39	.32	.27	.36		
Range	1.65-4	1.65-4	2.40-4	2.80-4	2.70-4	2.40-4		
<b>Number of resources</b>								
M	4.68	4.62	4.72	4.44	4.92	4.72	.59 (4, 313)	.70
SD	1.38	1.40	1.34	1.48	1.32	1.38		
Range	1-7	1-6	1-7	2-7	1-7	1-7		

*Note.* The full sample is not included in the comparison. F tests pertain to the five groups of participants. Sub-samples size (n) ranges from 36 - 101 patients.

#### 4.3.3.8. Coping with Cancer

This study also examined how patients cope with cancer at all measurements point in time. However, only t1 assessment was included in the comparison between the five groups of patients. Coping with cancer was measured by means of 3 subscales measuring active coping strategies, accommodatory coping, and avoidant coping strategies used by patients (definitions, examples, and how subscales are selected will be covered in the related section). Investigating differences between the five

groups of participants in coping strategies used at t1 by means of MANOVA test revealed no violation of the homoscedasticity assumption (*Box's M* test ( $p > .05$ ) and no multivariate main effect of participation on the three coping strategies (*Wilks'  $\eta^2$*  = .97 ( $F(12, 817) = .79, p = .67$ ).

#### 4.3.3.9. Finding Meaning in Cancer

This study assessed different types of meaning found in cancer including an increased appreciation of life, personal growth, positive changes in family relationships, acceptance of life imperfection, and an increased sensitivity to other people. Finding meaning through reporting more appreciation of life was assessed at all measurement points in time, whereas personal growth, positive changes in family relationships, acceptance of life imperfection, and an increased sensitivity to other people were measured only at t5.

Differences between the five groups of participants were examined only in increased appreciation of life reported at t1 by using ANOVA test. Results showed no marked differences between the five groups in this type of meaning found in cancer.

To summarize these results, comparisons between patients who participated in all assessments (i.e., from t1 to t5) and those who did leave the study (i.e. failed to complete all assessments) yielded no significant differences in regard to all demographic variables (i.e., age, sex, marital status, having children, and number of children), no significant differences in available medical data (i.e., site of cancer, recurrence, comorbidity, and multimorbidity), and no significant differences in most of the psychosocial variables (i.e., quality of life, pain, impairment due to illness, coping, and meaning found in cancer), although, participants in all assessment (i.e., the continuers) reported slightly better quality of life and lower level of pain than the other four groups.

Comparisons, however, showed marked differences between the continuers (i.e., from t1 to t5) and those who leaved the study in fatigue and types of surgery indicating that participants in all assessment reported less fatigue and undergoing curative rather than palliative surgery compared to non-continuers patients. Given that 338 (73.6%) from the full sample had undergone curative surgery, biases due to rate of attrition in this study are limited.

#### 4.4. Measurements Used in The Study

##### 4.4.1. Socio-demographic Assessments

Socio-demographic information were collected from all patients at t1 by means of self-report questionnaire; information provided included age, sex, marital status, having children, and number of children.

##### 4.4.2. Personal Resources

The internal resource pertains to a stable sense of personal competence to deal effectively with a variety of stressful events (Schwarzer, 1992; Schwarzer & al., 1999; Scholz et al., 2002). The general self-efficacy beliefs scale (Schwarzer & Jerusalem, 1999) was used to assess patients internal resources. The original scale (GSE) was developed by Jerusalem and Schwarzer (1979) and consisted of 20 items. However, in 1981 items of the scale were reduced to 10 items and adapted to 28 languages; results showed high internal consistencies of the new version of the scale among different samples (alpha range = .75 - .91; Scholz et al., 2002). An example of the items used is “*I can remain calm when facing difficulties because I can depend on my coping abilities*”. Responses range from *not at all true* (1) to *exactly true* (4). Previous results also attested to the unidimensionality and stability of the scale; test-retest reliability coefficients ( $r$ ), in many assessments with varying time-lags, ranged from .47 to .75 (Schröder et al., 1998; Schwarzer et al., 1993; Schwarzer & Jerusalem, 1999; Scholz et al., 2002).

In the present study the general self-efficacy scale (see Appendix A) was applied first at one month post-surgery (t3). The scale was introduced to patients as *thoughts and ideas* and they were asked to rate each item on a four-point scale ranging from *not at all true* (1) to *exactly true* (4). About 238 patients provided information regarding the scale; data analyses revealed a high internal consistency (Cronbach's  $\alpha = .92$ ). The stability of the scale was also tested by applying the scale 5 months (t4) and 11 months (t5) later; analyses showed stability coefficients of  $r(n = 95) = .75$  at t4 and .53 at t5.

### 4.4.3. Social Resources

Patients' external resources pertain to both the functional and structural aspects of social support. In this study both the functional and structural aspects of social support were measured. The functional aspects pertain to the emotional, instrumental, and informational support *received* by patients, and to how important resources of support are considered to be (.e.g., partner, children). The structural aspects of support pertain to the existence of and the number of social relationships (Cohen & Syme, 1985).

#### 4.4.3.1. Received Social Support

The Berlin Social Support Scale (BSSS; Schwarzer & Schulz, 2000) was used to assess the three different assets of support *received* by cancer patients (emotional, instrumental, and informational support). The scale was used in all measurement points in time to examine support received before surgery (t1) and post-surgery (t2, t3, t4, and t5). Patients were asked to rate how did the individual/s with whom they have a close relationship and/or affection reacted to them *during the last week* (t1, t2, and t3), *during the last month* (t4), and *during the last 12 months* (t5). The different time-frames applied in t4 and t5 were used to detect the effects of the increasing time-lag between the last three assessments on reports of social support received by patients (t3 - t4 = 5 months, t4 - t5 = 6 months). Examples of the items used to assess emotional support is “*This person comforted me when I was feeling bad*”, of instrumental support “*This person took care of many things for me*”, and of informational support “*This person helped me get something positive out of my situation*”. Responses range from *not at all true* (1) to *exactly true* (4).

Although this scale is divided to three subscales to measure the three different types of support, however, statistical analyses of the items using Principal Component Analyses (PCA), in all the five measurements points in time, revealed that these subscales are not stable over time (see Appendix A). In addition to that, one of the item measuring the informational aspect of received support overlaps with the concept of meaning found in cancer, a major variable in the study, as both of them

assess whether patients found something positive in their experiences “*This person helped me get something positive out of my situation*”. For these reasons summations of the emotional (6 items) and instrumental (3 items) subscales, and one item assessing informational support was used as an indicator of social support *received* by patient at the different measurement points in time. Data analyses revealed acceptable internal consistencies across the different measurement points in time (range of Cronbach’s  $\alpha = .78 - .87$ ). Examining the stability of the scale by using correlational analyses between received social support reported at t1 and all the four measurements (t2, t3, t4, and t5) showed stability coefficients of  $r$  ( $N = 89$ ) ranging from .49 to .61.

#### **4.4.3.2. Number of Resources of Support**

At t1, the degree of importance of the resource of support is measured by 7 items asking patients to rate, on a four-point scale, *how important every resource to them is*. These resources include spouse/partner, children/grandchildren, relative, friends/acquaintances, doctors/nurses, other patients, and another person. Responses range from *not at all important* (1) to *very important* (4). In order to examine the structural aspects of support, the four-response range of the seven items measuring the degree of importance of every resource were collapsed into *not important* (0) and *important* (1), and a summation of all recoded items was used as an index of number of resources obtained by every patients. About 353 patients from the full sample ( $N = 459$ ) reported, at t1, having a number of resources ranging from 1 to 7, and about 106 patients did not provided information as to how important each of the given resource is considered to be. The reason for this was not clear whether these patients have no resources at all or whether they forgot to fill these questions. Accordingly, it was decided to consider them as missing and not to include them in this analysis.

From the full sample 353 provided data and reported having a moderate number of resources ( $M = 4.71$ ,  $SD = 1.36$ ; range 1-7). About 8 patients reported having only one resource (2.3%), 21 (5.9%) patients have two resources, 39 (11%) patients have 3 resources, 63 (17.8%) patients have 4 resources, 94 (26.6%) patients have 5 resources, 122 (34.6%) patients have 6 resources, and 6 (1.7%) patients reported having 7 resources.

Examining the relationship between received social support reported at t1 and number of resources showed a significant but modest association between the two indicators of support ( $r = .14, p < .01; n = 343$ ). This correlation suggested that the number of resources can predict about 2% of the variance on support received at t1. This finding implies that the presence of more than one resource does not warrant receiving high social support.

Investigating the associations between number of resources, age, and sex revealed significant sex differences ( $t(353) = 2.21, p < .05$ ) and indicated that men ( $M = 4.84, SD = 1.34; n = 134$ ) reported having more resources of support than women did ( $M = 4.51, SD = 1.36; n = 219$ ). Significant association between age and number of resources was also found; younger patients reported having more resources than older patients did ( $r = -.13, p < .05$ ).

#### **4.4.4. Coping with Cancer**

This section concerns measurements used to assess how patients cope with cancer. Three categories of coping strategies were chosen to examine active coping strategies, acceptance and accommodatory coping strategies, and avoidant coping strategies used by patients. Active Coping strategies refer to strategies directed at problem solving and taking direct action to confront, reduced, and circumvent stressors. Acceptance and accommodatory coping strategies pertain to strategies used by patients in order to accept the reality of a situation and accommodate the self for situation in which the stressors can not be changed, whereas avoidant coping strategies are strategies that are used by patients to reduce the *acknowledged* stress associated with a situation by withdrawing from it (Carver, et al., 1989; Updegraff & Taylor, 2000). Active coping measured in this study strategies include planning, active coping, and fighting spirit, and avoidant coping was assessed by measuring self-distraction. Different measures were used in this study to assess the different coping strategies mentioned above. These measures include two items from the Mental Adjustment to Cancer Scales (MAC; Watson & Greer, 1987) translated by K uchler, Brandet and Rappat (unpublished study), 6 items from the Brief COPE (Carver, 1997) translated by Knoll (2002) and modified by Taubert and F orster (2003), 2 items measuring accommodatory coping, and 2 items assessing fighting

Spirit designed by Taubert and Förster, (2003) to assess these dimensions of coping strategies used by cancer patients (see Table 11).

The above mentioned scales, among other scales, were applied at t1 (3 days pre-surgery) to assess how patients cope with the tumor surgery. Instruction used were as follows:

People cope in different ways before undergoing a surgery. How did you behave in the last three days? Please don't be surprised if some sentences seem to be very similar.

Patients were told, by the research assistants, that there is no right and wrong answers and that their responses should indicate what “did they do” and not what “they should have done”. Response choice provided ranged from not at all (1) to exactly (4).

Coping was assessed at all measurements point in time (t1, t2, t3, t4, and t5). Different time frames were used due to the different time lag between the measurements (t1 – t2 =9 days, t2 - t3 = 21 days, t3 – t4 = 5 months, t4 – t5 = 6 months). Therefore the time frame used at t1 and t2 is the *last three days*, the time fame used at t3 is *the last week*, and the time frame used at both t4 and t5 is *the last month*.

At t1, initial inspections of the items used to assess the selected coping strategies, after treating missing values ( $n = 351$ ), showed positive inter-items correlations ranging from .37 to .73 except for the fighting spirit two-item subscale which turned to have a modest inter-item correlation ( $r = .24, p < .01$ ).



Table 11  
*English Translations of The German Scales of Coping*

Coping	Item- Number	Items	Source
<b>Active Coping Strategies</b>			
Active Coping	2	1- <i>I concentrated my efforts on changing something about the situation I am in.</i>	Brief COPE (Carver, 1997)
		2- <i>I took action to make the situation better.</i>	
Planning	2	1- <i>I thought exactly about how things should go on.</i>	Brief COPE (Carver, 1997) Modified by Taubert & Förster (2003)
		2- <i>I thought hard about what the best in my situation to do is.</i>	
Fighting Spirit	2	1- <i>I tried to fight the illness.</i>	MAC (Watson & Greer, 1987) Fighting Spirit (Taubert & Förster, 2003)
		2- <i>I tried to make the best out of my current situation.</i>	
<b>Acceptance &amp; Accommodatory Coping strategies</b>			
Acceptance	2	1- <i>I accepted what has happened.</i>	Brief COPE (Carver, 1997)
		2- <i>I learned to live with what has happened.</i>	
Accommodation	2	1- <i>I learned to live with my illness.</i>	Accommodation (Taubert & Förster, 2003)
		2- <i>I accommodated myself to the restriction caused by my illness.</i>	
<b>Avoidant Coping strategy</b>			
Self-Distraction	2	1- <i>I kept myself busy trying to think about something else.</i>	Brief COPE (Carver, 1997)
		2- <i>I distracted myself.</i>	

#### 4.4.4.1. Factor Structure of the Coping Scales

Process-oriented measurements of coping have been criticized on having an unstable factor structure and poor internal reliability on the subscales (e.g., the Ways of Coping Scale). By this reasoning, any change that appears across situations or over time using process measures of coping could be due to the unreliability of the instrument rather than to any important contribution of the situational context *per se* (Aldwin, 1994; Endler & Parker, 1990).

This problem has been acknowledged by many researchers using multidimensional coping measurements in both cross-sectionally and longitudinally designed studies. Culver, Arena, Antoni and Carver (2002) assessed coping among women with breast cancer across one year (five measurement points in time) and tried to avoid this problem by choosing one item that has the highest loading and is most clearly written of the subscale from which it was drawn. However, their method raises concern about the use of single item measurements.

Some researchers also tried to solve this problem by summarizing subscales by means of both exploratory (PCA) and confirmatory factor analyses (CFA) in order to have a smaller sets of general summery scores that have maximum variability and reliability (Knoll, 2002; Carver et al., 1989). Although this method proved to be efficient in reducing problems associated with low internal consistency of subscales and colinearity problems due to the high correlations between some subscales, the use of summarized subscales hide information about how particular coping strategies are used by individuals and how these coping strategies change over time.

Because this study aims at assessing how patients cope with cancer over time and whether certain coping strategies used are more associated with finding meaning in cancer than other, it was decided to investigate the factor structure of items constituting the theoretically based selected scales, over the five measurement points in time, and to choose items that keep on loading strongly on the same factors across all the five assessments. Consequently all the relevant items, measured at all waves, were subjected to a series of exploratory principal component analyses with subsequent oblique rotation (PCA). This method was chosen as it takes in to account the possible associations between the different coping subscales.

At t1 (n = 351), the analysis produced 3 factors with eigenvalues greater than one. The first factor was interpreted as *acceptance and accommodatory* coping strategies as it comprised the four items assessing acceptance and accommodation and explained 26.89% of the total variance. The second factor accounted for 17.32% of the common variance and was interpreted as *active coping* strategies since it comprised four of the six items of the relevant coping strategies. The other two items, one measuring fighting spirit “*I tried to make the best out of my current situation.*” and the other measuring planning “*I thought hard about what the best, in my situation, to do*”, loaded strongly on the first factor. The third factor explained about 12.15% of the total variance and comprised the two items used to assess *avoidant coping*.

Analyses of all items at the other four measurements points in time (t2, t3, t4, and t5) produced the same three factor (see Appendix A). The first factor continued to explain most of the total variance (variance ranged from 32.1% to 34.37%) and to include the same four items measuring *acceptance and accommodatory* coping, whereas the second factor, *active coping*, accounted for variance ranging from 14.29% to 17.97%. However, the two items assessing fighting spirit and planning mentioned above kept on loading strongly on both the first and the second factor. Thus, according to these results, it was decided to omit these two items from further analyses. The third factor, *avoidant coping*, explained variance ranging from 10.73% to 12.86% of the total variance and comprised the two items assessing avoidant coping. In all results, Kaiser-Meyer-Olkin test attested to the adequacy of the distribution of values for conducting factor analysis ( $p$  range= .74 - .81), and Bartlett’s test indicated no presence of identity matrix ( $p < .01$ ).

#### **4.4.4.2. The Three Coping Subscales: Confirmatory Factor Structure**

A series of confirmatory factor analyses (CFA) was used to examine the resulting three factors indicating active, accommodatory and acceptance, and avoidant coping strategies across all measurement point in time. First, the structural equation modeling (SEM) was performed on t1 data (n = 351). Maximum likelihood estimation was employed to estimate the model. This hypothesized model comprised three latent factors of coping including active coping strategies, accommodation and

acceptance coping strategies, and avoidant coping strategies. The four items accessing accommodation and acceptance coping served as indicators of the acceptance and accommodation latent variable. The four items measuring active coping, fighting spirit, and planning served as indicators of the latent variable active coping, whereas the two items measuring avoidant coping were used as indicators of the latent variable avoidant coping. The three latent variables were hypothesized to co-vary with each other. Results showed that this hypothesized model was rejected ( $X^2(32, n = 351) = 83.78, p < .01, RMR = .08, GFI = .95, TLI = .91, RMSEA = .07$ ).

Post hoc modification analyses were performed to enhance the fitting indices of the model. According to their results some errors were allowed to covariate. These included errors of the two items measuring active coping (active1 and active 2), and errors of the two items measuring acceptance (acceptance1, acceptance2) and one item measuring accommodation (accommodation 1). Although the fit indices improved, however, the  $X^2$  result was still significant indicating that the model is not acceptable ( $X^2(28, n = 351) = 57.35, p < .01, RMR = .06, GFI = .97, TLI = .94, RMSEA = .06$ ).

A close examination of the resulting factor loadings showed that the influence of one of the item measuring acceptance (acceptance1) on the *acceptance and accommodation* latent variable is moderate ( $\beta = .24$ ). The reason for this modest influence may be because this item “*I accepted what has happened*” emphasizes passive acceptance, that is, a sort of acceptance which is associated with fatalism rather than with a positive acknowledgment of illness. By deleting this item and letting another two errors to covariate (planning1 and fighting1), the model fit indices were improved and the chi-square test was no more significant ( $X^2(20, n = 351) = 29.08, p = .09, RMR = .04, GFI = .98, TLI = .98, RMSEA = .04$ ) indicating that the data fit the hypothesized model quite well. Therefore, it was decided to rename this latent variable as *accommodation* since this is what the other three items essentially measures (see Table 11 and Appendix A).

Inspection of the fit indices of this model on data from the other measurement points in time (t2, t3, t4, and t5) revealed good fitting indices and confirmed the three

coping subscales; *active coping strategies*, *accommodation*, and *avoidant coping strategies*.

Examination of the emerged three coping subscales measured at t1 ( $n = 351$ ) revealed an acceptable internal consistency for both the active coping and accommodation subscales (Cronbach's  $\alpha = .68, .70$  respectively), and high Inter-item correlation for the avoidant coping subscale ( $r = .72$ ). At t2, t3, t4, and t5 reliabilities of the two subscales measuring active coping and accommodation were satisfactory with Cronbach's Alpha ranging from .65 and .75. Inter-item correlation of the avoidance subscale (two items) across the four assessments (t2, t3, t4, and t5) showed high correlation coefficient ranging from  $r = .72$  to  $r = .78$ .

#### **4.4.5. Finding Meaning in Cancer**

Finding meaning pertains to reports of positive gains and benefits attributed to negative experiences. In this study, finding meaning is measured by two scales; a 7-item meaning scale, designed within the project by Taubert and Förster (2003), to assess reports of an increased appreciation of life in response to having had cancer, and a 17-item benefit finding scale (Antoni et al., 2001) that measures different types of benefits and gains including personal growth, positive changes in family relationships, and acceptance of life imperfection.

##### **4.4.5.1. The 7-Item Meaning Scale**

The meaning scale is designed by Taubert and Förster (2003) to assess meaning found in cancer. Based on the literature on meaning found in aversive events (Folkman, 2000), and pilot interviews with a group of cancer patients, the writers created 7 items that reflect perceived positive changes in the self mainly through increased appreciation of life that occurs as a result of having had cancer. An example of the items used '*I became a ware of how precious every day in life is*' (see Appendix A). Responses range from *not at all* (1) to *extremely* (4), and intermediate scores were given for *a little* (2) and *moderate* (3). All the items were worded positively to examine positive changes that had occurred as a result of having had cancer.

At the three-day pre-surgery assessment (t1) the seven items were administered to patients. The following instructions were used after the aims of the study was introduced to patients by the research assistances:

How did you feel in the last three days?

Please do not be surprised if some sentences look the same or seem to be a repetition of another sentence.

The research assistances also called patients' attention to two main points: first, there is no right or wrong answers; second, patients should indicate what they felt and not what they 'should feel'.

A total of 220 men and 131 women provided data. In this sample 249 (73.5%) were married, 22 (6.5%) single, 31 (9.1%) divorced, 37 (10.9%) widowed, and age ranges from 22 to 89 years with a mean age 62.99 years ( $SD = 10.91$  years). The internal consistency of the meaning scale was examined. Results showed a high internal consistency (Cronbach's  $\alpha = .84$ ). A principal Component Analysis (PCA) was also performed on these items using an oblique rotation. This method was used because it takes in to account the correlations among the seven items. The analysis produced only one eigenvalue greater than one and accounts for 52 % of the common variance. These results attests to the unidimensionality of the meaning scale. Examinations of the internal structures of the 7-item meaning scale using assessment from other measurement points in time (i.e., t2, t3, t4, and t5) by means of the Principal Component Analyses attest to the robust internal consistency of this scale (See Appendix A).

#### **4.4.5.2. The 17-Item Benefit Finding Scale**

The scale measures perceived benefits arising from the experience of diagnosis and treatment of breast cancer. It was derived from different sources including items by Behr, Murphy, and Summers (1992) who assessed perceptions of benefits among parents of children with special needs. Boyers, Carver, and Antoni (2000) have focused those items on breast cancer, added more items, and administered the resulting instrument to a sample of early stage breast cancer patients. Antoni et al. (2001) used the scale to measure the effect of cognitive-behavioral stress

management intervention on the prevalence of negative affect and benefit finding among women under treatment of early stage breast cancer ( $N = 100$ ).

The measure comprises 17 items (see Appendix A); each item begins with “having had breast cancer has...” and expresses some potential benefit from the experience. Responses were made on the scale with labels of “not at all” (1), “a little” (2), “moderately” (3), “quite a bit” (4), and “extremely” (5). Benefits found is assessed in different domains, including acceptance of life imperfections (e.g. “has led me to be more accepting of things”), positive changes in family relationships (e.g. “has brought my family together”), and personal growth (e.g. “has contributed to my overall emotional and spiritual growth”).

Antoni et al.’s scale was found to have high validity and reliability (Cronbach’s  $\alpha = .95$ ). Concerning the internal structure of the scale, the principal component analysis (PCA) of responses to the 17 items revealed four factors with eigenvalues greater than 1.00. The eigenvalue of the first factor was 7.73, whereas those of the second through the fourth factors ranged from 1.00 to 1.56. In addition to that, all items loaded at or above .50 on the unrotated first factor and only one item loaded more strongly on a different factor. Antoni et al. suggested that the measure can be appropriately used as a unitary scale.

### **The German Version of the Benefit Finding Scale**

The original American version of the scale was translated by a group of psychologists working in the project into German language, and the translation was re-examined by a native English speaker (Mohamed & Böhmer, 2004; Appendix B). The German instrument consists of the same 17 original items, has the same answer range (1 - 5), and measures the same previously mentioned positive domains. The instructions used were as follows:

You have undergone a tumor-surgery one year ago. Patients, sometimes, have the impression that their illness bring about negative as well as positive concomitants. Please indicate to what extent do you agree or disagree with the following statements.

The scale was applied at the one-year post-surgery assessment to measure different types of benefits and gains found in cancer. Participants used the 5-point scales to respond to the 17 items as they pertain to their last year experience.

About 139 patients provided data on the scale (t5). From this sample 3 patients were excluded from the analyses because they either did not answer all the 17 items or they provided answers to 5 items only. Missing values were treated using regression analyses (SPSS MVA; Tabachnick & Fidell, 2001) under the condition that 50% of the 17 items were answered. Thus imputed data for 136 patients was available for analyses.

In this sample ( $n = 136$ ) age ranged between 24 and 86 years ( $M = 64$ ,  $SD = 10.0$ ); 40.4% were women, 64% were married/with partner, 3% were single, 7% were divorced, and 10% were widowed (19% provided no information concerning their marital status). With regard to the site of cancer reported, 31.6% have rectum cancer, 26.4% intestine cancer, 10.3% liver/gall-bladder cancer, 8.1% stomach cancer, 6.6% peritoneal cancer, 5.9% oesophageal cancer, 8.1% lung cancer, and 2.9% cancer in other organs.

Items-level statistics and analyses of the internal structure of the German version are conducted and compared with the previous results of the original American scale. Item-mean scores were above the theoretical average of the scale (2.5; scale range: 1 – 5) and all corrected item total correlations were satisfactory (see Appendix A).

Results also attested to the high internal consistency of the benefit finding scale (Alpha Cronbach = .94), and confirmed the results of principal component analysis (PCA) previously found by Antoni et al. (2001). Kaiser-Meyer-Olkin test attested to the adequacy of the distribution of values for conducting factor analysis ( $p = .90$ ), and Bartlett's test indicated no presence of identity matrix ( $p < .01$ ). Analyses of the 17 items, by using varimax rotation that takes in to account the differences among the seventeen items, revealed four factors with eigenvalues greater than 1.00. The eigenvalue of the first factor was 8.77 and explained about 51.60% of the total variance, the eigenvalue of the second factor was 1.26 and explained 7.38% of the total variance, the eigenvalue of the third factor was 1.11 and explained about 6.53% of the total variance, whereas the eigenvalue of the last factor was 1.01 and explained 5.95% of the total variance. This finding is in line with Antoni et al.'s finding since



four factors emerged from the analysis with the first factor, in both studies, explaining more than 50% of the total variance. Although Antoni et al. suggested that the measure can be appropriately used as a unitary scale, however, in this study the benefit finding scale is used as both unitary (i.e., as a total score) and multidimensional scale (i.e., by identifying and using different subscales of benefits and gains).

#### **4.4.5.3. New Benefit Finding Subscales**

According to the literature on meaning and benefit finding, different types of positive gains are postulated to be associated, in different ways, with individuals' resources (e.g., personality characteristics), coping, and well being (Tedeschi & Calhoun; 1996; Antoni et al., 2001). To tap this issues, two sets of analyses were performed, one including the long version of the benefit finding scale and the other including subscales of benefit finding that assess particular benefits attributed to the experience of having had cancer.

Closed inspection of the four factors resulted from the exploratory factor analysis of the 17 items (PCA) showed that certain items tended to load strongly on one factors rather than the other three factors. Using a cut-off of .35 (Knoll, 2002) and guided by the theoretical background of the scale, items were selected to assess different types of benefits and gains found in cancer. These types include acceptance of life imperfection (item 2, 3, and 10), personal growth (item 12, 13, and 16), positive changes in family relationships (item 4 and 8), and an increased sensitivity to other people (items 14 and 15; see Appendix A).

A confirmatory analysis using AMOS was done on a hypothesized model that included four latent variables representing acceptance of life imperfection, personal growth, positive change in family relationship, and relating to others. The four latent variables were hypothesized to co-vary with each other. The selected items 2, 3, and 10 were used as indicators of the latent variable acceptance of life imperfection, item 12, 13, and 16 indicated the latent variable personal growth, item 4 and 8 were indicators of the latent variable positive changes in family relationship, and item 14 and 15 were indicators of the latent variable increased sensitivity to others. The

structural equation modelling was used, through AMOS, on data from 136 patients. The first results showed that the model is not acceptable;  $X^2(136, 29) = 54.43, p = .003$ ;  $GFI = .93, TLI = .93, RMSEA = .08$ . Based on post hoc modification analyses, some errors were allowed to covary. These included errors of the three items assessing acceptance of life imperfection (item 2 and 3; and item 2 and 10). Results of the modified model supported the hypothesized three subscales of the benefit finding scale  $X^2(136, 27) = 36.36, p = .11$ ;  $GFI = .95, TLI = .97, RMSEA = .05$ .

Based on these results new four subscales of benefit finding were built; the first subscale measures acceptance of life imperfection (3 items), the internal consistency of the this subscale was satisfactory (Cronbach's alpha = .84). The second subscale measures personal growth, the internal consistency of this subscale was (Cronbach's alpha = .75). The third subscale assesses positive change in family relationships (2 items); the inter-item correlation was acceptable ( $r = .67, p < .01$ ). The fourth subscale measures increased sensitivity to other people (2 items) and has an acceptable item inter-correlation ( $r = .56, p < .01$ ).

The new four subscales correlated with each other ( $r$  ranged from .46 to .54,  $p < .01$ ), strongly with the 17-item benefit finding scale ( $r_s > .67, p < .01$ ), and moderately with the reported appreciation of life measured at t5 (see Table 12). Correlational analyses also revealed no significant associations between the 17-item benefit finding scale, the four subscales, age, and sex with the exception of reports of positive changes in family relationships. Results indicated that being a male patient is associated with reports of high positive changes in family relationships due to having had cancer ( $r = -.21, p < .05$ ).

In this study finding meaning in cancer is assessed by using both the full benefit finding scale (17-item scale), the meaning scale (7-item scale), as well as the four subscales assessing different types of benefits found in cancer. Thus, finding meaning in cancer is operationalized as patients reports of finding meaning in and benefiting from having cancer through (a) an increased appreciation of life, (b) acceptance of life imperfection, (c) positive changes in family relationships, (d) personal growth, and (c) increased sensitivity to other people.

#### 4.4.6. Emotional and Physical Health Status

##### 4.4.6.1. Quality of Life

The global quality of life was assessed by means of two items chosen from the European Organization for Research and Treatment of Cancer (EORTC-QLQ-C30; Aaronson et al., 1993). The first item asks patients to rate their overall *health status*, and the second item asks patients to rate their overall *quality of life*. The time frame used in the first, second, and third assessments (t1, t2, and t3) is *the last three days* and responses are endorsed on a seven-point scale ranging from *very bad* (1) to *excellent* (7). Quality of life was assessed at all measurements points in time (t1, t2, t3, t4, and t5). The time frame used in the fourth and fifth assessments is *the last month*.

Inter-item correlations of the two items, across all measurements points in time, ranged from  $r = .74$  to  $.87$ . In the full sample, patients reported a moderate levels of quality of life at t1 ( $M = 56.51$ ,  $SD = 23.50$ ).

Table 12  
*The 7-Item Meaning Scale, The 17-Item Benefit Finding Scale, and Four Benefit Finding Subscales*

	More Appreciation of Life (t5)	Benefit Finding 17- Item Scale	Acceptance of Life Imperfection	Positive Changes in Family Relationships	Personal Growth	Increased Sensitivity
<b>Descriptive</b>						
M	3.18	3.6	3.73	3.70	3.09	3.88
SD	.61	.92	1.06	1.28	1.12	1.11
Range	1 - 4	1 - 5	1 - 5	1 - 5	1 - 5	1 - 5
<b>Correlation</b>						
Acceptance of Life Imperfection	.49	.80	--	.53	.51	.47
Positive Changes in Family Relationships	.38	.78	--	--	.49	.46
Growth	.54	.81	--	--	--	.55
Increased Sensitivity to Others	.37	.67	--	--	--	--
Benefit Finding 17- Item Scale	.62	--	--	--	--	--

*Note.*  $n = 136$  patients;  $n$  (patients provided data on more appreciation of life) = 137. All  $ps < .01$ .

#### 4.4.6.2. Pain, Fatigue, and Impairment Attributed to Illness

Pain, fatigue, and impairment due to illness were assessed, at all waves, by three visual analogue scales (VAS) designed, within the project, to assess these parameters in cancer patients. Patients were asked to rate, by marking points on three lines beginning with Zero and ending with 100, how much pain and fatigue they feel *today*, and how much does the *illness* impair their live *in the time being*. The Zero and 100 ranges in the three scales indicate extreme responses on pain (no pain (0), strong, conceivable pain (100)), fatigue (I feel fresh and energetic (0)), I feel extremely exhausted (100), and impairment due to illness (no at all (0), very strongly (100)). In the full sample impairment attributed to illness measured at the 3-days pre-surgery assessment (t1) was moderate ( $M = 53.67$ ,  $SD = 34.38$ ), whereas pain ( $M = 13.29$ ,  $SD = 21.36$ ), and fatigue ( $M = 30.35$ ,  $SD = 26.19$ ) reported at the measurement point in time were low.

#### 4.4.6.3. Negative Affect

Negative affect refers to a general facet of subjective distress or unpleasant mood states including, feeling depressed, lonely, sad, fearful, and irritable. Negative affect was assessed by means of six items including five items selected, for the reasons of *burden and costs*, from a self-reported depression scale designed by Radloff (CESD, 1977) and translated by Hauzinger and Bailer (ADS; 1993) into German to be used as part of a general depression scale, and one item from a German adaptation of the Positive Affect Negative Affect Scale (PANAS; Krohne, Egloff, Kohlmann & Tausch, 1996) to assess a different facet of negative affect (see Appendix A). Negative affect was assessed at all measurements points in time (t1, t2, t3, t4, and t5). At t1, t2, and t3 patients were asked to rate how did they feel *in the last three days* on a four-point scale ranging from *non of the time* (1) to *most of the time* (4). An example of the items used is “*I was bothered by things that usually don’t bother me*”. The time frame used in these three waves was chosen to detect recent changes in patients’ emotional well being. At t4 and t5 the time fame used to assess negative affect was *the last month*. The use of a different time frame, in these waves, was

necessitated by the increased time lag between the last three assessments ( $t3 - t4 = 5$  months;  $t4 - t5 = 6$  months).

Examination of the 6 items measured at  $t1$  ( $n = 354$ ) revealed an acceptable internal consistency (Cronbach's  $\alpha = .78$ ), at  $t2$ ,  $t3$ ,  $t4$ , and  $t5$  reliabilities of the 6 items were high with Cronbach's alpha's ranging from .80 and .88. Close inspection of the 6 items using exploratory factor analyses (PCA) showed six factors with eigenvalues ranging from 2.95 to .315, however, only the first factor was greater than 1.00 and explained about 49.25% of the total variance. Consequently, the scale can be appropriately used as a unitary scale measuring one dimension of affect. Investigating the internal structure of the 6 items, across the other four measurements points in time ( $t2$ ,  $t3$ ,  $t4$ , and  $t5$ ), revealed the same internal structure, with an emerging robust factor that explained a variance ranging from 51.16% ( $t2$ ,  $n = 313$ ) to 62.98% ( $t5$ ,  $n = 129$ ) of the total variance. Summations of all 6 items, within the different five assessments, were used to reflect levels of negative affect; with higher scores indicating higher levels of negative affect. Test-retest reliability, using different time intervals ranging from 9 days to one year, were between .56 ( $t1 - t2$ ; 9 days time-lag) and .41 ( $t1 - t5$ ; 12 months time-lag).

With regard to the concurrent and discriminant validity, the 6-item negative affect scale demonstrated acceptable validity across all assessments. As an example, at  $t1$ , correlations between the negative affect scale, global quality of life, pain, fatigue, and impairment attributed to illness measured were ranging from  $r = .39$  ( $p < .001$ ) for impairment attributed to illness,  $r = .14$  ( $p < .05$ ) for pain, to  $r = -.36$  ( $p < .001$ ) for quality of life. Correlational analyses also showed a significant associations between sex, age, marital status (currently married/with a partner versus not married/without a partner), and negative affect. Women, at all waves, reported having higher negative affect than men did (e.g., at  $t1$ ,  $t(n = 351) = 5.02$ ,  $p = .001$ ); and younger patients were more likely to report negative affect, at  $t2$ ,  $t3$ , and  $t4$ , than older patients were. Being married or with a partner was associated with having less negative affect at both 3 days pre-surgery and 7 days post-surgery assessments.

#### **4.5. The Study Design**

This study is a part of the Berlin Longitudinal Study on Quality of Life after Tumor Surgery. The project was conducted to investigate of the roles of definite social and personal resources, coping strategies, and medical factors, among other factors, for psychological and physical adjustment after tumor surgery.

This study make use of some of the assessments that are applied in the parent study to test the aforementioned hypotheses. These measurements include social support assessed in all waves, self-efficacy assessed at t3, coping strategies measured in all waves and medical data. The medical data was collected twice; before and after surgery from the patients' hospital records and medical histories on the days of admissions and discharge by the research assistances. Indicators of psychological and physiological adjustment including finding meaning in cancer through reports of more appreciation of life, negative affect, quality of life, pain, fatigue, and impairment attributed to illness were measured in all waves, while finding meaning through reports of acceptance of life imperfection, personal growth, positive changes in family relationships, and increased sensitivity to others were measured at one year post-surgery (t5).

Written as well as oral instruction for the completion of the questionnaires were provided at t1 by the research assistances, whereas only written instructions were used at t2, t3, t4, and t5, as a header on each questionnaire posted to the participants. Participants were asked to fulfil the questionnaires and to send them back within one month. Those who failed to send the questionnaires back were reminded by a letter sent to them again with another questionnaire to complete. For a summary of the measurements included in this study see Table 13.

#### **4.6. Missing Data and Statistical Analyses**

To treat missing values, estimation by means of regression, through SPSS missing values analyses (MVA), was chosen. Data were imputed within waves only under the condition that 50% of the multi-item scales were answered. The presence of outliers was examined at the multivariate levels by means of residual plot and a  $p < .001$  criterion for Mahalanobis distance a method that is recommended by Tabachnik and

Fidell (2001). Cases that were found to be outliers were excluded from further analyses. The statistical analyses used in this study to investigate relationships between the major variables of the study, and to explore possible covariate that may account for these relationships included correlational analyses (e.g., Pearson correlation, partial correlation), t test, chi-square tests, regression analyses, repeated measures ANOVAs, and path analyses (AMOS).

Table 13  
*The Study Design*

Variables	T1	T2	T3	T4	T5
<b><i>Resources</i></b>					
Received Social support	x	x	x	x	x
Number of Resources	x				
<b><i>Personal Resources</i></b>					
Self-Efficacy			x	x	x
<b><i>Coping</i></b>					
	x	x	x	x	x
<b><i>Outcomes</i></b>					
The 7-item meaning scale	x	x	x	x	x
The 17-item Benefit Finding scale					x
Negative Affect	x	x	x	x	x
Quality of Life	x	x	x	x	x
Pain	x	x	x	x	x
Fatigue	x	x	x	x	x
Impairment due to Illness	x	x	x	x	x
<b><i>Miscellaneous</i></b>					
<b><i>Medical Data</i></b>					
	x		x		
<b><i>Demographic Variables</i></b> (e.g., sex, age, marital status)					
	x				