

ORIGINAL ARTICLE

Work-related predictors of not returning to work after inpatient rehabilitation in cancer patientsHILKE M. BÖTTCHER¹, MONIKA STEIMANN², ANNEKE ULLRICH¹,
MARTIN ROTSCH³, KARL-HEINZ ZURBORN⁴, UWE KOCH¹ & CORINNA BERGELT¹

¹Center of Psychosocial Medicine, Department of Medical Psychology, University Medical Center Hamburg-Eppendorf, Germany, ²HELIOS-Rehabilitation Clinic Lehmrade GmbH, Lehmrade, Germany, ³HELIOS-Rehabilitation Clinic Schloss Schönhagen GmbH, Ostseebad Schönhagen, Germany, and ⁴HELIOS-Rehabilitation Clinic Ahrenshoop GmbH, Ostseebad Ahrenshoop, Germany

Abstract

Background. The purpose of the study was to explore the association between work-related factors and not returning to work in cancer patients. The identification of any special issues contributes to the development of occupation-related rehabilitation programmes. This study focused on aspects that may be influenced by patients with the help of counselling (e.g., handling occupational stress). **Material and methods.** At the beginning and one year after the end of rehabilitation, we asked patients to answer occupation-related questionnaires. We used t-tests and χ^2 -tests as well as logistic regression analyses to address our research questions. **Results.** Of 333 patients, 21% had not returned to work one year after the end of rehabilitation. In comparison with working patients, patients who were not working reported poorer mental health and more occupational problems at the beginning of rehabilitation. Unemployment at the beginning of rehabilitation, an elevated risk of early retirement and limited self-assessed work ability increased the probability of not returning to work. **Conclusion.** Patients who did not return to work represent a subgroup within rehabilitation. These patients need special support and should receive counselling beyond the time of rehabilitation. This is particularly true for unemployed patients who need intensive help to return to the workforce. Furthermore, patients' estimations of their work ability and their plans for returning to work play a crucial role and should be discussed during rehabilitation.

Cancer patients of working age often report that returning to work after treatment for cancer helps to establish normalcy and increases their quality of life [1,2]. Nevertheless, internationally, one year after the diagnosis an average of just 62% of cancer patients return to work [3]. Although the return-to-work rates increase over time (two years after diagnosis approximately 89% [3]), some patients might benefit from an earlier return to professional life. In regard to financial security for example, being absent from work often leads to a loss of income. Therefore, some patients might experience an increased financial pressure to return to work as soon as possible. In Germany, patients get sick-pay for 78 weeks when they need to stop working due to sickness. The amount of money is calculated as 70% of the income

a patient had earned before he got ill [4]. In case someone is able to work again after the period of sick leave, but unemployed, he must apply for unemployment benefit [4]. Patients, who are not able to get back to their old job when the time of sick-pay ends, i.e., due to the consequences of the disease, might plan to apply for a temporary disability pension or an early retirement. As the German Pension Insurance Agency is interested in preventing high costs as a consequence of early retirements, patients at working age are normally requested to enrol for rehabilitation at first (slogan "rehabilitation before retirement" [5]). Rehabilitation clinics provide multidisciplinary therapy programmes, which include physical therapy, patient education or advice on occupational problems [5,6]. Aim is to support patients, if they are of

Correspondence: H. M. Böttcher, Center of Psychosocial Medicine, Department of Medical Psychology, University Medical Center Hamburg-Eppendorf, Martinistraße 52, W26, 20246 Hamburg, Germany. E-mail: hi.boettcher@uke.uni-hamburg.de

(Received 27 November 2012; accepted 28 March 2013)

working age, to find a way back into their social and professional life. In case it is not possible to get back to the old job, patients must be mobilised and encouraged to find new working solutions. To determine which patients require intensive help, it is crucial to screen patients in need for support at the beginning of rehabilitation and to provide adequate occupation-related therapy modules. Although different concepts of work-related interventions exist internationally [7,8], thus far, there are no systematic guidelines for identifying patients who are in need or determining what kind of therapy modules should be offered. One way to develop occupation-related rehabilitation programmes is to explore the barriers that increase the likelihood that patients will not return to work. Previous studies have mainly focused on the influence of sociodemographic and medical characteristics as well as work-related factors [3]. Although the results regarding sociodemographic aspects (e.g., age) are mixed [9,10], studies that have analysed cancer-related factors have found that the cancer site and the treatment play an important role [3,7]. Symptoms such as fatigue or depression are less strongly associated with not returning to work [10]. In terms of work-related factors, patients who are not supported by co-workers or who perform manual labour have a higher probability of not returning to the workforce [3,10,11].

Less attention has been concentrated on analysing the influence of psycho-social aspects on the decision to not return to work, such as patients' attitudes towards work or their occupational behaviour. Predictors of not returning to work that are based on patients' own perception provide important information for the development of screening instruments or occupation-related therapy modules. Although it is obviously impossible to change patients' socio-demographic or medical characteristics, psycho-social counselling can support patients in improving communication with colleagues or gaining confidence in their work ability. Furthermore, studies based on data of samples from different non-cancer populations also showed in general that negative emotions towards work and feeling occupationally stressed increases the likelihood of applying for pension before retirement age [12,13]. Until now, only a few studies have explored those factors in a population of cancer patients, namely patients' intention to return to work or perceived work ability [14,15]. Although the results regarding perceived work ability are ambiguous, patients who do not intend to return to work have a higher probability of not returning to the workforce. Due to the few research results and the importance of involving a patient's point of view into treatment, in addition to objective factors, an analysis of why patients do not return to work must

focus on subjective work-related predictors. Hence, the aim of our study was to analyse the association between psycho-social work-related factors and the likelihood of not returning to work.

Material and methods

Study design

The study used a prospective and quasi-experimental design with three measurement points and three participating rehabilitation clinics. The study was conducted in an inpatient rehabilitation setting with the aim of evaluating an occupational rehabilitation programme. In Germany, every cancer patient has the legal right to enrol for a rehabilitation programme to improve the health condition. To support patients, rehabilitation clinics work with multidisciplinary teams [5]. In the context of our study, one of the three clinics offered additionally a special rehabilitation concept that focused on occupational aspects of every therapy module (e.g., physical therapy) [16]. Patients completed questionnaires at the beginning of rehabilitation (t1) and received two additional questionnaires by mail six (t2) and 12 months (t3) after the end of rehabilitation. The patients were recruited by the rehabilitation physicians if they met the inclusion criteria (Figure 1). The study protocol was approved by the department of data security of the German Pension Insurance Agency and the local ethics committee.

In this paper, we focus on the outcomes of the first measurement point to predict the likelihood of not returning to work one year after the end of rehabilitation. Results regarding the explicit evaluation of the occupation-related concept are discussed elsewhere [16].

Measures

Outcome variable. One year after the end of rehabilitation, patients were categorised as having returned to work when they returned to their old job, began a new job or began occupational retraining.

Demographic and medical characteristics. At the beginning of rehabilitation, patients reported education, occupational status and type of job. Furthermore, physicians assessed cancer-related aspects, such as the cancer site or tumour stage.

Mental health. We assessed the psycho-social situation of the patients using the Hospital Anxiety and Depression Scale (HADS). The HADS measures the degree of anxiety and depression of somatically ill patients on the basis of two separate subscales [17].

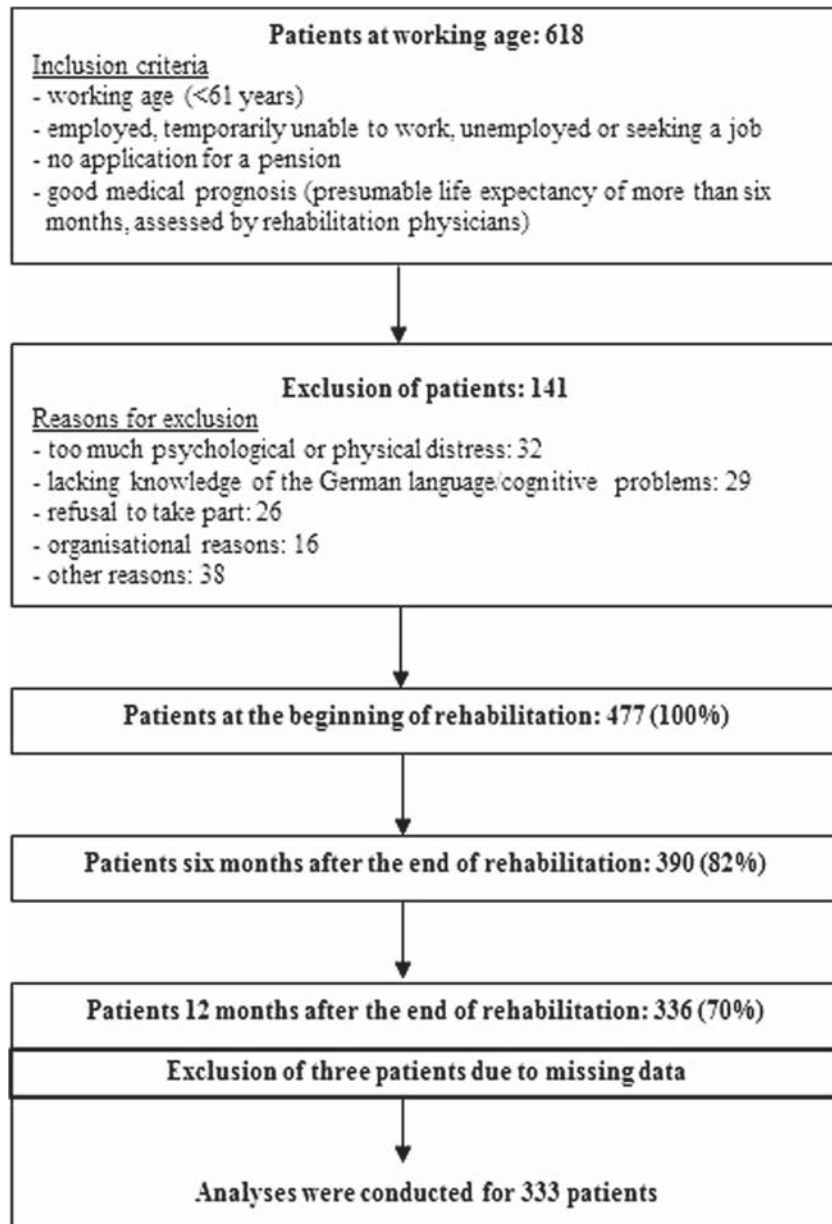


Figure 1. Patient flowchart of the study.

Patients who exceed the cut-off point of 8 on one of the subscales are considered to suffer from moderate to clinically relevant depression or anxiety [18].

Occupation-related factors. At the beginning of rehabilitation, patients provided information about their duration of sick leave within the last 12 months. Furthermore, they assessed their subjective work ability by estimating the possible amount of working hours per day after the end of rehabilitation. This item is originally part of the sociomedical assessment of a patient's working performance which rehabilitation physicians evaluate at the end of

rehabilitation. As we were interested in the patient's own perception of work ability at the beginning of rehabilitation, we adapted the item.

Occupation-related questionnaires. The participants answered the Effort-Reward Imbalance at Work Questionnaire (ERI) and the Screening Instrument Work and Occupation (German abbr. SIBAR).

The ERI measures the subjective amount of effort an individual expends at work and the reward the individual gains in return [19]. If high job strain does not lead to adequate gratification, an imbalance may exist that may lead to occupational stress. Imbalance

is calculated with the ERI ratio and is indicated by a score of one or more (for ratio-calculation see [20]).

The SIBAR is a screening instrument to assess patients' need for occupational rehabilitation. This instrument consists of three subscales [21]. The SIBAR I subscale classifies patients in terms of their risk of early retirement on the basis of various sources of medical and psycho-social information, such as current sick leave or the patient's estimation of when to return to work. A score of more than 7 of 19 possible points indicates an elevated risk of early retirement. The SIBAR II subscale measures the amount of stress at work while patients rate their subjective need for rehabilitation on the SIBAR III subscale. Subscales I–III are calculated to determine whether the physician should recommend occupation-oriented rehabilitation to the patient [22].

Occupation-related rehabilitation programme. Because the special occupation-related rehabilitation programme offered by one of the clinics may have had an impact on the likelihood of not returning to work one year after the end of rehabilitation, we included participation in this programme as a possible predictor in our analyses to control for effects.

Patients

Of 618 patients at working age, 477 cancer patients were included at the first measurement point, and 336 patients answered the questionnaire one year after the end of rehabilitation. For three respondents data about the occupational status one year after the end of rehabilitation were missing. Hence, we only included 333 patients into our analyses (Figure 1).

Compared to responders at the third measurement point, non-responders were significantly younger and were more likely to be male and unemployed at the beginning of rehabilitation. Significantly fewer non-responders were diagnosed with breast cancer. Furthermore, the majority of non-responders reported earning less money and were diagnosed with a later tumour stage, and fewer of these patients had been in surgery or received hormone therapy.

Analysing strategy

The non-responder analyses revealed some differences between responders and non-responders at the third measurement point. Therefore, we imputed the missing data of the non-responders to avoid response bias. Before running the regression analysis, we firstly imputed all missing values within the set of data for the first measurement point ($N = 477$) by using the mode (nominal scaled), median (ordinal

scaled) or mean (interval scaled). Second, to impute the missing values of the outcome of not returning to work at the third measurement point, we conducted a logistic regression analysis to classify the likelihood that non-responders would not return to work one year after the end of rehabilitation. The regression analysis was conducted based on the regression equation used to predict not returning to work among responders at the third measurement point ($N = 333$).

Statistical analysis

We conducted descriptive analyses to examine the characteristics of the sample. The variables that differed significantly between patients who returned to work and those who did not return to work one year after the end of rehabilitation (χ^2 -tests and two-sample t-tests) were considered possible predictors for the logistic regression analysis. To avoid multicollinearity, we analysed the intercorrelations among the significant variables [23]. When two variables were correlated with a value > 0.6 , we excluded one of them (i.e., HADS: anxiety highly correlated with depression; SIBAR: need for rehabilitation highly correlated with risk of early retirement). As low correlations between variables do not guarantee low multicollinearity [23], we calculated the tolerance values of the remaining predictors. The analyses revealed low values for the ERI variables of effort, reward and the ERI ratio. We deleted effort and reward in favour of the ERI ratio. Altogether, we conducted two logistic regression analyses to examine the associations between the likelihood to not return to work and the predictors. First, we ran an analysis after imputing all missing data. Second, we examined the associations by including only the data of the responders at the third point of measurement to secure our results.

Regarding the non-responder analysis, we conducted univariate (χ^2 -tests and two-sample t-tests) analyses.

Results

Sample characteristics

From the patients, who answered the third questionnaire one year after the diagnosis, the majority of the patients were female, and the most frequent diagnosis was breast cancer. On average patients had been diagnosed with cancer 10 months ago when they started rehabilitation. The mean age was 49 years. Most of the patients were employed at the first point of measurement, had white-collar jobs and were classified with a tumour stage of 1 (Table I).

Table I. Characteristics of the responders at the beginning of rehabilitation (t1, N = 333).

	n	Whole sample (N = 333)	n	Return to work one year after the end of rehabilitation (N = 264)	n	No return to work one year after the end of rehabilitation (N = 69)	p
Age (M, SD)	333	49.4 (7.3)	264	49.4 (7.1)	69	49.5 (8.3)	0.894 ¹
Gender	333	%	264	%	69	%	
Female		75.7		76.1		73.9	0.702 ²
Education	327 ⁶	%	258 ⁶	%	69	%	
Up to 9 years		20.2		19.0		24.6	0.051 ²
10 years		52.3		50.4		59.4	
12–13 years		27.5		30.6		15.9	
Occupational status	322 ⁶	%	254 ⁶	%	68 ⁶	%	
Employed		91.6		95.7		76.5	<0.001 ³
Unemployed		6.5		3.1		19.1	
Other		1.9		1.2		4.4	
Type of occupation	326 ⁶	%	257 ⁶	%	69	%	
Blue-collar job		19.6		15.6		34.8	0.004 ³
White-collar job		71.5		75.9		55.1	
Self-employed		5.2		5.1		5.8	
Public servant		3.7		3.5		4.3	
Household income per month	317 ⁶	%	251 ⁶	%	66 ⁶	%	
Up to 1000€/up to 1287\$ ⁴		7.2		6.4		10.6	0.012 ²
1000–2000€/1287–2575\$ ⁴		32.2		28.3		47.0	
2000–3000€/2575–3862\$ ⁴		36.0		39.0		24.2	
3000–4000€/3862–5150\$ ⁴		14.2		14.3		13.6	
More than 4000€/more than 5150\$ ⁴		10.4		12.0		4.5	
Cancer site	333	%	264	%	69	%	
Breast		43.8		46.6		33.3	0.043 ²
Digestive organs		19.5		18.9		21.7	
Lymphoid, haematopoietic and related tissue		9.6		8.3		14.5	
Female genital organs		8.7		8.0		11.6	
Endocrine glands and related structures		3.3		3.4		2.9	
Respiratory system and intrathoracic organs		2.7		1.5		7.2	
Other		12.3		13.3		8.7	
Tumour stage (UICC)	333	%	264	%	69	%	
Stage 0		3.3		2.3		7.2	0.031 ²
Stage 1		31.2		34.5		18.8	
Stage 2		24.0		23.9		24.6	
Stage 3		12.3		12.1		13.0	
Stage 4		6.0		4.5		11.6	
Other ⁵		8.7		8.0		11.6	
Treatment	333	%	264	%	69	%	
Surgery		91.0		92.8		84.1	0.024 ²
Chemotherapy		56.2		54.2		63.8	0.152 ²
Radiation		55.0		54.5		56.5	0.769 ²
Hormone therapy		34.8		36.7		27.5	0.153 ²
Months since diagnosis (M, SD)	332 ⁶	10.2 (11.0)	263 ⁶	10.5 (11.7)	69	9.1 (7.4)	0.210 ¹

¹t-test, two-tailed; ² χ^2 -test; ³Fisher's exact test; ⁴Conversion rate 26/03/2013; ⁵As tumours of lymphoid, haematopoietic and related tissue are not classified via UICC, they are summarised as 'other'; ⁶Different sample sizes due to missing values within some variables.

Characteristics with regard to not returning to work

Sociodemographic and cancer-related characteristics. In comparison with patients who had returned to work (N = 264), patients who did not return to work (N = 69) were less likely to be employed at the first measurement point, had a higher probability of having a blue-collar job and reported earning less money. Furthermore, a significantly larger number of patients who were not working were diagnosed

with cancer of the digestive organs, were classified within a later tumour stage, and fewer of these patients had been in surgery (Table I).

Psycho-social and work-related characteristics. Twenty-one percent of the patients who responded at the third measurement point (whole sample: N = 333) had not returned to work one year after the end of rehabilitation. Nearly 8% reported to be unemployed

or obtaining disability pension. Only 1% had retired early and 4% of the sample were still on sick leave one year after the end of rehabilitation. In comparison with working patients, not-to-work-returned patients reported higher values of anxiety and depression (HADS), and 23% showed an effort-reward imbalance at work (ERI). More than half of the patients who had not returned to work showed an elevated risk of early retirement, and 38% reported feeling stressed at work. In comparison to 5% of the patients who have returned to work one year after the end of rehabilitation, 37% of the patients who have not returned to work should have been initially assigned to occupational counselling at the beginning of rehabilitation (SIBAR). The two groups did not differ in terms of their subjective need for occupational rehabilitation. While half of the patients who had not returned to work had been on sick leave for more than 25 weeks within the last year, this situation applied to only 34% of the working patients. Furthermore, the majority of patients who were not working reported limited work ability, whereas the majority of the working patients were

fully able to work. Forty-two percent of the patients who did not return to work participated in the occupational intervention programme, whereas this was the case for 58% of the working patients (Table II).

Prediction of not returning to work

The following predictors were significantly associated with not returning to work: occupational status, type of occupation, tumour stage, risk of early retirement and subjective work ability (N = 477, Table III).

Considering only the data of responders, the regression analysis revealed significant associations between the outcome of not returning to work and the predictors of occupational status, risk of early retirement and subjective work ability (N = 333, Table III).

Discussion

The aim of this study was to explore the association between psycho-social work-related factors and the

Table II. Mental health and occupation-related variables at the beginning of rehabilitation in cancer patients who did return and who did not return to work one year later (t1, N = 333).

	Return to work one year after the end of rehabilitation (N = 264) M (SD)	No return to work one year after the end of rehabilitation (N = 69) M (SD)	p ¹	d
Anxiety and Depression – HADS				
Anxiety	6.8 (3.7)	8.1 (4.2)	0.011	–0.33
Depression	4.7 (3.5)	6.4 (4.1)	0.001	–0.45
Occupation-related variables				
Effort-reward imbalance – ERI				
Effort ²	14.9 (5.1)	16.7 (5.5)	0.012	–0.34
Reward	48.1 (6.6)	44.3 (8.6)	0.002	0.50
	n (%)	n (%)	p ³	d
Effort-reward imbalance (cut-off ≥ 1)	16 (6.8)	14 (22.6)	<0.001	–
Need for rehabilitation – SIBAR				
	n (%)	n (%)	p ³	d
Risk of early retirement	24 (10.4)	32 (53.3)	<0.001	–
Occupational stress	32 (12.4)	26 (38.2)	<0.001	–
Subjective need of occupational rehabilitation	66 (25.8)	18 (27.3)	0.806	–
Occupational rehabilitation recommended	12 (5.3)	21 (36.8)	<0.001	–
Duration of sick leave (last 12 months)				
	n (%)	n (%)	p ³	d
No sick leave	33 (12.8)	8 (11.9)		
0–5 weeks	49 (19.0)	4 (6.0)	0.022	–
6–25 weeks	88 (34.1)	21 (31.3)		
26–62 weeks	88 (34.1)	34 (50.7)		
Subjective work ability at the last job at the beginning of rehabilitation				
	n (%)	n (%)	p ³	d
Fully able to work (6 hours or more)	145 (56.2)	12 (17.4)		
Limited able to work (less than 6 hours)	108 (41.9)	43 (62.3)	<0.001	–
Not able to work	5 (1.9)	14 (20.3)		
Participation within the occupational rehabilitation programme				
	n (%)	n (%)	p ³	d
Occupation-related intervention	153 (58.0)	29 (42.0)	0.018	–

¹t-test, two-tailed; ²Analyses based on the six-item version of the ERI; ³χ²-test.

Table III. Multivariate analyses of the predictors of not returning to work one year after the end of rehabilitation with (N = 477) and without imputed data (N = 241¹).

	Not returning to work one year after rehabilitation			
	odds ratio (N = 477) (95% confidence interval)	p ²	odds ratio (N = 241 ¹) (95% confidence interval)	p ²
<i>Patients' characteristics</i>				
<i>Education</i>				
Up to 10 years	1.511 (0.631–3.623)	0.354	1.444 (0.430–4.847)	0.552
<i>Occupational status</i>				
Employed	Ref		Ref	
Unemployed/other	6.633 (2.953–14.900)	<0.001	5.521 (1.108–27.510)	0.037
<i>Type of occupation</i>				
White-collar job/self-employed/public servant	Ref		Ref	
Blue-collar job	2.292 (1.144–4.592)	0.019	1.697 (0.568–5.067)	0.343
<i>Household income per month</i>				
Up to 2000€/2575\$ ³	Ref		Ref	
Between 2000€/2575\$ and 4000€/5150\$ ³	0.641 (0.336–1.224)	0.178	0.803 (0.307–2.100)	0.655
More than 4000€/5150\$ ³	0.643 (0.156–2.656)	0.541	1.040 (0.196–5.517)	0.963
<i>Cancer site</i>				
Breast cancer	Ref		Ref	
Cancer of the digestive organs	1.654 (0.674–4.058)	0.272	1.366 (0.343–5.442)	0.658
Other	1.702 (0.777–3.731)	0.184	2.721 (0.923–8.022)	0.070
<i>Tumour stage</i>				
Stage 0–2	Ref		Ref	
Stage 3–4	2.404 (1.151–5.020)	0.020	1.374 (0.463–4.078)	0.567
Other	0.702 (0.299–1.650)	0.417	0.622 (0.169–2.291)	0.475
<i>Surgery</i>				
	0.759 (0.277–2.084)	0.593	0.748 (0.158–3.543)	0.714
<i>Mental health</i>				
Depression (HADS)	1.068 (0.984–1.158)	0.114	1.062 (0.939–1.201)	0.338
<i>Occupation-related variables</i>				
Effort-reward imbalance (cut-off ≥ 1) (ERI)	2.246 (0.619–8.159)	0.219	2.405 (0.651–8.890)	0.188
Risk of early retirement (SIBAR)	3.462 (1.735–6.908)	<0.001	3.773 (1.343–10.601)	0.012
Occupational stress (SIBAR)	2.066 (0.954–4.471)	0.066	1.835 (0.624–5.397)	0.270
<i>Duration of sick leave</i>				
0–5 weeks	Ref		Ref	
6–25 weeks	1.313 (0.551–3.126)	0.539	1.837 (0.561–6.014)	0.315
More than 25 weeks	2.091 (0.881–4.962)	0.094	1.096 (0.314–3.826)	0.885
<i>Subjective work ability at the last job</i>				
Able to work (6 hours or more)	Ref		Ref	
Limited ability to work (less than 6 hours)	3.498 (1.686–7.257)	0.001	4.129 (1.004–33.478)	0.009
Not able to work	13.174 (3.804–45.618)	<0.001	5.799 (1.004–33.478)	0.049
<i>Participation within the occupational rehabilitation programme</i>				
Occupation-related intervention	0.816 (0.428–1.556)	0.537	0.893 (0.341–2.342)	0.818

N = 477: Multicollinearity tolerance values between 0.718 and 0.909; Nagelkerkes R² 51%; N = 241: Multicollinearity tolerance values between 0.629 and 0.908; Nagelkerkes R² 47%.

¹Due to missing values within the predictor variables, of 333 patients, a total of 241 patients could be included in the analysis; ²Wald Test;

³Conversion rate 26/03/2013.

likelihood of not returning to work among cancer patients. A lot of research investigates the influence of sociodemographic and medical factors on return to work [3,7,9,10], but only a few studies explored the role of psycho-social factors [14,15]. Therefore we assessed variables from the patient's point of view, which are changeable with the help of rehabilitation programmes. This included experiencing occupational stress, the self-assessed work ability or the individual's risk of early retirement. Occupational counselling within rehabilitation gives patients the

opportunity to learn new strategies how to prevent or handle occupational stress or to learn what kind of occupational tasks are still possible even if the work ability is perceived as low. This could give patients a new perspective instead of resigning and applying for disability pension or early retirement.

To secure our results against a non-responder bias, we imputed missing values to conduct one of the regression analyses on basis of the entire sample.

Overall, our results show that patients who do not return to work represent a special subgroup that

requires more intensive support. Not only did these patients report worse mental health, but they also experienced more occupational stress, had an elevated risk of early retirement and assessed their work ability as more limited. Hence, 37% of this subgroup should be recommended for occupational rehabilitation. Over half of the patients, who did not return to work, reported to be unemployed or to obtain disability pension one year after the end of rehabilitation. Only few patients have applied for early retirement. Of course the possibility must be considered, that in the end not every patient will be able to return to work. If it is not possible anymore to fulfil the old job tasks due to the general physical condition or new barriers in consequence of the disease, it must be discussed with patients if a re-training is imaginable for them or if early retirement would be indeed the best solution. Nonetheless, altogether, the patients in our study who did not return to work represent a minority (21%). The fact that almost 80% of patients had returned to work by one year after the end of rehabilitation indicates the success of oncological rehabilitation in enhancing patients' return to work. Our results are very similar to the return-to-work rate of another German study in the rehabilitation setting, in which 76% of the cancer patients have returned to work one year after the end of rehabilitation [14]. The success of oncological rehabilitation is even more apparent when we compare these rates to those with other indications, such as orthopaedic patients (72%) [24] or cardiology patients (62%) [25]. In regard to the minority of patients in need, our results emphasise the importance of reliable screenings to identify those who should be offered more intensive occupational rehabilitation.

The multivariate analysis showed that most of the sociodemographic and cancer-related factors were not significantly associated with the probability of not returning to work. However, being unemployed at the beginning of rehabilitation significantly increased the likelihood of not being employed one year after the end of rehabilitation. This finding is consistent with the findings of another study [14] and demonstrates general problems with employment after a diagnosis of cancer [9,26,27]. In general, the question arises how to connect those patients more carefully with after-care programmes. Although medical rehabilitation can help to give patients orientation and recommendations how to proceed after the end of treatment, a further contact point could be necessary to keep patients at planning how to return to work or how to apply for a new job.

Patients who demonstrated an elevated risk for early retirement had a much higher likelihood of not returning to work. On the one hand, these results

show that the SIBAR is a reliable instrument to screen patients at risk [21]. On the other hand, because the retirement score of the SIBAR is also based on the patient's own estimation of when to return to work, the identified association supports the results of the other German rehabilitation study of cancer patients in which the intention to return to work was strongly associated with the actual return to work [14]. Therefore, it seems important to examine whether patients underestimate their own abilities. Furthermore, patients must be provided with the opportunity to talk about occupational stress. Although the multivariate analysis suggests that occupational stress is not associated with not returning to work, stress may influence some patients' plans regarding returning to work. Returning to a stressful job requires physical and mental strength. Because some cancer patients report cognitive problems due to the disease [28–31], negative expectations may negatively influence the intention to return to work. This assumption is supported by the finding that patients who reported limited work ability were more likely to not return to work. Although it must be assumed that work ability improves over time, our results show that one year after the end of rehabilitation might not be enough time to recover completely to feel ready to return to work.

Our results were further confirmed by the regression analysis based on responder data without imputing missing values. This analysis verifies our conclusions; the results based on the imputed set of data must be interpreted carefully. Although we imputed missing data to avoid non-responder bias, imputing data by using the mode, median and mean might have homogenised the sample.

Nonetheless, the range of patients (e.g., different cancer sites) included in our study represents the typical population within German rehabilitation clinics. Our analyses show that a subgroup of these patients is in need for occupation-related help. Reliable screening is necessary to identify these patients. In particular, psycho-social work-related aspects should be discussed with patients.

Although we included patients with all cancer sites and at all ages, it must be considered, that our results cannot be interpreted in regard to the needs of the general cancer population in Germany. In 2006 nearly 34% of all cancer patients enrolled in rehabilitation programmes and therefore our sample represents a subgroup of cancer patients in Germany [32]. It has not been analysed yet, if patients who not enrol in rehabilitation programmes, differ from rehabilitation patients in regard to work-related needs. Therefore, research is still needed to determine how to reach and counsel those cancer patients and if it is necessary.

Acknowledgements

We thank Dr. Levente Kriston for his statistical support and counselling when preparing the manuscript and we thank all of the patients who took part within the study.

Declaration of interest: The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

We thank the Society for the promotion of rehabilitation research in Hamburg, Mecklenburg-Western Pomerania and Schleswig-Holstein e.V. (Verein zur Förderung der Rehabilitationsforschung in Hamburg, Mecklenburg-Vorpommern und Schleswig-Holstein e.V., vffr, Grant ID 117) for funding the project.

References

- [1] Main DS, Nowels CT, Cavender TA, Etschmaier M, Steiner JF. A qualitative study of work and work return in cancer survivors. *Psychooncology* 2005;14:992–1004.
- [2] Ferrell BR, Grant MM, Funk B, Otis-Green S, Garcia N. Quality of life in breast cancer survivors as identified by focus groups. *Psychooncology* 1997;6:13–23.
- [3] Mehnert A. Employment and work-related issues in cancer survivors. *Crit Rev Oncol Hematol* 2011;77:109–30.
- [4] Mau W. Sozialmedizinische Beurteilung. In: Morfeld M, Mau W, Jäckel WH, Koch U, editors. *Querschnitt Rehabilitation, Physikalische Medizin und Naturheilverfahren. Ein fallorientiertes Lehrbuch*. München: Urban & Fischer; 2007. p. 31–5.
- [5] Hellbom M, Bergelt C, Bergenmar M, Gijsen B, Loge JH, Rautalathi M, et al. Cancer rehabilitation: A Nordic and European perspective. *Acta Oncol* 2011;50:179–86.
- [6] Gerdes N, Zwingmann C, Jäckel WH. The system of rehabilitation in Germany. In: Jäckel WH, Bengel J, Herdt J, editors. *Research in Rehabilitation*. Stuttgart: Schattauer GmbH; 2006. p 3–19.
- [7] de Boer AG, Frings-Dresen MHW. Employment and the common cancers: Return to work of cancer survivors. *Occup Med* 2009;59:378–80.
- [8] de Boer AG, Taskila T, Tamminga SJ, Frings-Dresen MH, Feuerstein M, Verbeek JH. Interventions to enhance return-to-work for cancer patients. *Cochrane Database Syst Rev* 2011;16:CD007569.
- [9] Drolet M, Maunsell E, Brisson J, Brisson C, Masse B, Deschenes L. Not working 3 years after breast cancer: Predictors in a population-based study. *J Clin Oncol* 2005; 23:8305–12.
- [10] Spelten ER, Verbeek JH, Uitterhoeve AL, Ansink AC, van der Lelie J, de Reijke TM, et al. Cancer, fatigue and the return of patients to work – a prospective cohort study. *Eur J Cancer* 2003;39:1562–7.
- [11] Taskila T, Lindbohm ML. Factors affecting cancer survivors' employment and work ability. *Acta Oncol* 2007; 46:446–51.
- [12] Elovainio M, Forma P, Kivimäki M, Sinervo P, Sutinen R, Laine M. Job demands and job control as correlates of early retirement thoughts in Finnish social and health care employees. *Work Stress* 2005;19:84–92.
- [13] Siegrist J, Wahrendorf M, von dem Knesebeck O, Jürges H, Borsch-Supan A. Quality of work, well-being, and intended early retirement of older employees: Baseline results from the SHARE Study. *Eur J Public Health* 2007;17:62–8.
- [14] Mehnert A, Koch U. Predictors of employment among cancer survivors after medical rehabilitation – a prospective study. *Scand J Work Environ Health* 2012;39:76–87.
- [15] de Boer AG, Verbeek JH, Spelten ER, Uitterhoeve AL, Ansink AC, de Reijke TM, et al. Work ability and return-to-work in cancer patients. *Br J Cancer* 2008;98:1342–7.
- [16] Böttcher HM, Steimann M, Ullrich A, Rotsch M, Zurborn K-H, Koch U, et al. [Evaluation of a vocationally oriented concept within inpatient oncological rehabilitation.] *Rehabilitation (Stuttg)* 2013 (in press).
- [17] Zigmond AS, Snaith RP. The hospital anxiety and depression scale. *Acta Psychiatr Scand* 1983;67:361–70.
- [18] Bjelland I, Dahl AA, Haug TT, Neckelmann D. The validity of the Hospital Anxiety and Depression Scale. An updated literature review. *J Psychosom Res* 2002;52:69–77.
- [19] Siegrist J. Adverse health effects of high-effort/low-reward conditions. *J Occup Health Psychol* 1996;1:27–41.
- [20] Siegrist J, Starke D, Chandola T, Godin I, Marmot M, Niedhammer I, et al. The measurement of effort-reward imbalance at work: European comparisons. *Soc Sci Med* 2004;58:1483–99.
- [21] Bürger W, Deck R. [SIBAR – a short screening instrument for the assessment of need for occupation related treatment in medical rehabilitation.] *Rehabilitation (Stuttg)* 2009;48:211–21.
- [22] Bürger W, Deck R, Raspe H, Koch U. "SIBAR"- Screening-Instrument Beruf und Arbeit in der Rehabilitation. Entwicklung und Implementierungsmöglichkeiten eines generischen Screening-Instrumentes zur Identifikation von beruflichen Problemlagen und des Bedarfs an berufsorientierten und beruflichen Rehabilitationleistungen. Abschlussbericht. 2007.
- [23] Backhaus K, Erichson B, Plinke W, Weiber R. *Multivariate analysemethoden. Eine anwendungsorientierte Einführung*. Berlin: Springer; 2006.
- [24] Bürger W, Dietsche S, Morfeld M, Koch U. [Multiperspective estimates on the probability of patient return to work following orthopaedic rehabilitation: Findings and predictive relevancy.] *Rehabilitation (Stuttg)* 2001;40:217–25.
- [25] Mittag O, Kolenda KD, Nordman KJ, Bernien J, Maurischat C. Return to work after myocardial infarction/coronary artery bypass grafting: Patients' and physicians' initial viewpoints and outcome 12 months later. *Soc Sci Med* 2001; 52:1441–50.
- [26] Park JH, Park JH, Kim SG. Effect of cancer diagnosis on patient employment status: A nationwide longitudinal study in Korea. *Psychooncology* 2009;18:691–9.
- [27] Carlsen K, Dalton SO, Diderichsen F, Johansen C, Danish Cohort Study. Risk for unemployment of cancer survivors: A Danish Cohort Study. *Eur J Cancer* 2008;44:1866–74.
- [28] Ullrich A, Böttcher HM, Bergelt C. [Gender-related aspects of returning to work in cancer survivors. A systematic review.] *Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz* 2012;55:516–32.
- [29] Böttcher HM, Steimann M, Koch U, Bergelt C. [Return to work – experiences and expectations of cancer patients during inpatient rehabilitation.] *Rehabilitation (Stuttg)* 2012;51:31–8.
- [30] Kennedy F, Haslam C, Munir F, Pryce J. Returning to work following cancer: A qualitative exploratory study into the experience of returning to work following cancer. *Eur J Cancer* 2007;16:17–25.
- [31] Maunsell E, Brisson C, Dubois L, Lauzier S, Fraser A. Work problems after breast cancer: An exploratory qualitative study. *Psychooncology* 1999;8:467–73.
- [32] Deutsche Rentenversicherung. *Abgeschlossene Leistungen zur Rehabilitation. Rentenversicherung in Zeitreihen* 2011: 203–20.