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Occupational stress and its association with early retirement and subjective need for occupational rehabilitation in cancer patients

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Abstract

***Objective*: Returning to work often plays an important role for cancer survivors. Occupational stress may hamper a successful return to work, so cancer survivors should be given the opportunity to address occupational stress issues before returning to work. We investigated the amount of occupational stress among cancer patients and whether it is associated with their well-being, their subjective need for occupational rehabilitation and elevations in their risk of early retirement.**

***Methods*: At the beginning of rehabilitation, we asked cancer patients to respond to occupation-related and health-related questionnaires. We used *t*-tests, chi-square tests, and logistic regression analyses to address our research questions.**

***Results*: A total of 477 patients participated in the study. Of these, 19% were occupationally stressed, and 26% reported subjective need for occupational rehabilitation. Patients who reported work-related stress had a diminished quality of life, were more likely to report subjective need for occupational rehabilitation (OR = 2.16), and had a higher risk of early retirement (OR = 5.44). Furthermore, cancer patients reported deficits in both active coping abilities and mental stability at work.**

***Conclusions*: Because occupational stress is associated with a higher risk of early retirement, both patients and physicians should take work-related problems seriously. Screening patients for occupational stress may help physicians identify patients who are at risk of experiencing problematic work re-entries. Furthermore, the results of the study suggest that cancer patients might have problems maintaining confidence in their abilities to solve work-related problems. Therefore, facilitating the development of a perception of self-efficacy might be an important treatment goal.**

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Introduction

After being diagnosed with cancer, depending on the cancer site and treatments, patients of working age are often on sick leave for a long time [1–4]. Because nearly half of the adult cancer survivors are under the age of 65 years [5], the issue of returning to work plays a crucial role in recovery for a significant proportion of patients. To date, an average return-to-work rate of 62% has been reported internationally [4,6–9].

Over the last three decades, researchers have surveyed cancer survivors to identify barriers complicating return to work [5,10–21]. The most frequently reported problems followed by cancer and its treatment are fatigue, tiredness, and physical limitations [16–18,22,23]. Thus, the restricted health conditions of these patients may force them to retire instead of remaining in the workforce [16,17,24,25]. Population-based studies have also found an association between the poor well-being of employees and the likelihood of quitting their jobs prior to retirement age [26–29]. However, additional risk factors, such as sociodemographic or medical characteristics or working conditions, must be considered [26–31]. Studies that included only cancer patients report risk factors such as older age, lower levels of education and income [32–35], cancer site, manual work, and physical or psychiatric comorbidities [34,35]. It is also necessary to consider occupation-related variables because the results of population-based studies provide evidence of a strong association between a poor quality of work and an elevated risk of early retirement [26–31]. Although literature exists that investigates how the occupational situation of patients influences the return to work [10,16–18,36–39], the impact of occupational stress on a patient's risk of early retirement has not yet been studied. However, because cancer patients often experience disease-related problems at work [10,16–18,38,40], early detection of occupational stress may help to avoid an additional negative impact on returning to work.

In order to assess occupational stress, patients may be asked directly, or a model framework may be used. We considered both options and applied the effort-reward imbalance model [28,41,42], which accounts for a variety of work-related aspects, such as support from co-workers, job strains, or time pressure [28,41,42]. This model states that experiencing an imbalance between high levels of effort and low levels of reward at work leads to a negative perception of work and job dissatisfaction [42]. In addition, Schaarschmidt's concept of working behavior

was used to assess specific occupational problems, such as coping strategies in regard to difficult working situations [43,44].

Addressing occupational issues and helping patients to return to work successfully are important aims within rehabilitation programs [12,19]. Although many kinds of occupation-related programs exist internationally, there are no official guidelines for the use of specific therapy modules [45–47]. In Germany, occupation-related rehabilitation strategies have been developed for many specific indications [48–52], but not for oncology so far. This may be caused by the smaller number of patients of working age in oncological rehabilitation as compared with psychosomatic or orthopedic rehabilitation [48–52]. Thus, there is little knowledge regarding the needs of those patients when attempting to prepare to return to work.

Because of that lack of knowledge, we analyzed (i) the amount of occupational stress in cancer patients; (ii) cancer patients' profiles of occupational behavior; and (iii) the quality of life in occupationally stressed patients. Furthermore, we analyzed (iv) the associations between occupational stress and the risk of early retirement and subjective need for occupation-related rehabilitation.

Methods

Data collection and participants

Data were obtained in a study that included three points of measurement in the context of inpatient cancer rehabilitation in Germany. The protocol was approved by both the department of data security at the German Pension Insurance Agency and the local ethics committee. In the present analyses, we focused on cross-sectional data that the patients provided at the beginning of rehabilitation.

In Germany, cancer patients can get inpatient rehabilitation for at least 3 weeks, and it usually takes place shortly after primary treatment [47]. Rehabilitation clinics provide a multidisciplinary concept that includes physical and psycho-oncological treatment, nutrition, and occupational counseling [47].

Patients were consecutively recruited by rehabilitation physicians from three clinics between December 2008 and May 2010. During the medical examinations, the physicians informed all cancer patients who met our inclusion criteria about the study. Patients were eligible if they were at working age, that is, not more than 60 years old. Regarding their occupational situation, eligible patients had to either be employed at the beginning of rehabilitation, temporarily unable to work (for example, receiving disability pension temporarily) or seeking a job. Housewives and househusbands were excluded from the study. Furthermore, patients' prognosis had to be good (presumable life expectancy of more than 6 months), which was assessed by rehabilitation physicians. If patients reported to be excessively psychologically or physically stressed, they were not included. The same applies to patients who had a lacking knowledge of the German language, cognitive deficits, or refused to take part. Therefore, out of 618 patients at working age, 141 patients were excluded because of the listed reasons.

Variables and instruments

Occupational stress, risk of early retirement, and subjective need for occupational rehabilitation were measured with the 'Screening Instrument Work and Occupation' (German abbr. SIBAR, [53]). Occupational stress was additionally assessed using the 'Effort–reward Imbalance at Work Questionnaire' (ERI, [41,42]).

Aim of the *SIBAR* is to identify whether a patient requires work-related rehabilitation. The score is determined from the results on three scales [53]. This instrument is a recently developed questionnaire, and its use has been established within German rehabilitation clinics. The nine-item SIBAR I subscale assesses the risk of early retirement. Patients are asked about sick leave, unemployment, and their ability to work. Additional items consider the influence of their health status on future working capacity and the planned time at which the patient intends to return to work. Patients are classified as having a high risk of early retirement if they exceed a score of seven points (19 points possible). The one-item SIBAR II subscale assesses occupational stress. Patients estimate the stressfulness of their working situations on a 5-point scale. The one-item SIBAR III subscale is used to ask patients to estimate their subjective need for occupational rehabilitation on a 3-point scale. The reliability for SIBAR I within our sample was .63 (Cronbach's alpha), which is similar to the value reported by the authors of the instrument [53]. The validity of the SIBAR has been tested by its authors. They report that high results of SIBAR I are positively correlated with the likelihood that a patient will apply for early retirement within 1 year after the end of rehabilitation [54].

The *ERI* was developed on the basis of Siegrist's model of effort–reward imbalance, and is widely used in occupational psychology and healthcare [41,42]. The model postulates that experiencing an inconsistency between the effort at work and the level of resulting reward may cause occupational stress. According to Siegrist, a motivational pattern of excessive work-related commitment, called overcommitment, increases the risk of suffering from effort-reward imbalance [41]. The ERI measures effort and overcommitment with two 6-item subscales and reward with an 11-item subscale. Respondents who achieve an ERI ratio of 1 or higher are considered to be at risk of suffering from an effort-reward imbalance (further information regarding the ratio-calculation in [41]). In our sample, the internal consistencies (Cronbach's alphas) for the three subscales ranged from .77 to .82; these are similar to the values of another German study [55]. Moreover, a number of studies have confirmed the validity of the factorial structure of the ERI [41,55,56].

Occupational behavior was assessed using the 'Occupational Stress and Coping Inventory' (German abbr. AVEM). Aim of the *AVEM* is to identify aspects of working behavior according to three domains: 'commitment at work', 'resistance towards stress', and 'emotions, that is, subjective well-being' [44]. This inventory is primarily used within areas of occupational/personnel development and rehabilitation [43,57–59]. The AVEM consists of 11 subscales and 66 items. Five subscales are used to measure 'commitment at work'; they provide information about career ambitions or the ability to keep emotionally distanced from work. 'Resistance towards stress' is assessed using three subscales, which

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measure whether a person is likely to resign in stressful working situations or whether he is able to cope. Items in the 'emotions' domain provide information about the degree to which a respondent is satisfied with work or the level of social support. The internal consistencies (Cronbach's alphas) of the subscales ranged from .76 to .89 in our sample; these values are similar to the values that have been reported by the authors of the instrument [43]. The validity of the AVEM was tested in different studies that have considered its factorial structure, which has been confirmed [43,60].

Cancer-specific quality of life was measured with the 'European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-Core 30' (EORTC QLQ-C30). Aim of the 30-item *EORTC QLQ-C30* is to measure the quality of life of cancer patients. One scale assesses the global quality of life, five scales measure aspects of the functioning of the patient, and nine scales assess various symptoms [61]. The reliability of the questionnaire has been assessed in several countries [62–64], and Cronbach's alphas that were obtained in the present study ranged from .65 to .90.

Statistical analysis

We conducted descriptive analyses to examine the amount of occupational stress (SIBAR II, ERI), the risk of early retirement (SIBAR I), and subjective need for occupational rehabilitation (SIBAR III) in our sample. Additionally, the results of the ERI were compared with the results of a German population-based reference sample ($N = 709$, average age = 40 years, 13% women [65]) using one-sample *t*-tests.

Furthermore, descriptive analyses were conducted to examine patients' occupational behaviors (AVEM). The results of the entire sample as well as of a subgroup of occupationally stressed patients (SIBAR II) were compared with AVEM data of a German population-based reference sample ($N = 3168$, average age = 41 years, 47% women [66]) using one-sample *t*-tests. To avoid alpha inflation when testing the 11 subscales of the AVEM, we used the Holm–Bonferroni correction.

To determine whether experiencing high levels of occupational stress is associated with lower quality of life (two-sample *t*-tests), patients were divided into groups based on their occupational stress level (SIBAR II, ERI).

To examine the associations between occupational stress and the outcomes 'subjective need for work-related rehabilitation' and 'risk of early retirement' (SIBAR I and III), multivariate logistic regressions were conducted. *Predicting variables were*: self-reported occupational stress (SIBAR II), ERI ratio and overcommitment at work (ERI), and role functioning (EORTC QLQ-C30). *Confounding variables were*: age, gender, education, type of occupation, cancer site, and tumor stage. Variables were included in the analyses if they showed a significant univariate association ($p < .10$) with one of the outcome variables.

Results

Sample

A total of 477 cancer patients aged from 19 to 60 years participated (Table 1), 73% were women. The patients had been diagnosed with 13 different cancer sites; the most frequent diagnosis among women was breast cancer (54%) and among men cancer of the digestive organs (36%).

Approximately 89% of patients were employed at the time of inpatient rehabilitation, and 89% planned to return to work within 6 months after rehabilitation treatment.

Occupational stress, risk of early retirement, and subjective need for rehabilitation

A total of 19% of the patients reported occupational stress (SIBAR II), 26% reported need for occupational rehabilitation (SIBAR III), and 23% of the patients were classified as having a high risk of early retirement (scores of >7 on SIBAR I). The proportions of men and women did not differ significantly (data not shown). In comparison with patients with a high risk of early retirement, patients with a low risk reported higher levels of education, had lower unemployment rates and white-collar jobs (Table 1).

In general, 11% of the sample reported an effort-reward imbalance. In comparison to the German reference sample [65], patients did not differ significantly regarding the reported effort and overcommitment. Furthermore, both groups did not differ significantly considering the ERI ratio. Our sample did, however, report to receive a significantly higher amount of reward at work compared with the reference sample [65].

The results of the ERI scales did not differ significantly between men and women (data not shown).

Occupational behavior

Our sample differed significantly from the German reference sample [66] on seven AVEM subscales. Our sample reported significantly less career ambition, less commitment at work, and a lower ability to cope with working problems and to keep mental stability. Above that they reported significantly less satisfaction with their work and life. Regarding the ability to keep distanced emotionally from work, they reported significantly higher values. However, with the exception of career ambition, the effect sizes were relatively small (Table 2). In general, men reported having more career ambition than women (men: $M = 17.4$, $SD = 4.6$; women: $M = 15.2$, $SD = 4.4$, $p < .001$, $d = 0.49$, AVEM data not shown).

A comparison between occupationally stressed patients (19%, SIBAR II) and the German reference sample showed that stressed patients reported having a significantly greater tendency to resign in stressful working situations ($M = 17.4$, $SD = 4.2$, $p < .001$, $d = 0.46$). Regarding the other AVEM-scales, stressed patients achieved significantly lower values on the subscales career ambition, commitment at work, active coping, mental stability, and satisfaction with work and life. Regarding emotional distancing, stressed patients achieved higher values in comparison with the reference sample. In regard to the comparison between the entire sample and the reference sample, the analyses of the subgroup revealed larger effect sizes (range from $d = -0.51$ to 0.46).

Quality of life

Patients who reported having either occupational stress (SIBAR II) or a high level of overcommitment (ERI) scored significantly lower on all functioning scales as well

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Table 1. Characteristics of the study sample ($N = 477$)

	Whole sample ($N = 477$)	Patients with a high risk of early retirement (SIBAR I) ($n = 92$)	Patients with a low risk of early retirement (SIBAR I) ($n = 316$)	p
Age (*M*, *SD*)	48.9 (7.7)	49.0 (8.7)	48.9 (7.3)	.855[a]
Gender (%)				
Female	73.0	74.1	65.2	.097[b]
Education (%)				
Up to 9 years	21.1	21.1	19.2	**<.001**[b]
10 years	52.0	67.8	48.2	
12–13 years	27.0	11.1	32.6	
Occupation (%)				
Employed	88.5	75.9	93.2	**<.001**[c]
Unemployed	8.0	17.2	4.8	
Partial disability pension	1.5	4.6	0.6	
Other	2.0	2.2	1.3	
Type of occupation (%)				
Blue-collar job	22.1	36.0	16.5	**<.001**[c]
White-collar job	70.2	51.7	77.1	
Public servant	2.8	4.5	2.5	
Self-employed	4.9	7.9	3.8	
Monthly household income (%)				
Up to 1000 € ($1270 or less)[d]	9.1	11.6	6.6	.223[b]
1000–2000 € ($1270–2545)	34.0	38.4	31.8	
2000–3000 € ($2545–3817)	32.0	31.4	33.1	
3000–4000 € ($3817–5089)	15.8	11.2	18.4	
More than 4000 € ($5089+)	9.1	7.0	10.2	
Cancer site (%)				
Breast	39.6	30.4	42.1	.082[b]
Digestive organs	20.1	22.8	19.0	
Male or female genital organs	11.7	10.9	12.7	
Lymphoid, hematopoietic and related tissues	10.5	16.3	7.9	
Other	18.1	19.6	18.3	
Tumor stage (UICC) (%)				
Stage 0	2.5	1.1	3.2	.169[b]
Stage 1	28.7	23.9	31.6	
Stage 2	21.4	19.6	21.2	
Stage 3	13.6	14.1	14.2	
Stage 4	7.3	9.8	6.0	
Other[e]	9.6	15.2	7.3	
Treatment (%)				
Surgery	89.1	80.4	92.7	**.001**[b]
Chemotherapy	57.4	64.1	53.8	.079[b]
Radiation	53.5	53.3	52.2	.860[b]
Hormone therapy	32.3	28.3	33.2	.369[b]

[a] *t*-test.
[b] χ^2-test.
[c] Fisher's exact test.
[d] Conversion rate 01/09/2012.
[e] Because tumors of lymphoid, hematopoietic, and related tissues are not classified in the UICC, they are summarized as belonging to 'other' stages.
UICC, Union for International Cancer Control; SIBAR, Screening Instrument Work and Occupation.

as on the global health status scale of the EORTC QLQ-C30 (Table 3; effect sizes range from $d = -1.00$ to -0.33).

With the exception of the social functioning scale, patients who reported an effort-reward imbalance reported significantly lower levels of functioning on the EORTC QLQ-C30 scales ($d = -1.18$ to -0.35) in comparison with patients for whom there was little or no imbalance.

Associations between occupational stress, subjective need for occupation-related rehabilitation, and a high risk of early retirement

The multivariate logistic regression analysis revealed a significant positive association between the outcome subjective need for occupational rehabilitation (SIBAR III) and the predictor self-reported occupational stress (SIBAR II). The other predictors were not associated with the outcome (Table 4).

The multivariate logistic regression analysis that was used to assess the association between a number of work-related variables and the outcome variable high risk of early retirement (SIBAR I) revealed significant associations between the outcome variable and the predictors self-reported occupational stress (SIBAR II) and overcommitment at work (ERI) (Table 4).

Discussion

In this paper, we measured the extent to which cancer patients within rehabilitation have an elevated risk of retiring early, report occupational stress and subjectively require work-related rehabilitation. In addition, we examined the associations between these variables and whether rehabilitation patients reported problems regarding their work-related behaviors.

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Table 2. Effort-reward imbalance (ERI) and occupational behavior (AVEM) within the current (*N*=477) and reference samples (*N*=709; *N*=3168)

	Study sample (*N* = 477)	Reference sample (*N* = 709[a], *N* = 3168[b])		
	M (*SD*)	*M*(*SD*)	*p*[c]	*d*
Effort-reward imbalance (ERI)				
Effort	15.4 (5.3)	15.0 (4.0)	.120	
Reward	47.1 (7.4)	44.8 (7.9)	**<.001**	.030
ERI ratio	0.63 (0.3)	0.65 (0.3)	.226	
Overcommitment	14.3 (3.9)	14.2 (3.0)	.640	
	n (%)			
Effort–reward imbalance (cut off ≥ 1)	46 (11.2)	—	—	
Occupational behavior (AVEM)				
Commitment at work				
Subjective significance of work	16.1 (5.0)	16.3 (4.7)	.465	
Career ambition	15.8 (4.6)	18.3 (5.0)	**<.001**	−0.52
Commitment	18.1 (5.0)	19.0 (4.4)	**<.001**	−0.19
Striving for perfection	22.2 (4.5)	22.5 (4.1)	.170	
Emotional distancing	19.0 (5.1)	17.6 (5.1)	**<.001**	0.27
Resistance towards stress				
Resignative tendencies	15.7 (4.4)	15.4 (4.4)	.147	
Active coping	21.4 (3.7)	22.2 (3.5)	**<.001**	−0.22
Balance and mental stability	19.3 (4.4)	20.1 (4.4)	**<.001**	−0.18
Emotions, that is, *subjective well being*				
Satisfaction with work	21.4 (4.0)	22.1 (3.9)	**<.001**	−0.18
Satisfaction with life	21.0 (4.0)	21.7 (3.9)	**<.001**	−0.18
Experience of social support	23.1 (4.1)	22.7 (4.3)	.079	

[a]ERI, Effort-reward Imbalance at Work Questionnaire, German reference sample: [65].
[b]AVEM, Occupational Stress and Coping Inventory, German reference sample: [66].
[c]One-sample *t*-test, two-tailed, Holm–Bonferroni procedure for adjusting the α levels of the *Commitment at work, Resistance towards stress and Emotions* dimensions.

Table 3. Quality of life (EORTC QLQ-C30) scores for patients with occupational stress (*N*=477)

	Rehabilitation and work (SIBAR)					Effort–reward imbalance (ERI)									
	Occupational stress					Imbalance					Overcommitment[c]				
	Yes		No			Yes		No			High		Low-to-average		
	n = 89		*n* = 379			*n* = 46		*n* = 363			*n* = 96		*n* = 371		
EORTC QLQ-C30[a]	***M***	***SD***	***M***	***SD***	***p*[b]**	***M***	***SD***	***M***	***SD***	***p*[b]**	***M***	***SD***	***M***	***SD***	***p*[b]**
Global health status	47.5	18.2	62.1	17.8	**<.001**	44.7	17.7	61.8	17.9	**<.001**	49.6	19.1	61.6	18.0	**<.001**
Physical function	67.4	19.2	76.7	18.5	**<.001**	69.9	18.3	76.7	18.3	**.019**	69.0	20.2	76.4	18.7	**.001**
Role function	45.5	30.5	59.7	28.9	**<.001**	48.6	27.4	58.7	29.6	**.028**	48.6	27.4	58.7	29.6	**.028**
Emotional function	41.9	21.2	64.5	24.1	**<.001**	36.8	22.1	64.1	24.0	**<.001**	36.8	22.1	64.1	24.0	**<.001**
Cognitive function	58.1	27.0	72.8	25.3	**<.001**	58.7	22.7	72.1	26.7	**.001**	58.1	30.1	73.0	24.4	**<.001**
Social function	51.1	29.6	64.1	27.2	**<.001**	54.7	28.9	63.1	28.1	.057	53.3	29.6	63.6	27.6	**.002**

[a]Scores from 0 to 100. Higher scores indicate a better quality of life.
[b]Two-sample *t*-test, two-tailed
[c]Patients were categorized as having a high overcommitment if their scale values were above average (reference group [65]) and were characterized as having a low-to-average overcommitment if their scale values were average or below average (reference group [65]). *Average* has been defined as the medial 68% of the scores.
SIBAR, Screening Instrument Work and Occupation; ERI, Effort–reward Imbalance at Work Questionnaire; EORTC QLQ-C30, European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-Core 30.

Table 4. Multivariate analyses of the subjective need for work-related rehabilitation and high risk of early retirement (*N* = 477)

	Subjective need for work-related rehabilitation (SIBAR III)		High risk of early retirement (SIBAR I)	
	Odds ratio (95% confidence interval)	*p*[a]	Odds ratio (95% confidence interval)	*p*[a]
Role function[b] (EORTC QLQ-C30)	1.00 (0.99–1.01)	.554	0.99 (0.98–1.00)	.050
Reported occupational stress[b] (SIBAR II)	2.16 (1.14–4.10)	**.019**	5.44 (2.60–11.37)	**<.001**
Risk of occupational stress[b] (ERI)	1.80 (0.80–4.02)	.154	0.83 (0.32–2.14)	.694
Overcommitment[b] (ERI)	1.53 (0.83–2.83)	.174	2.22 (1.07–4.59)	**.032**

[a]Wald test.
[b]Multicollinearity: tolerance values between .755 and .926 (need for work-related rehabilitation) and between .797 and .923 (risk of early retirement).
SIBAR, Screening Instrument Work and Occupation; ERI, Effort–reward Imbalance at Work Questionnaire; EORTC QLQ-C30, European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-Core 30.

Between 11 and 19% of our sample reported occupational stress (SIBAR II) or showed a high risk for occupational stress (ERI). Oncological rehabilitation patients seem to be less stressed in comparison with other rehabilitation populations, such as cardiological or orthopedic patients (rates assessed by SIBAR at approximately 40% [53]).

Nevertheless, we found that patients who reported occupational issues also experienced a diminished quality of life. These results emphasize the importance of screening patients early within rehabilitation in regard to occupational stress to identify patients in need for occupation-related personalized support.

In comparison with a German reference sample [66], our sample showed different profiles of working behavior, namely being less confident in their abilities to solve work-related problems and less able to cope with occupation-related disappointments (AVEM). This might be a consequence of the disease as cancer patients often report cognitive problems such as lacking concentration or less resistance towards stressful situations due to treatment side effects [16,17,24]. The identified deficits are particularly notable in the subgroup of occupationally stressed patients. However, compared with the German reference sample [66], participants in our study generally reported being more able to emotionally distance themselves from their work. This may help cancer patients compensate for work-related deficits and should be reinforced during rehabilitation.

We also found evidence of a positive association between suffering from occupational stress (SIBAR II) and subjective need for occupation-related support in rehabilitation patients. We can therefore assume that patients who feel overwhelmed at work will actively seek out occupation-related support. Nearly one in four patients reported having subjective need for occupation-related rehabilitation. We found that this need was not related to having an effort-reward imbalance nor to overcommitment at work (ERI). Thus, we assume that patients who only have some risk of experiencing occupational stress may not judge their situation as being stressful enough to warrant attention during rehabilitation. In these cases, it is important to remind patients that work-related support is also useful to prevent future stress. Another reason for not asking for help might be the change in patients' priorities following a crisis such as cancer [18,67]. Thus, instead of attempting to address potential work-related problems within rehabilitation, some patients might see the experience of having a life-threatening disease as a reason to re-orient themselves within their professional lives [68]. For these patients, supporting the development of new job perspectives would be a high priority.

Finally, our results clearly showed that occupational stress and high levels of commitment at work (SIBAR II, ERI) are strongly associated with a high risk of early retirement. Nearly 23% of the rehabilitation patients had a high likelihood of applying for pensions. Placing patients in a rehabilitation setting gives them opportunities to discuss problems, to be supported by professionals and to realize that certain fears are common.

The results of the present study are based on a study sample that included 477 patients who chose to undergo rehabilitation. The distribution of the cancer sites among the patients in our study is roughly in line with the official German cancer statistics [69]. The fact that there are more women than men in our sample reflects the higher incidence of cancer among women who are diagnosed prior to the age of 60 years [70]; it also corresponds to the fact that the majority of patients in the German cancer rehabilitation population are female [71]. Nearly 34% of the German cancer patients diagnosed in 2006 underwent inpatient rehabilitation [71]. Thus, rehabilitation patients represent a substantial part of the cancer population in Germany. Internationally, establishing occupation-related rehabilitation programs becomes more important as well [47]. To explore the needs of the cancer population who decide not to enroll in rehabilitation programs, future research is needed. It should address (i) the ways in which cancer survivors seek help when rehabilitation is not an option and (ii) whether the percentage of these survivors with a high risk of early retirement or need for support is smaller compared with the percentage among those in the rehabilitation setting.

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Conflict of interest

None of the authors have any conflicts of interest to report.

References

1. Bradley CJ, Oberst K, Schenk M. Absenteeism from work: the experience of employed breast and prostate cancer patients in the months following diagnosis. *Psycho-Oncology* 2006;**15**:739–747.
2. Lauzier S, Maunsell E, Drolet M *et al*. Wage losses in the year after breast cancer: extent and determinants among Canadian women. *J Natl Cancer Inst* 2008;**100**:321–332.
3. Meadows ES, Johnston SS, Cao Z *et al*. Illness-associated productivity costs among women with employer-sponsored insurance and newly diagnosed breast cancer. *J Occup Environ Med* 2010;**52**:415–420.
4. Mehnert A. Employment and work-related issues in cancer survivors. *Crit Rev Oncol Hematol* 2011;**77**:109–130.
5. Short PF, Vasey JJ, Tunceli K. Employment pathways in a large cohort of adult cancer survivors. *Cancer* 2005;**103**:1292–1301.
6. Amir Z, Brocky J. Cancer survivorship and employment: epidemiology. *Occup Med-Oxford* 2009;**59**:373–377.
7. Spelten ER, Sprangers MAG, Verbeek JHAM. Factors reported to influence the return to work of cancer survivors: a literature review. *Psycho-Oncology* 2002;**11**:124–131.
8. Steiner ER, Cavender TA, Main DS, Bradley CJ. Assessing the impact of cancer on work outcomes: what are the research needs? *Cancer* 2004;**101**:1703–1710.
9. Stone RW. Employing the recovered cancer patient. *Cancer* 1974;**36**:285–286.
10. Berry D. Return-to-work experiences of people with cancer. *Oncol Nurs Forum* 1993;**20**:905–911.
11. Bradley CJ, Bednarek HL. Employment patterns of long-term cancer survivors. *Psycho-Oncology* 2002;**11**:188–198.
12. Brown HG, Tai-Seale M. Vocational rehabilitation of cancer patients. *Semin Oncol Nurs* 1992;**8**:202–211.
13. Carter BJ. Surviving breast cancer. A problematic work re-entry. *Cancer Nurs* 1993;**2**:135–140.
14. Ehrmann-Feldman D, Spitzer WO, Del Greco L, Desmeules L. Perceived discrimination against cured cancer patients in the work force. *CMAJ* 1987;**136**:719–723.
15. Feldman FL. Female cancer patients and caregivers: experiences in the workplace. *Women Health* 1986;**11**:137–153.
16. 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 Care (Engl)* 2007;**16**:17–25.
17. Main DS, Nowels CT, Cavender TA, Etschmaier M, Steiner JF. A qualitative study of work and work return in cancer survivors. *Psycho-Oncology* 2005;**14**:992–1004.

18. Maunsell E, Brisson C, Dubois L, Lauzier S, Fraser A. Work problems after breast cancer: an exploratory qualitative study. *Psycho-Oncology* 1999;**8**:467–473.
19. Mellette SJ. The cancer patient at work. *CA Cancer J Clin* 1985;**35**:360–373.
20. van der Wouden JC, Greaves-Otte JG, Greaves J, Kruyt PM, van Leeuwen O, van der Does E. Occupational reintegration of long-term cancer survivors. *J Occup Med* 1992;**34**:1084–1089.
21. Villaverde RM, Batlle JF, Yllan AV *et al.* Employment in a cohort of breast cancer patients. *Occup Med (Lond)* 2008;**58**:509–511.
22. Yabroff KR, Lawrence WF, Clauser S, Davis WW, Brown ML. Burden of illness in cancer survivors: findings from a population-based national sample. *J Natl Cancer Inst* 2004; **96**:1322–1330.
23. Hewitt M, Rowland JH, Yancik R. Cancer survivors in the United States: age, health, and disability. *J Gerontol A Biol Sci Med Sci* 2003;**58**:82–91.
24. Stewart DE, Cheung AM, Duff S *et al*. Long-term breast cancer survivors: confidentiality, disclosure, effects on work and insurance. *Psycho-Oncology* 2001;**10**:259–263.
25. Jonsson B, Nilsson B. The impact of pituitary adenoma on morbidity. Increased sick leave and disability retirement in a cross-sectional analysis of Swedish national data. *Pharmacoeconomics* 2000;**18**:73–81.
26. Krause N, Lynch J, Kaplan GA, Cohen RD, Goldberg DE, Salonen JT. Predictors of disability retirement. *Scand J Work Environ Health* 1997;**23**:403–413.
27. Mein G, Martikainen P, Stansfeld SA, Brunner EJ, Fuhrer R, Marmot MG. Predictors of early retirement in British civil servants. *Age Ageing* 2000;**29**:529–536.
28. Siegrist J, Wahrendorf M, von dem Knesebeck O, Jurges 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**:62–68.
29. Elovainio M, Forma P, Kivimaki 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.
30. Blekesaune M, Solem PE. Working conditions and early retirement. *ROA* 2004;**27**:3–30.
31. Lahelma E, Laaksonen M, Lallukka T *et al.* Working conditions as risk factors for disability retirement: a longitudinal register linkage study. *BMC Public Health* 2012;**12**:309.
32. Bednarek HL, Bradley CJ. Work and retirement after cancer diagnosis. *Res Nurs Health* 2005;**28**:126–135.
33. Bradley CJ, Neumark D, Luo Z, Bednarek H, Schenk M. Employment outcomes of men treated for prostate cancer. *J Natl Cancer Inst* 2005;**97**:958–965.
34. Carlsen K, Oksbjerg Dalton S, Frederiksen K, Diderichsen F, Johansen C. Cancer and the risk for taking early retirement pension: a Danish cohort study. *Scand J Public Health* 2008;**36**:117–125.
35. Damkjae LH, Deltour I, Suppli NP *et al*. Breast cancer and early retirement: associations with disease characteristics, treatment, comorbidity, social position and participation in a six-day rehabilitation course in a register-based study in Denmark. *Acta Oncol* 2011;**50**:274–281.
36. Steiner JF, Nowels CT, Main DS. Returning to work after cancer: quantitative studies and prototypical narratives. *Psycho-Oncology* 2010;**19**:115–124.
37. Gudbergsson SB, Fossa SD, Dahl AA. A study of work changes due to cancer in tumor-free primary-treated cancer patients. A NOCWO study. *Support Care Cancer* 2008;**16**:1163–1171.
38. Ullrich A, Böttcher HM, Bergelt C. Gender-related aspects of returning to work in cancer survivors. A systematic review. *Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz* 2012;**55**:516–532.
39. Fantoni SQ, Peugniez C, Duhamel A, Skrzypczak J, Frimat P, Leroyer A. Factors related to return to work by women with breast cancer in northern France. *J Occup Rehabil* 2010;**20**:49–58.
40. Böttcher HM, Steimann M, Koch U, Bergelt C. Return to work- experiences and expectations of cancer patients during inpatient rehabilitation. *Rehabilitation (Stuttg)* 2012;**51**:31–38.
41. Siegrist J, Starke D, Chandola T *et al*. The measurement of effort-reward imbalance at work: European comparisons. *Soc Sci Med* 2004;**58**:1483–1499.
42. Siegrist J. Adverse health effects of high-effort/low-reward conditions. *J Occup Health Psychol* 1996;**1**:27–41.
43. Schaarschmidt U, Fischer AW. AVEM-Work-related behaviour and experience patterns. In *Vienna Test System-Psychological assessment*, Schuhfried-GmbH (ed.). Paul Gerin Druckerei, Wolkersdorf: Mödling, 2011.
44. Schaarschmidt U, Fischer AW. Coping with professional demands: a new diagnostic approach. In *Current Psychological Research in Austria*, Kallus KW, Posthumus N, Jimenez P (eds). Akademische Druck- und Verlagsanstalt: Graz, 2001; 145–149.
45. 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.
46. de Boer AG, Frings-Dresen MHW. Employment and the common cancers: return to work of cancer survivors. *Occup Med (Lond)* 2009;**59**:378–380.
47. Hellbom M, Bergelt C, Bergenmar M *et al*. Cancer rehabilitation: a Nordic and European perspective. *Acta Oncol* 2011;**50**: 179–186.
48. Bürger W, Dietsche S, Morfeld M, Koch U. Multiperspective estimates on the probability of patient return to work following orthopaedic rehabilitation: findings and predictive relevance. *Rehabilitation (Stuttg)* 2001;**40**:217–225.
49. Morfeld M, Hofreuter K, Möller JU *et al*. Kognitiv-verhaltenstherapeutische Intervention bei Patienten nach erster Bandscheiben Operation und die Rückkehr zur Arbeit. *Verhaltenstherapie und Verhaltensmedizin* 2006;**27**:338–362.
50. Bürger W. Positive und gesundheitsförderliche Aspekte der Arbeit und ihre Bedeutung für Patienten in der medizinischen Rehabilitation. *Zeitschrift für Gesundheitspsychologie* 1998;**6**:137–150.
51. Koch S, Hedlund S, Rosenthal S, Hillert A. Stressbewältigung am Arbeitsplatz: Ein stationäres Gruppentherapieprogramm. *Verhaltenstherapie* 2006;**16**:7–15.
52. Bürger W. Stepwise occupational reintegration after orthopedic rehabilitation--participants, realization, effectiveness, and optimization requirements. *Rehabilitation (Stuttg)* 2004;**43**:152–161.
53. 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**: 211–221.
54. 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. Universitätsklinikum Hamburg-Eppendorf: Hamburg; 2007.
55. Rödel A, Siegrist J, Hessel A, Brähler E. Psychometric test of the questionnaire measuring effort-reward imbalance at work in a representative German sample. *ZDDP* 2004;**25**:227–238.
56. Hanson EK, Schaufeli W, Vrijkotte T, Plomp NH, Godaert GL. The validity and reliability of the Dutch effort-reward imbalance questionnaire. *J Occup Health Psychol* 2000;**5**:142–155.
57. Kieschke U, Schaarschmidt U. Coping style as indicator of entrepreneurs' fitness: results of a longitudinal research project. *Zeitschrift für Personalpsychologie* 2003;**2**:107–117.
58. Voltmer E, Kieschke U, Spahn C. Work-related behaviour and experience patterns of physicians compared to other professions. *Swiss Med Wkly* 2007;**137**:448–453.
59. Voltmer E, Schwappach DLB, Frank E, Wirsching M, Spahn C. Work-related behavior and experience patterns and predictors of mental health in German physicians in medical practice. *Fam Med* 2010;**42**:433–439.
60. Beutel ME, Zwerenz R, Kayser E, Schattenburg L, Knickenberg RJ. Vocational attitudes, resources, and risk factors in the course of psychotherapy: is the AVEM a suitable measure for psychosomatic patients?. *Z Klin Psychol Psychother* 2004;**33**:110–119.
61. Aaronson NK, Ahmedzai S, Bergman B *et al*. The European organization for research and treatment of cancer QLQ-C30: a quality-of-life instrument for use in international clinical trials in oncology. *J Natl Cancer Inst* 1993;**85**:365–376.
62. Apolone G, Filiberti A, Cifani S, Ruggiata R, Mosconi P. Evaluation of the EORTC QLQ-C30 questionnaire: a comparison with SF-36 Health Survey in a cohort of Italian long-survival cancer patients. *Ann Oncol* 1998;**9**:549–557.
63. Arraras JI, Arias F, Tejedor M *et al*. The EORTC QLQ-C30 (version 3.0) Quality of Life questionnaire: validation study for Spain with head and neck cancer patients. *Psycho-Oncology* 2002;**11**:249–256.
64. Mistakidou K, Tsilka E, Parpa E, Kalaidopoulou O, Smyrniotis V, Vlahos L. The EORTC core quality of life questionnaire (QLQ-C30, version 3.0) in terminally ill cancer patients under palliative care: validity and reliability in a Hellenic sample. *Int J Cancer* 2001;**94**:135–139.

65. Kudielka BM, von Känel R, Gander M-L, Fischer JE. Effort-reward imbalance, overcommitment and sleep in a working population. *Work Stress* 2004;**18**:167–178.
66. Schaarschmidt U, Fischer AW. *Arbeitsbezogenes Verhaltens- und Erlebensmuster (AVEM)* (*3. Auflage*). Harcourt Test Services GmbH: Frankfurt/ M., 2006.
67. Degner LF, Hack T, O'Neil J, Kristjanson LJ. A new approach to eliciting meaning in the context of breast cancer. *Cancer Nurs* 2003;**26**:169–178.
68. Grunfeld, EA, Cooper, AF. A longitudinal qualitative study of the experience of working following treatment for gynaecological cancer. *Psycho-Oncology* 2012;**21**:82–89.
69. Robert Koch-Institut & Gesellschaft der epidemiologischen Krebsregister in Deutschland e. V. *Krebs in Deutschland 2005/2006. Häufigkeiten und Trends*, Berlin, 2010
70. Ferlay J, Shin HR, Bray F, Forman D, Mathers CD, Parkin D. *GLOBOCAN 2008 v1.2. Cancer Incidence and Mortality Worldwide: IARC CancerBase No.10*. International Agency for Research on Cancer: Lyon, France, 2010. Available at: http://globocan.iarc.fr [accessed on 30/01/2012]
71. Deutsche Rentenversicherung. Abgeschlossene Leistungen zur Rehabilitation. *Rentenversicherung in Zeitreihen* 2011; 203–220.

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