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Employment and work-related issues in cancer survivors

Anja Mehnert *

Department of Medical Psychology, University Medical Center Hamburg-Eppendorf, Martinistrasse 52–W26, 20246 Hamburg, Germany

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Abstract

Purpose of this systematic literature review was to identify current knowledge about employment in cancer survivors. Sixty-four studies met inclusion criteria that were original papers published between 01/2000 and 11/2009. Overall, 63.5% of cancer survivors (range 24–94%) returned to work. The mean duration of absence from work was 151 days. Factors significantly associated with a greater likelihood of being employed or return to work were perceived employer accommodation, flexible working arrangements, counseling, training and rehabilitation services, younger age and cancer sites of younger individuals, higher levels of education, male gender, less physical symptoms, lower length of sick leave and continuity of care. Cancer survivors had a significantly increased risk for unemployment, early retirement and were less likely to be re-employed. Between 26% and 53% of cancer survivors lost their job or quit working over a 72-month period post diagnosis. Between 23% and 75% of patients who lost their job were re-employed. A high proportion of patients experienced at least temporary changes in work schedules, work hours, wages and a decline in work ability compared to non-cancer groups.

Keywords: Cancer; Survivorship; Employment; Work; Work ability

1. Introduction

Although cancer is still one of the leading causes of morbidity and mortality worldwide, early detection and progress

* Tel.: +49 40 7410 56203; fax: +49 40 7410 54940.
E-mail address: mehnert@uke.uni-hamburg.de.

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in multimodal treatment regimes have markedly improved the prognosis for many cancer patients during recent years. An estimated 3,191,600 cancer cases were diagnosed in Europe in 2006 [1]. The most common form of cancers was breast cancer (13.5% of all cancer cases), followed by colorectal cancers (12.9%) and lung cancer (12.1%) [1].

Although cancer is a disease more likely to occur in older populations, a significant number of patients will experience the cancer diagnosis during an age, when career and work-related issues play an important role in individual and family lives. As the increase in cancer incidence and the improvement in survival rates through use of enhanced treatment regimes have led to a growing number of cancer survivors, the importance of work ability, (re-)employment and social reintegration have gradually emerged as critical topics within psycho-oncological and cancer survivorship research. Moreover, the (re-)integration of individuals with disabilities, chronic health conditions, diseases and handicaps into working life is one important aspect of participation according to the International Classification of Functioning, Disability and Health (ICF) [2].

Yet, while a large body of psychosocial cancer research has noted the importance of distressing factors, individual coping attempts, psychosocial burden and resources in understanding both health-related quality of life (QoL) and psychological adjustment to cancer, considerably less attention has been focused on understanding the impact of cancer on daily activities, work ability and employment, particularly in the context of extended and long-term cancer survivorship. Aim of this literature review was to identify the current state of knowledge about cancer survivorship issues related to employment and work. In particular, the review focuses on prevalence of employment and return to work, factors related to employment and return to work, barriers related to not returning to work and job loss, sick leave and length of absence from work, reduction in work hours, wages and work changes, work ability and perceived job strain, career changes, job satisfaction, and employer accommodation, as well as physical and psychological disablement and QoL. A further objective was to identify emerging issues with regard to the impact of cancer and its treatment on work predominantly relevant to further research.

2. Method

2.1. Search strategy

A systematic literature review on return to work and employment in cancer survivors was undertaken. Criteria for considering studies for this review were original papers published in English in peer-reviewed journals between 01/2000 and 11/2009. The databases PubMed, Medline, Embase and PsycInfo/Psyndex were searched extensively using a search string of "cancer OR neoplasm OR carcinoma OR oncology" combined with each of the following terms: "work", "employment/employed", "occupation/occupational", "labor", "labor market", "absenteeism", "sick leave", "sickness absence", "retirement", "pension", "disability pension", "rehabilitation", "work ability", "work disability", "wages", "job loss", "job performance", "career" and "employer accommodation". The reference lists of the identified articles and literature reviews [3–9] were searched manually until no additional articles were found.

Inclusion criteria: Considered studies for this review had to (1) primarily focus on employment and work-related issues in cancer patients; (2) be an original article using quantitative methodology; and (3) including adults.[1]

Exclusion criteria: Articles were excluded if they (1) only reported incidence or measurement of employment status, work ability or economic costs; (2) only reported employment status or work-related aspects as a correlate to another outcome variable of interest (often as part of the sociodemographic characteristics); (3) focused on work-related cancer risk factors (e.g. industrial or environmental risk factors); (4) were articles using qualitative methodology (primarily non-numerical data collection such as qualitative interviews); (5) focused primarily on the assessment of caregivers, employers or co-workers instead of cancer patients; and (6) focused on childhood cancer survivors. Studies on childhood cancer survivors were excluded due to the fact that this population – although under researched in the psycho-oncological literature – has a variety of specific topics and problems that would be addressed adequately in an independent review.

Quality assessment: The search process was executed in duplicate with two additional reviewers. The abstracts of the identified articles were then searched manually by the author and the two reviewers for relevance and inclusion in the review.

3. Results

The database search and the review of reference lists of the identified articles and literature reviews resulted in 417 potentially relevant articles. All abstracts were screened for eligibility. Out of 417 articles, 353 were excluded according to the defined exclusion criteria. Sixty-four articles met the inclusion criteria for this review. Detailed findings are shown in Table 1.

The majority of studies[2] did solely or predominantly focus on women and breast cancer patients or mixed cancer populations; 17 studies largely included patients with malignant prostate cancer, hematological cancers, stomach and colorectal cancer, head and neck cancers and one study included pituitary adenoma patients. Three studies did not specify the

[1] One study included a mixed sample of cancer patients between 14 and 65 years old.

[2] Several papers apparently refer to the same study, although the reported numbers might slightly differ in different papers.

Table 1
Studies review on work and employment-related issues published between 01/2000 and 11/2009.

Authors	Study objectives	Study design	Variables	Sample	Cancer sites	Results
Ahn et al., 2008 [23] *Breast Cancer Res Treat*	To describe the changes in employment and household income following a cancer diagnosis	Cross-sectional comparison group	Information regarding employment status (employment or self-employment), work-related difficulties (both related to occupational work and housework), and demographic characteristics	*Cancer survivors* $N = 1594$, 100% female age range: ≤39–59 years *Comparison group* $N = 419$, 100% female age range: ≤39–59 years	Breast cancer	*Employment status* Among patients, 45% were working at time of diagnosis. Employment decreased from 48 to 33% after treatment. Significantly fewer patients worked after treatment relative to the general population. *Correlates of employment levels* Among patients, low employment levels correlated with lower educational levels and low household income. Higher employment levels in patients correlated with being single and being separated, divorced or widowed. Numbers of comorbid diseases, advanced cancer stage, and extensive surgery were associated with unemployment. *Return to work* Among employed patients, 59% returned to work. Fatigue and exhaustion (46.8%) were the most frequent problems among patients. Patients reported reductions in work-related abilities (18%), decreased wages (16%), reduced working hours (8%), reduced opportunity for promotion (2.0%). Compared with the general population, cancer patients had significantly more difficulties with reduced working hours and fatigue and exhaustion
Amir et al., 2007 [17] *J Cancer Surviv*	To investigate the rate of cancer patients who returned to paid employment within 18 months of diagnosis, and to explore factors associated with return to paid work in one English region	Cross-sectional (postal survey of all cancer patients registered in North West England from June through December 2002)	Return to work, work absence, job satisfaction	$N = 267$ 73% female mean age: 48 years (range 18–55)	Mixed diagnoses, 48% breast cancer, 14% colorectal cancer, 9% prostate cancer, 6% lung cancer, and 23% other cancers	*Return to work and sick leave absence* 82% of respondents returned to work, 8.3% changed to a different work place and 9.5% stopped working. Treatment modality (absence of surgery) and the length of sick leave were significant factors related to return to work. The median length of sickness absence was less than six months, longer in the most economically deprived quintile. *Job satisfaction* 20% those who returned to work and stayed in the same employment reported deterioration in job satisfaction and career prospects, highest in those with longer sick leave
Balak et al., 2008 [19] *J Occup Rehabil*	To investigate whether treatment and cancer-related symptoms interfered with return to work after early-stage breast cancer	Cross-sectional	Contracted hours per week, duration of employment, occupation, demographic and cancer-, and treatment-related characteristics	$N = 72$ 100% female mean age: 49 years (range 18–65)	Breast cancer	*Absence from work* The mean duration of absence with early-stage breast cancer was 11.4 months. 35% of patients were absent longer than one year and 4 patients did not return to work within two years after diagnosis. Duration of absence depended on the type of treatment and was significantly longer in patients who underwent chemotherapy or multimodal treatment. *Return to work* Women started working about four months after the end of therapy irrespective of the type of treatment. Fatigue was reported in 13% of patients and neither postponed partial nor full return to work
Bednarek and Bradley, 2005 [75] *Res Nurs Health*	To evaluate the socioeconomic effect of and risk factors for work-related disability due to head and neck cancer and its treatment	Cross-sectional study	Retirement	*Cancer patients*: $N = 253$	Mixed diagnoses, breast, colorectal, lung or prostate cancer	*Retirement* Patients retired were older, had less education and lower incomes, and fewer had health insurance through their current/former employer relative to employed survivors. Those who had retired, regardless of whether they retired before or after a cancer diagnosis, were similar in age, race/ethnicity, health insurance status, household income, and impressions of retirement
Bieri et al., 2008 [14] *Bone Marrow Transplant*	To assess HRQOL, work-related and social variables in patients after allogeneic hematopoietic stem cell transplantation (HSCT), disease at the time of evaluation and in healthy controls	Cross-sectional	HRQOL, employment status, work-related and social variables	$N = 124$ 79% male mean age: 34 years (range 14–65)	Hematological malignancies	*Employment prior to cancer diagnosis* In total, 119 patients (96%) had an occupation or were in school or training before HSCT. *Return to work* 60% of the patients returned to work after HSCT; 31% part time, 29% full time, and 10% returned to training or school. 40% of the patients depended on disability insurance (39%) or were retired (1%). *Quality of life* Among patients fully employed, 73% reported good quality of life compared to 22% of those on disability insurance and 28% of those on part-time work. Age and employment status were significantly associated with HRQOL

Table 1 (*Continued*)

Authors	Study objectives	Study design	Variables	Sample	Cancer sites	Results
Bouknight et al., 2006 [18] *J Clin Oncol*	Identification of factors associated with return to work in employed breast cancer survivors	Longitudinal, Assessment at 12 and 18 months post diagnosis	Return to work, demographic and clinical characteristics, subjective health status	$N = 416$ 100% female mean age: 51 years (range 30–64)	Breast cancer	*Return to work* 82% of the patients returned to work during the study period. *Employer accommodation* 87% of the patients reported that their employer was accommodating to their cancer illness and treatment. *Correlates of return to work* After adjusting for demographic characteristics, health status, cancer stage, treatment, and job type, *heavy lifting on the job*, *perceived employer accommodation*, and *perceived employer discrimination* because of cancer were independently associated with return to work at 12 months after diagnosis, perceived employer accommodation was independently associated with return to work at 18 months after cancer diagnosis
Bradley and Bednarek, 2002 [22] *Psycho-Oncology*	Assessment of employment status, hours worked, reduced work schedules	Cross-sectional	Employment status, hours worked, work schedules	$N = 253$ 53% male mean age: 62 years (range 35–75)	Mixed diagnoses, 29% breast cancer, 27% prostate cancer, 23% lung cancer, 21% colon cancer	*Employment prior to cancer diagnosis* 56% ($N = 141$) of the patients were employed prior to cancer; 67% ($N = 95$) of those were employed 5 years post diagnosis. Most frequent causes to stop working were retirement (54%) and poor health/disablement (24%). *Reduction of work hours* 55% of the patients reduced their work schedule at least one time; 86% returned to former work schedules. Mean hours per week were 49 h for full-time workers; 20 h for part time workers. 10% of the sample was disabled
Bradley et al., 2002 [33] *Health Econ*	To examine differences between breast cancer survivors and a non-cancer comparison group in employment, hours worked wages, and earnings	Retrospective longitudinal social security earnings data base approach	Employment status, hours worked, wages and earnings	*Cancer patients*: $N = 156$ 100% female mean age: 55 years *Comparison group:* $N = 5818$ 100% female mean age: 54 years	Breast cancer	*Employment status* The probability of breast cancer patients working was 7 percentage points lower than for women who do not have breast cancer. The interaction for having a spouse with employer-based health insurance and breast cancer was not statistically significant. Thus, the hypothesis that breast cancer patients who have the option of health insurance through their spouses are less likely to work – or equivalently that those without such insurance are more compelled to work – is questionable. *Hours worked, wages and earnings* Employed breast cancer patients were estimated to work 3.39 h ($P < 0.05$) more a week than other employed women. Breast cancer patients had significantly higher earnings than the non-cancer comparison group
Bradley et al., 2002 [42] *Health Serv Res*	To explore factors that influence breast cancer survivors' labor market decisions	Cross-sectional (data selected from 2002 Health and Retirement Study) Comparison group	Probability of working, weekly hours worked,	*Cancer patients*: $N = 150$ 100% female mean age: 55 years *Comparison group*: $N = 5578$ 100% female mean age: 54 years	Breast cancer	*Employment and probability of working* The probability of breast cancer survivors working was 10 percentage points less than that for women without breast cancer. *Weekly hours worked* Among working women, breast cancer survivors worked approximately three more hours per week than non-cancer controls. Results of similar magnitude persisted after health status was controlled
Bradley et al., 2005 [11] *Health Econ*	To examine the consequences of breast cancer for women's labor market attachment for the six-month period following diagnosis	Longitudinal cohort study, comparison group	Probability of employment, weekly hours worked	*Cancer patients*: $N = 445$ 100% female mean age: 51 years (range 30–64) *Comparison group*: $N = 372$ 100% female mean age: 45	Breast cancer	*Probability of employment* Breast cancer patients were 25 percentage points less likely to be employed six months following diagnosis. The likelihood of employment diminished with more severe disease stages. *Weekly hours worked* Working women with breast cancer reduced their weekly hours worked by nearly 18% at six months after diagnosis. Women with more advanced stages reduced weekly hours worked by more, relative to women in the control group
Bradley et al., 2005 [31] *J Natl Cancer Inst*	To investigate the influence of prostate cancer treatment on work and changes in employment status 6 and 12 months after prostate cancer diagnosis	Longitudinal population-based cohort study, two comparison groups	Employment after diagnosis, reasons for employment or changes in the number of weekly hours worked, treatment-induced disabilities	*Cancer patients*: $N = 267$ 100% male mean age: 56 years (range 30–65) *Comparison groups*: $N = 283$, $N = 256$ 100% male mean age: 49, 48 years (range 30–65)	Prostate cancer	*Employment in cancer patients* At six months after diagnosis, 72.4% of the sample were employed, at 12 months after diagnosis, 80.5% were employed. *Return to work and retirement* Patients with prostate cancer were less likely to be working six months after diagnosis. A higher percentage of cancer patients retired from their jobs at six months post diagnosis. At 12 months post diagnosis, the likelihood of employment for cancer patients and control subjects was not significantly different. *Disability* 26% of patients reported that cancer interfered with their ability to perform tasks that involved physical effort
Bradley et al., 2006 [52] *Psycho-Oncology*	To examine the number of days employed patients undergoing treatment for cancer were absent from their jobs	Cross-sectional	Employment status, days missed at worked	*Breast cancer*: $N = 239$ 100% female mean age: 50 years (range 30–64) *Prostate cancer:* $N = 206$ 100% male mean age: 55 years (range 30–64)	Breast and prostate cancer	*Absence from work* Breast cancer patients missed an average of 44.5 days from work (median 22 days). Prostate cancer patients missed an average of 27 days from work (median 20 days). Taking a leave of absence and greater elapsed time from diagnosis to interview was associated with the greatest number of days absent from work for all patients

Carlsen et al., 2008 [51] *Scand J Public Health*	To determine the risk for taking early retirement pension in cancer survivors who were working at the time of diagnosis. Comparison with a random population-based cancer free comparison cohort	Cross-sectional, population based cohort study, comparison group	Socioeconomic status, physical and psychiatric comorbidity, early retirement	*Cancer* patients: $N = 44{,}905$ 64% female age range: 30–60 years *Comparison group*: $N = 211{,}562$ 65% female age range: 30–60 years	Mixed diagnoses, 55% breast cancer, 16% colon/rectum cancer	*Early retirement pension (ERP)* Cancer patients had an increased risk of ERP compared to cancer-free controls (RR, 1.60; 95% CI, 1.55–1.65). Risk factors for taking ERP were late age; dissimilated disease, manual job, and sickness leave the year before taking ERP, physical and psychological comorbidity, low education and low income. Risk categories by cancer site were leukemia, prostate cancer and ovary cancer
Carlsen et al., 2008 [40] *Eur J Cancer*	To investigate whether cancer survivors are at an increased risk for unemployment	Longitudinal register-based cohort study (1–20 year follow-up), comparison group	Employment, job type, education, household income, depression, physical comorbidity	*Cancer* patients: $N = 40{,}884$ 70% female age range: 30–60 years *Comparison group*: $N = 196{,}109$ 70% female age range: 30–60 years	Mixed diagnoses, 60% breast cancer, 18% colon/rectum cancer	*Unemployment* Of all persons in the study (patients and controls), 19% became unemployed during follow-up. Cancer patients had a small but significantly increased risk for unemployment. *Risk factors for unemployment* Risk for unemployment was highest in persons aged 50–60 years at time of diagnosis. Socioeconomic factors such as manual work, median income and vocational education were found to be risk factors for unemployment amongst cancer patients. Depression was a risk factor for unemployment independent of cancer/non-cancer status
Chan et al., 2008 [24] *J Cancer Surviv*	To investigate the impact of rehabilitation services on return to work in unemployed cancer patients. To investigate the impact of cancer patients demographic variables and the provision of cash and medical benefits on return to work among unemployed cancer patients after receiving vocational rehabilitation services	Cross-sectional	US Department of Education, Rehabilitation Service Administration (RSA) Case Service Report database (2005)	$N = 1201$ unemployed cancer patients 53% female mean age: 40 years (range 16–55 and above)	not specified	*Return to work* 52% of cancer patients were classified as "successful employed" after receiving vocational rehabilitation services. Successful employed patients spend less time in services but received significantly more services than unemployed patients. *Correlates of return to work* Female gender, lower educational levels, the provision of cash or medical benefits were significantly associated with a greater likelihood of being unemployed after receiving vocational rehabilitation services. Counseling, miscellaneous training services, job replacement services, job search assistance and maintenance services were significantly associated with a greater likelihood of being employed
Choi et al., 2007 [47] *Psycho-Oncology*	To investigate the impact of a cancer diagnosis on employment status, and to identify relevant associated factors	Longitudinal cohort study, Baseline: post diagnosis, 3, 6, 9 and 12 months follow-up	Employment status, job loss and re-employment, sociodemographic, and work-related factors	$N = 305$ 100% male mean age: 55	Mixed diagnoses, 38% liver cancer, 32% stomach cancer, 30% colorectal cancer	*Un- and re-employment post diagnosis* Of the 305 male patients who were employed at the time of diagnosis, 53% lost their job, and of these 23% later re-employed. *Correlates of un- and re-employment* Job loss was significantly associated with years of education, job characteristics (non-sedentary) and disease stage. Re-employment was significantly associated with disease stage and cancer site: Terminal and liver cancer patients were less likely to be re-employed
De Boer et al., 2008 [12] *Br J Cancer*	To examine changes in work ability scores in cancer patients over time and to study differences among patient groups. To assess the extent to which self-assessed work ability predicts return to work among cancer patients	Longitudinal Baseline (four to six months following first day of sick leave), 6 and 12 months follow-up	Return-to-work, work ability, work load and work stress, cancer-related and sociodemographic factors	$N = 195$ 60% female mean age: 42 years (range 18–58)	Mixed diagnoses, 26% breast cancer	*Return to work* At six months post diagnosis, 24% of patients had returned to work or had continued working, 50% at 12 months, and 64% at 18 months. *Work ability* Self-assessed current work ability improved significantly over time. Work ability scores of women improved more over time. The hematological oncology patients showed the significantly lowest; patients with genitourological and gastrointestinal the highest scores of work ability. Patients that received chemotherapy showed lower work ability. Work ability at six months strongly predicted return-to-work at 18 months, after correction for the influence of age and treatment
Drolet et al., 2005 [49] *CMAJ*	To examine work absence in breast cancer patients.	Cancer registry-based cohort study, comparison group	Duration of work absence of four weeks or more, chemotherapy	*Cancer patients*: $N = 646$ 100% female mean age: 45 years (age range: 18–59) *Comparison group*: $N = 890$ 100% female mean age: 47 years (age range: 18–59)	Breast cancer	*Absence from work* 1 year after diagnosis, 85% of breast cancer patients who remained free of disease during the 3-year study period were absent from work for four weeks or more compared with 18% of healthy women. By the third year, no difference in absence from work was found between disease-free women and women in the comparison group. *Correlates of absence from work* Receiving adjuvant chemotherapy prolonged absence duration (9.5 vs. 5.4 months among women not receiving chemotherapy). Compared with patients belonging to a union, those who did not belong to a union and those who were self-employed were more likely to report no work absence

Table 1 (*Continued*)

Authors	Study objectives	Study design	Variables	Sample	Cancer sites	Results
Drolet et al., 2005 [36] *J Clin Oncol*	To identify and compare factors increasing the likelihood of not working among breast cancer patients compared with women in the general population	Cancer registry-based cohort study, comparison group	Work characteristics, treatment and prognosis factors	*Cancer patients*: $N = 646$ 100% female mean age: 45 years (age range: 18–59) *Comparison group*: $N = 890$ 100% female mean age: 47 years (age range: 18–59)	Breast cancer	*Unemployment* Slightly more patients were not working 3 years after diagnosis compared with women never diagnosed with cancer (21% and 15%, respectively). *Correlates of unemployment* Older age and union membership increased the likelihood of not working at the end of study follow-up. Income less than $20,000 compared with $50,000 were associated with not working among patients. Adjuvant treatments did not predict work cessation. Any new cancer event during follow-up did significantly predict work cessation
Fantoni et al., 2009 [21] *J Occup Rehab*	To assess the rate of return to work, the time until return among breast cancer patients working at the time of diagnosis, and to study the impact of objective (e.g. treatment) and self-perceived factors (e.g. fatigue, support) on return to work on time until return to work	Cross-sectional (data selected from the national medical computerized program)	Employment status, sociodemographic and disease-related variables, psychosocial variables (e.g. fatigue, anxiety, support) and work-related factors	$N = 379$ 100% female mean age: 48 years (age range: 18–60)	Breast cancer	*Return to work* During a median follow-up of 36 months after treatment (range: 22–49 months), 82% had returned to work. 85% of those who returned to work had resumed their previous job. *Sick leave* Median duration of sick leave was 11 months (95% CI [9.2–12.1]) in the 12 months after starting treatment. *Predictors of problems to return to work* Older age, lower educational level, chemo-, radiotherapy, lymphedema, psychological or organizational self-perceived constraints related to former job, lack of moral support from work colleagues both limited and delayed return to work. *Fatigue, cognitive impairments, and support* Among women who had returned to work, 77% suffered from fatigue, pain, 41% from concentration deficits, 38% from lower efficiency, lack of support from colleagues (17%) or employer (22%)
Feuerstein et al., 2007 [66] *J Cancer Surviv*	To investigate patterns of discrimination claims in employees with cancer in contrast to those with other impairments or illnesses	Retrospective data analysis over a 6 year period	US Equal Employment Opportunity Commission (EEOC) data (employment discrimination claims)	$N = 59{,}981$ cases cancer, cancer and non-cancer impairments 52% male	not specified	*Predictors for discharge from work* A protective effect for any impairment other than cancer related to discharge from work was found Cancer survivors were more likely to file job loss claims and differential treatment related to workplace policies (termination and terms of employment)
Gudbergson et al., 2006 [58] *Support Care Cancer*	Exploration of living conditions among disease-free cancer patients after primary cancer treatment Comparison of living conditions between cancer patients and the general population	Cross-sectional Comparison group	Employment, work conditions, economy, health status, housing conditions, social participation	*Cancer patients*: $N = 430$ 50% female mean age: 49 years *Comparison group*: $N = 596$ 53% female mean age: 47 years	Mixed diagnoses, 50.2% breast cancer, 38.4% testicular cancer, 11.4% prostate cancer	*Work conditions*: No significant differences between patients and controls in the number of paid hours per week and in the working time each week (full-time, part-time) was found. Female patients belonged to significantly lower social class than female controls. Female patients reported significantly lower physical and mental working capacity than female controls. *Economy*: Annual household income levels showed no significant differences *Health status*: Patients had significantly more comorbid diseases than controls. Male patients had significantly worse subjective health status and higher somatic symptom levels than controls. *Housing conditions*: No significant differences between patients and controls regarding owned or rented living places were found. *Social participation*: No significant differences were found in the number of close friends, social participation, and social visits between patients and controls
Gudbergson et al., 2007 [55] *Acta Oncol*	Exploration of job strain in primary-treated cancer patients. Comparison of job strain between cancer patients and a matched comparison-group	Cross-sectional Comparison group (gender and age matched)	Aspects of job strain (demand, control, support) quality of life, psychological distress, personality traits	*Cancer patients*: $N = 417$ 50% female mean age: 49 years *Comparison group*: $N = 417$ 50% female mean age: 48 years	Mixed diagnoses, 50% breast cancer, 39% testicular cancer, 11% prostate cancer	*Job strain* The job strain of cancer patients did not differ in any work relevant way from their controls, and survivorship status was not significantly associated with job strain. No differences in job strain were observed between subgroups of patients, except that female patients experienced more strain than males. No significant differences were found in current sick leave between cancer patients and controls
Gudbergson et al., 2007 [71] *Support Care Cancer*	To explore associations between employment, living conditions, and attitudes in physical, psychosocial, spiritual/existential domains in cancer patients	Cross-sectional	Employment, living conditions, physical, psychological, social, spiritual/existential domains	$N = 459$ 50% female 33%: 25–45 years, 67%≥ 46 years	Mixed diagnoses, 50% breast cancer, 36% testicular cancer, 14% prostate cancer	*Employment* 64% of the sample was full time employed, 15% were part time employed and 20% were not employed. *Correlates of employment* Being employed was significantly and negatively associated with body changes, negative self-evaluation, negative outlook and life interference

Gudbergson et al., 2008 [61] *J Cancer Surviv*	To explore work engagement in employed tumor-free cancer patients compared to matched controls from the general population	Cross-sectional, cancer patients, comparison group	Demography, morbidity, work-related issues (including work engagement)	*Cancer patients* $N = 446$ 51% female *Comparison group*: $N = 588$ 54% female	Mixed diagnoses, 100% breast cancer in women, 76% testicular cancer and 24% prostate cancer in men	*Employment* No differences in work engagement were observed between cancer patients and the comparison group (dedication and absorption domain scores). *Symptom burden* Cancer patients reported significantly poorer work ability, poorer health status, greater numbers of disease symptoms, more anxiety, and reduced physical quality of life, and scored significantly higher on both neuroticism and extraversion. The vigor domains score was statistically lower among cancer patients
Gudbergson et al., 2008 [56] *Support Care Cancer*	Exploration of characteristics of tumor-free cancer patients who made work changes due to cancer and to compare them to patients who did not	Cross-sectional	Quality of life, psychological distress, personality traits, work ability	$N = 431$ 51% female mean age: 51 years	Mixed diagnoses, 51% breast cancer, 35% testicular cancer, 14% prostate cancer	*Work changes* 17% ($N = 72$) of the sample reported work changes due to cancer. A significantly higher proportion of female patients had changed work due to cancer. *Work situation, health* The change group had significantly poorer current work ability, higher proportion of part-time work, reduced physical and mental work ability in general and due to cancer compared to the non-change group. The change group reported significantly higher demands caused by tasks of work/work load and lower support from colleagues; and had more weeks on sick leave. The change group showed a significantly lower somatic symptoms score, but a poorer subjective health status and more comorbid diseases. *Psychological distress and QoL* The change group had significantly higher anxiety and depression scores. The change group had significantly poorer physical and mental QoL and a higher score on neuroticism
Johnsson et al., 2007 [20] *Acta Oncol*	Association of socio-economic and treatment-related factors with problems to return to work in early-stage pre-menopausal breast cancer patients	Longitudinal Baseline: (Randomized trial of different types of adjuvant endocrine therapy 1990–1994) three to four weeks after surgery Follow-up assessments: 12, 18, 24, 36 months post surgery	Adjuvant endocrine therapy, cancer treatment, return to work	$N = 222$ 100% female mean age: 45 years (range 29–54)	Breast cancer	*Return to work* At 24 months post surgery, 84% of the sample had returned to work. At 36 months post surgery ($N = 204$), 86% of the sample had returned to work. Most frequent reasons for not returning to work were working environment/nature of work and physically exhaustion and deterioration. *Correlates of return to work* Use of adjuvant endocrine therapy was associated with a twofold increase in the odds ratio of not having returned to work after two years. Tumor stage (nodal status) was negatively associated with work status
Johnsson et al., 2009 [16] *Acta Oncologica*	To identify factors influencing return to work after surgery for early-stage breast cancer	Prospective longitudinal study	Return to work, demographic characteristics, socio-economic status, job strain, self-rated health, sense of coherence, life satisfaction, social support at the workplace and sickness absence	*Cancer patients*: $N = 97$ 100% female age range: 18–64 years	Breast cancer	*Employment status and return to work* At baseline, the majority of women performed non-manual work tasks, worked full-time, and had jobs with low demands and high control. Ten months after surgery, 59% of the women were working their pre-diagnosis hours and the remaining 41% were on part-time or full-time sick leave. *Factors associated with return to work* Baseline factors associated with a higher likelihood of return to work at 10 months after surgery were $\leq$30 days of sick leave during the previous 12 months, very good or good self-rated health, high satisfaction with life as a whole and also with the vocational situation, low demand in the work situation, no axillary dissection, no irradiation to breast/chest wall and regional nodes, and no chemotherapy
Jonsson and Nilsson, 2000 [50] *Pharmaco-economics*	To quantify sick leave and medical retirement in adults with a history of nonsecreting pituitary adenoma	Cross-sectional (data from the Swedish National Social Insurance Board) Comparison group	Sick leave and retirement	*Cancer patients*: $N = 809$ *Comparison group:* $N = 5121$	Nonsecreting pituitary adenoma	*Retirement* 24% of the patients with a history of pituitary adenoma had retired due to ill health; twice as much as expected from national statistics (12%). The majority (75%) retired on medical grounds at least one year after cancer diagnosis. Patients with a history of pituitary adenoma took significantly more sick leave days than those in the control group
Hansen et al., 2008 [64] *JOEM*	To determine whether physical fatigue, depression, anxiety, and cognitive limitations were differentially associated with work limitations in patients compared to a non-cancer group of employed workers	Cross-sectional, cancer patients, comparison group	Health and social behaviors, anxiety, depression, fatigue, cognitive symptoms and work-related variables (web-based questionnaire)	*Cancer patients* $N = 100$ 100% female mean age: 50 years *Comparison group*: $N = 103$ 100% female mean age: 40 years	Breast cancer	*Work limitations* Four years after diagnosis breast cancer patients reported higher levels of age-adjusted work limitations. *Correlates of work limitations* Fatigue was more strongly related to work limitations in the cancer survivor group whereas depressive symptoms were more strongly related to limitations at work in the non-cancer group. Although fatigue accounted for 22% of the variance in the model, it explained 71% of the contribution of symptom burden to the overall model

Table 1 (*Continued*)

Authors	Study objectives	Study design	Variables	Sample	Cancer sites	Results
Hensel et al., 2002 [25] *Ann Oncol*	To investigate quality of life and employment status in long-term patients after high-dose chemotherapy and autologous stem cell transplantation	Cross-sectional	Employment status, quality of life (QoL)	*N* = 238 55% female mean age: 47 years (range 17–67)	Hematological cancers (35% Non-Hodgkin lymphoma)	*Return to work* Of the 238 patients who had an occupation and were employed, 55% returned full time or part time to their previous occupation. Employment status post-transplantation and QoL were similar in patients who participated in rehabilitation programs compared with those who did not. *Predictors of re-employment* Younger age groups and higher educational levels were significantly associated with a higher probability of re-employment
Hensley et al., 2005 [76] *Breast Cancer Res Treat*	To determine survivors' perceptions of the impact of breast cancer on employment	Cross-sectional	Employment status, career promotion, family income	*N* = 245 100% female	Breast cancer	*Employment status* At 1 year prior to breast cancer diagnosis, 53% of women reported they had been employed full-time, 14% part-time, 8% retired, 22% homemaker, and 2% unemployed. At the time of survey completion, these distributions had changed to 31% employed full-time, 13% part-time, 35% retired, 14% homemaker, 5% unemployed. 10% of survivors reported a positive impact of breast cancer on employment, 85% neutral, and 5% a negative impact. *Family income* 6% reported a relationship between breast cancer and family income, slightly half of these perceived their current income as being lower than expected.
Hewitt et al., 2003 [67] *J Gerontol*	Comparison of health, disability and ability to work of adult cancer survivors and a control group without a history of cancer	Cross-sectional, data from the National Health Interview Survey (1998–2000)	General health status, psychological disability, limitations in activities of daily living, physical function, health-related ability to work	*Cancer patients*: *N* = 4878 67% female age range: 18 to >75 years *Comparison group*: *N* = 90,737 56% female age range: 18 to <75 years	Mixed diagnoses, 22% breast cancer	*Work ability* A significant higher percentage of cancer patients under the age of 65 reported being unable to work because of a health condition compared to non-cancer controls under the age of 65. *Health status* Cancer survivors were significantly more likely to report fair or poor health, psychological disabilities, limitations of activities of daily living or instrumental activities of daily living, and functional limitations
Lauzier et al., 2008 [59] *J Natl Cancer Inst*	To evaluated wage losses, their determinants, and the associations between wage losses and changes in the family's situation among women over the first 12 months after early breast cancer diagnosis	Longitudinal, 1, 6 and 12 months after the start of the cancer treatment	Wage loss, employment characteristics, sociodemographic and treatment-related variables	*N* = 459 100% female mean age: 50 years (range 23–71)	Breast cancer	*Wage losses* On average, working women lost 27% of their projected usual annual wages (median = 19%) after compensation received had been taken into account. *Correlates of wage losses* A higher percentage of lost wages was significantly associated with a lower level of education, lower social support, receipt of chemotherapy, self-employment, shorter tenure in the job, and part-time work
Lee et al., 2008 [34] *Br J Cancer*	To compare employment status and work-related difficulties between stomach cancer survivors and the general population	Cross-sectional, population-based comparison group	Employment status, work hours, work-related difficulties, sociodemographic characteristics	*Cancer patients*: *N* = 408 74% male age range: 18 to >65 years *Comparison group*: *N* = 994 50% male age range: 18 to >65 years	Stomach cancer	*Employment status* Working was significantly higher among the general population (37%) than in cancer patients (47%). Patients had reduced working hours and reduced work-related ability. *Correlates of nonworking* Poorer performance status and receiving total gastrectomy in patients were positively associated with nonworking. The association of nonworking with older age and being female was significantly more positive for patients than for the general population. *Work-related symptom burden* Cancer patients had significantly more fatigue and experienced more difficulties in performing both housework and gainful work
Mahar et al., 2008 [26] *J Psychosoc Oncol*	To examine the impact of the employment status on the psychosocial well-being among breast cancer patients	Cross-sectional (secondary data of the Economic Consequences of Cancer Survival [ECCS] study	Employment status, psychosocial distress, physical and mental functioning, QoL	*N* = 369 100% female mean age: 52 years at time of the interview (range 27–63)	Breast cancer	*Employment status* 254 patients (69%) continued to work through treatment, 25% returned to work after treatment completion and 6% stopped working. *Associations with working and nonworking* The lowest level of psychosocial distress and the highest levels of physical and mental functioning, and QoL were found in women who continued to work through treatment, followed by women who discontinued to work through treatment but returned to work. The highest level of psychosocial distress and the lowest levels of physical and mental functioning, and QoL were found in women who stopped working at all after cancer diagnosis

Maunsell et al., 2004 [35] *J Natl Cancer Inst*	To investigate involuntary changes in employment situation (including changes in position, wages, and other conditions), associated with a breast cancer diagnosis	Cross-sectional (Cancer registry-based cohort study), comparison group	Changes in work situation, Changes in working conditions	*Cancer patients*: $N = 646$ 100% female mean age: 45 years (age range: 18–59) *Comparison group*: $N = 890$ 100% female mean age: 47 years (age range: 18–59)	Breast cancer	*Working conditions* Working conditions were similar between patients and the comparison group at the beginning of follow-up. After 3 years, slightly more survivors (21%) than women in the comparison group (15%) were unemployed, although most women who were not working (84% of unemployed survivors and 76% of unemployed women in the comparison group) said that the decision to stop working was their own. Among women still employed, no deterioration in working conditions was observed in either group
Molina et al., 2008 [37] *Clin Transl Oncol*	To identify different factors influencing return to work in cancer survivors who were working prior to the cancer diagnosis. To explore prognostic factors to describe work experiences. To identify risk factors for having labor problems in cancer patients	Cross-sectional	Personal and clinical characteristics, work characteristics (e.g. type of job, job status, employment status, problems with co-workers, relation-ship with managers, perceived consequences of disease and treatment)	$N = 347$ 58% male mean age at diagnosis: 47 years (range 22–65)	Mixed diagnoses, 28% breast cancer, 21% colon/rectum cancer	*Employment status* At the time of diagnosis, 15% had continued working. By the end of treatment, 59% had returned to work (mean time since diagnosis: 33 months ± 30). 21% of patients reported changes in their relationship with co-workers and managers. *Correlates of sick leave* Male gender, age over 44 years, type of work (employed vs. self-employed), and chemotherapy were significantly associated with sick leave. At the end of treatment, age over 44 years, elementary school education, comorbidity, disease stage IV, presence of sequelae and having lung cancer were significantly associated with sick leave. *Predictors for employment* The strongest predictors for remaining in employment were younger age, overall response and sequelae of the disease of treatment
Nieuwen-huijsen et al., 2009 [77] *Psycho-Oncology*	To investigate the relationship between neuro-psychological functioning and the ability to work in cancer survivors	Cross-sectional (part of a longitudinal study)	Cognitive functioning including executive functioning and verbal memory, work ability	$N = 45$ 67% female mean age: 44 years	Mixed diagnoses, 31% gastro-intestinal cancer, 20% breast cancer	*Cognitive functioning and work ability* 33% of patients showed neuropsychological impairments The mean workability of cancer survivors with neuropsychological impairment was significantly lower compared to those with no impairments More cancer survivors with neuropsychological impairments (53%) than without (70%) had not yet returned to work
Norredam et al., 2009 [78] *J Gen Intern Med*	To investigate socioeconomic outcomes among older cancer survivors (of > 4 years post diagnosis) compared to non-cancer patients	Cross-sectional (data selected from 2002 Health and Retirement Study) Comparison group	Household income, housing assets, net worth, insurance, employment, and future work expectations	*Cancer patients*: $N = 964$ 64% female mean age: 69 years for women and 68 years for men *Comparison group*: $N = 14{,}333$ 57.5% female	Mixed diagnoses, in women: 36% breast cancer, 19% endometrial cancer, 10% cervix cancer; in men: 20% prostate cancer, 13% bladder cancer, 12% colon cancer	*Employment status and working conditions* At a mean of 15 years post diagnosis, female survivors did not differ from non-cancer patients in terms of income, housing assets, net worth, or likelihood of current employment; but more were self-employed, and fewer were confident that if they lost their job they would find an equally good job in the next few months. At a mean of 10 years post diagnosis, male survivors and non-cancer patients had similar income and housing assets but differed in net worth
Ohguri et al., 2010 [54] *J Occup Health*	To evaluate the work limitations and attendance rates return to work from sick leave To identify related factors for the limitations and attendance rates at a manufacturing company	Cross-sectional (retrospective)	Sick leave periods, work limitations, demographic and illness-related characteristics	$N = 133$ 97% male	Mixed diagnoses, 24% stomach cancer, 17% colorectal cancer, 15% lung cancer	*Sick leave periods* The median total period of sick leave absence due to cancer was 86 days (range 11–929 days) *Work limitations* 33% of patients reported a high degree and 26% a mild degree of work limitations. A higher degree of work limitations was significantly correlated with work-related factors before sick leave (i.e. shift work) as well as disease/treatment-related factors (i.e. chemotherapy, recurrence/metastasis), while the attendance rates after return to work were not correlated with adverse work-related factors before sick leave
Park et al., 2008 [48] *J Clin Oncol*	To investigate the impact of the cancer diagnosis on job loss and re-employment. To identify factors affecting job loss and re-employment	Longitudinal 1st Baseline: (Cancer diagnosis in Korean employees Apr-Dec 2001) 2nd Baseline (Patients who lost their job within the first year) 72 months follow-up	Employment status (National Health Insurance data), type of job, socioeconomic status, cancer site	1st Baseline: $N = 5396$ 70% male age range: 25–55 years 2nd Baseline: $N = 1398$ age range: 25–55 years	1st Baseline: All cancer sites, 25% stomach cancer, 15% liver cancer 2nd Baseline: 15 most frequent cancer sites, 27% stomach cancer, 15% liver cancer	*Job loss* 47% of the sample lost their job over a 72-month period; 26% of the sample lost their job within the first year. The mean time to job loss was 41 months. *Factors related to job loss*: Age < 30 and > 50years, company employee lower income, lung, brain/CNS cancer sites, leukemia were associated with job loss. *Re-employment* 30.5% of the sample (1398) was re-employed during the 69-month follow-up. The mean time to re-employment was 46 months. *Factors related to re-employment*: Female gender (–), leukemia, stomach, liver cancer (–), and thyroid cancer were associated with re-employment

Table 1 (*Continued*)

Authors	Study objectives	Study design	Variables	Sample	Cancer sites	Results
Park et al., 2008 [43] *Psycho-Oncology*	To investigate whether cancer diagnosis effects employment status by comparing employment status changes in cancer patients with to that of cancer-free workers over a 5–6-year period	Longitudinal 1st Baseline: (Cancer diagnosis in non-self-employed Korean workers, 2001) 2nd Baseline (Patients who lost their job within the first year) (Comparison group of individuals of the general population)	Employment status (National Health Insurance data), job loss and re-employment, time until job loss and re-employment	*Cancer patients* 1st Baseline: $N = 4991$ 74% male age range: 25–55 years 2nd Baseline: $N = 1334$ 62% male age range: 25–55 years *Comparison group*: 1st Baseline: $N = 12{,}468$ 77% male age range: 25–55 years 2nd Baseline: $N = 2075$ 68% male age range: 25–55 years	1st Baseline: All cancer sites, 26% stomach cancer, 16% liver cancer, 12% colon/rectum cancer	*Employment status* Cancer patients were more likely to lose their jobs after cancer diagnosis and were less likely to be re-employed than cancer-free individuals in almost all sex and age groups. The mean time until job loss was significantly lower in cancer patients (41 vs. 50) months. *Correlates of job loss and re-employment* Most major cancer sites were associated with decreased employment status, with the exception of thyroid cancer. Patients with pancreatic cancer, lung cancer, brain and central nervous system (CNS) cancer, or non-Hodgkin's lymphoma were more likely to lose their jobs sooner than other cancer patients. The mean time to re-employment was significantly longer in cancer patients than in the comparison group (47 vs. 32 months). After adjusting for sex, age, job type, and income level, cancer patients were less likely to be re-employed than the comparison group
Peuckmann et al., 2008 [46] *Eur J Cancer*	To investigate long-term female breast cancer survivors' employment, health care utilization, and health	Cross-sectional (Danish Breast Cancer Cooperative Group register data) (Comparison group of women of the general population)	School and occupational education, employment, health care utilization, physical activity, body-mass-index (BMI)	$N = 1316$ 100% female age range: 18 to >70 years	Breast cancer	*Employment status* Among patients, 33% were employed at time of the study, 38% reported receiving pension, 13% being early-retirement pensioner, 12% being housewife, and others. Compared to the women of the general population, patients were significantly less often disability pensioners. No difference concerning being engaged in employment or having had sick leave within the past two weeks was found. Patients <60 years reported a higher prevalence of sick leave. Among employed women the extent of employment (paid by the hour, temporary work, and average weekly hours) was similar between patients and the comparison group. *Work limitations* 11% patients reported having 'stopped working/changed job due to sequelae' related to breast cancer. Limitations were most frequently reported by patients in the following activities: managing 'heavier work at home, taking a 15-min walk with a 'rather healthy speed, climbing stairs, doing the grocery, and taking the bus. Going outside the house, walking around in their home, getting out of bed, taking a bath, getting dressed, and managing light work at home were reported by 65% as troublesome.
Poirier, 2005 [79] *Policy Polit Nurs Pract*	To examine the impact of sick leave benefits, individual characteristics, and fatigue on employment during radiation therapy	Prospective, longitudinal	Sick leave benefits, sociodemographic variables, fatigue, pain	$N = 77$ 58% female mean age: 54 years (range 29–67)	Mixed diagnoses, 44% breast cancer, 14% prostate cancer	*Sick leave benefits* 49% of study participants had paid sick leave benefits available at the start of radiation. Younger Age, lower levels of pain, male gender, lower levels of side effects, availability of sick leave benefits, and lower levels of fatigue were associated with work along the trajectory of radiation therapy
Poirier, 2006 [80] *Oncol Nurs Forum*	To examine the relationship among sick leave benefits, employment patterns, and fatigue in patients receiving radiation therapy	Prospective, longitudinal	Fatigue, sick leave benefits, employment patterns	$N = 77$ 58% female mean age: 54 years (range 29–67)	Mixed diagnoses, 44% breast cancer, 14% prostate cancer	*Fatigue and sick leave benefits* Side effects, education, living situation, age, treatment site, and work were associated with fatigue along the trajectory of radiation therapy. Study participants who were working at the end of radiation had lower fatigue scores than those who were not. Availability of sick leave benefits was associated with employment patterns during treatment
Pryce et al., 2007 [13] *J Occup Rehabil*	To investigate the association of symptom disclosure und work adjustment with a) working during treatment, and b) return to work after treatment completion	Cross-sectional	Symptoms due to cancer and treatment, work adjustment, cancer disclosure to supervisors and co-workers, working during primary cancer treatment, return to work	$N = 328$ 77% female mean age: 50 years (range 18–68)	Mixed diagnoses, 48% breast cancer	*Employment status* 30% of the sample continued to work during treatment *Factors related to working during treatment*: Flexible working possible, cancer disclosure to colleagues, difficulties managing fatigue, and paid time off to attend medical appointments (–) were associated with working during treatment. *Return to work* 42.3% of the patients returned to work after completing treatment. *Factors related to return to work*: Fatigue, stress, advice from doctor about work, return to work meeting with employer, and physical symptoms (–) were associated with return to work

Roelen et al., 2009 [53] *Int Arch Occup Environ Health*	To investigate the duration of sick leave due to breast cancer in the workforce	Retrospective longitudinal register-based study (data selected from the ArboNed Occupational Health Services)	Duration of sick leave	*Cancer patients*: $N = 2259$ 100% female	Breast cancer	*Sick leave* Between 2001 and 2005, 2259 women were counted with 2361 sick leave absences certified due to breast cancer The mean duration of sickness absence due to breast cancer was 349 days; 1733 episodes were longer than six months, 950 episodes lasted longer than 12 months, and 425 episodes longer than 18 months. In 240 cases, there was no return to work within 2 years after diagnosis. The proportion of young women (25–34 years of age) with breast cancer who returned to work in the second year of sick leave was lower than that of women aged $\geq$ 35 years
Sanchez et al., 2004 [27] *AAOHN*	To identify potential barriers to a timely return to the workplace for cancer survivors. To investigate the role of person, disease, and work-related factors to a timely return to the workplace	Cross-sectional (Cancer registry-based cohort study)	Person and disease-related factors, work-related factors, health status	*Cancer survivors* $N = 250$ 53% female mean age: 45 years (age range: 18–59) *Comparison group*: $N = 890$ 100% female mean age: 47 years (age range: 18–59)	Colorectal cancer	*Employment status and return to work* 80% of the survivors were employed at diagnosis and 89% returned to work. Of those who returned to work, 81% sustained employment 5 years post diagnosis. 34% of survivors delayed their return beyond 2 months post diagnosis. After controlling for ethnicity, education, and disease severity, the reason for delay was related to chemotherapy treatment
Schultz et al., 2002 [38] *AAOHN Journal*	To explore ability to work, job discrimination, and quality of life in long term cancer survivors (> 5 years post cancer diagnosis)	Cross-sectional (mail and web based surveys)	Employment and work-related issues (e.g. work ability, job discrimination)	$N = 4364$ (mail surveys) $N = 180$ (web based surveys)	Mixed diagnoses (not specified)	*Employment* 1526 (35%) of survivors were working at the time of the survey; 8.5% considered themselves unable to work as a result of cancer or cancer treatment. *Correlates of employment* Significantly more men (64%) were working than women (49%); more Hispanic and Asian survivors were working than White and Black survivors; younger patients were more likely to work than older patients. Cancer types with a greater proportion of survivors working were genitourinary, melanoma and Hodgkin's disease; cancer types with a greater proportion of survivors unable to work were gynecological, lung, head and neck, gastrointestinal, and colon cancers. *Job discrimination* Of the survivors working at the time of the survey, 7% had experienced job discrimination (e.g. fired or forced to quit, denied promotion, denied employment, inability to obtain health insurance
Short et al., 2005 [45] *Cancer*	To investigate employment and work-related disability in adult cancer survivors	Cross-sectional	Employment, work-related disability	$N = 1433$ 100% female mean age: 61 years (range 25 to $\leq$62)	Mixed diagnoses, 31% breast cancer, 8% prostate cancer	*Employment status* 88% of the male and 78% of the female survivors were working at the time of diagnosis. 41% of males and 39% of females who were working at the time of diagnosis stopped during cancer treatment. 20% of survivors reported cancer-related disabilities and half of those with disabilities were working. *Termination of work* A projected 13% of all survivors had quit working for cancer-related reasons within 4 years of diagnosis. More than half of survivors quit working after the first year, when three-quarters of those who stopped for treatment returned to work. Survivors of CNS cancers, head and neck cancers, stage IV blood and lymph malignancies had the highest adjusted risk of disability or quitting work
Short et al., 2008 [69] *Psycho-Oncology*	To quantify the increase in work disability attributable to cancer in a cohort of adult survivors who were an average of 46 months post-diagnosis. To compare disability rates in cancer survivors to individuals with other chronic conditions	Cross-sectional (cancer survivor data from the Penn State Cancer Survivor Study), comparison group of patients with other chronic conditions (data from the Health and Retirement Study)	Work disabilities, sociodemographic variables	*Cancer patients*: $N = 647$ 61% female age range: 55–65 years *Comparison group: N* = 5988 56% female age range: 55–65 years	Mixed cancers, 50% breast cancer in females, 40% prostate cancer in males	*Work disabilities* 27% of the male and 32% of the female cancer patients reported work disabilities. For both genders, the unadjusted rate of work disability was significantly higher in the cancer sample than in the comparison group. About half of all disabled patients (16 of 30%) reported that their disability was related in some way to their cancer. The adjusted rate of work disability was significantly higher for cancer patients compared to adults of the same gender with no history of cancer. A history of cancer raised the rate of work disability by 14 percentage points. The increase in disability for patients with any new cancers was significantly greater than the increase in disability for cancer-free survivors
Short et al., 2008 [57] *Health Serv Res*	To estimate the long-term effects of cancer survivorship on the employment of older workers	Longitudinal (cancer survivor data from the Penn State Cancer Survivor Study), comparison group of patients with other chronic conditions (data from the Health and Retirement Study)	Employment outcomes (working, working full time, usual hours per week)	*Cancer patients*: $N = 504$ 61% female age range: 55–65 years *Comparison group*: $N = 3903$ 56% female age range: 55–65 years	Mixed cancers, 50% breast cancer in females, 40% prostate cancer in males	*Employment status and work hours* Cancer survivors of both genders worked an average of 3–5 h less per week than controls. For females, significant effects of survivorship on the probability of working, the probability of working full-time, and hours were found. For males, survivorship affected the probability of full-time employment and hours without significantly reducing the probability of working. For both genders, these effects were primarily attributable to new cancers. There were no significant effects on the employment of cancer-free survivors

Table 1 (*Continued*)

Authors	Study objectives	Study design	Variables	Sample	Cancer sites	Results
Spelten et al., 2003 [10] *Eur J Cancer*	To assess the impact of fatigue and other cancer-related symptoms on the return to work of cancer survivors	Longitudinal Baseline: cancer diagnosis, 6, 12 and 18 months follow-up	Diagnosis, fatigue, depression, sleep problems, physical complaints, cognitive dysfunction, psychological distress, work-related factors, sick leave	$N = 235$ 60% female mean age: 42 years (range 19–58)	Mixed diagnoses, 25% gyn. cancers, 24% breast cancer, 23% male genital/urological cancers	*Return to work* At six months following the first day of sick leave, 24% had returned to work, at 12 months, this percentage had increased to 50%, and at 18 months to 64%. *Correlates of return to work* Fatigue, diagnosis, treatment type, age, gender, depression, physical complaints and workload were related to the time taken to return to work. Fatigue scores were strongly related to diagnosis, physical complaints, and depression scores. Fatigue at six months predicted a longer sick leave with a hazard ratio of 0.71 (95% C.I. 0.59–0.85), adjusted for diagnosis, treatment type, age and gender. Diagnosis, treatment, age, physical complaints and workload remained the only significant predictors of duration of sick leave. Fatigue levels predicted the return to work at 18 months follow-up independent of diagnosis and treatment
Steiner et al., 2008 [28] *Psycho-Oncology*	To assess the changes in work and the demographic, clinical, and psychosocial characteristics associated with work changes over 2 years following diagnosis	Cross-sectional (data from the Colorado Central Cancer Registry)	Return to work, reduction in work hours, physical and psychological symptoms, changes in occupational role	$N = 100$ 60% female age range: 21–67 years	Mixed diagnoses, 20% breast cancer	*Employment and work changes* 8% of the 100 previously employed survivors were no longer employed. Individuals with less education were more likely to leave the work force. Of the 92 cancer survivors who remained employed after cancer treatment, 57% reduced work by more than 4 h/week (a mean reduction of 15.6 h/week). *Correlates of work changes* A reduction in work hours was significantly associated with more physical symptoms (specifically lack of energy, nausea/vomiting) and with more psychological symptoms or fears (feeling bored or useless, anxiety, or feeling down or depressed). 56% of the individuals who returned to work reported changes in occupational role. Patients reported few workplace barriers on returning to work
Stewart et al., 2001 [29] *Psycho-Oncology*	To investigate the experience of breast cancer patients with respect to the impact of cancer on confidentially, work and insurance	Cross-sectional, Assessment at a mean of 9 years post diagnosis	Cancer disclosure, impact of cancer on work and aspects of insurance	$N = 378$ 100% female mean age: 61 years (range 35–88)	Breast cancer	*Employment status* 41% of the women were no longer working; 25% reported a career change, and 12.5% retired early as a result of cancer. *Career changes* 41% of the sample had told their cancer diagnosis to their boss/supervisor. 41% of the sample felt the cancer had altered their priorities and ambitions at work. 12% felt they were unable to fulfill their work or career potential. 26% felt that cancer had made them more goal focused and 6.5% reported a positive career change
Syse et al., 2008 [41] *J Cancer Surviv*	To investigate the extent to which cancer survivors stay affiliated to working life compared to the cancer-free population, to investigate the impact of cancer on earnings	Cross-sectional population-based study (register data covering the entire Norwegian population in 2001)	Employment probability, earnings	*Total* $N = 1.116300$ 51% male age range: 42–59 years *Cancer survivors* $N = 34{,}109$ 65% female age range: 42–59 years	Mixed diagnoses, 36% breast cancer in women, 19% skin cancer in men	*Employment and earnings* A cancer diagnosis was strongly associated with not being employed. Cancer was associated with a 12% decline in overall earnings for those employed. *Correlates of reduced employment and earnings* Leukemia, lymphomas, lung, brain, bone, colorectal, and head-and neck cancer resulted in the largest reductions in employment and earnings. Earning declines were strongly associated with educational level
Taskila et al., 2004 [32] *Eur J Cancer*	To explore the effect of cancer diagnosis on employment according to cancer type, education, occupation, age, gender, mother tongue, calendar time and hospital district	Cross-sectional, population based cohort study, population based comparison group	Employment rate, sociodemographic and medical characteristics	*Cancer survivors:* $N = 12542$ age range: 15–60 years *Control group:* $N = 12542$ age range: 15–60 years	Mixed diagnoses, 33% breast cancer	*Employment status* The employment rate of cancer patients before diagnosis was 78%, the same as in the cancer-free population. 2–3 years after diagnosis, employment rate of cancer survivors was slightly lower (64%) than in matched referents (73%). *Correlates of employment/unemployment* The probability of being employed was lowest among patients who had primary education. There was no statistically significant difference in the employment among individuals who had university education. Cancer sites of young persons at diagnosis showed a high employment rate, while the sites prevalent at high age showed a low rate. Probability of employment was low in patients with leukaemia, lung and stomach cancer, and cancer of the nervous system
Taskila et al., 2006 [65] *Support Care Cancer*	To examine the amount of emotional and practical support that cancer patients needed and had received from co-workers, supervisors, and the occupational health personnel	Cross-sectional	Social support, emotional and practical support, treatment characteristics	$N = 640$ 75% female age range: 25 to >50 years	Mixed diagnoses, 89% breast cancer in women, 41% lymphoma in men	*Received and needed support* Cancer patients had received most support from their co-workers. 39% of women and 29% of men hoped for more support particularly from the occupational health care personnel. Men who had lymphoma, had received chemotherapy, or had low education level needed more support. Need for practical support from the occupational health personnel was fivefold between the chemotherapy-treated and those not treated Women both received and needed more support than the men did

Taskila et al., 2007 [62] *Eur J Cancer*	To examine whether the self-assessed current work ability differs between cancer survivors and people without cancer. To examine whether survivors experienced that their physical or mental work ability had been impaired due to cancer	Cross-sectional, cancer survivors, population-based comparison group	Work ability, disease-related and socio-demographic factors	*Cancer patients*: $N = 591$ 74% female age range: 25–64 years *Comparison group*: $N = 757$ 73% female age range: 25–64 years	Mixed diagnoses, 90% breast cancer in women, 41% lymphoma in men	*Current work ability* No difference in the mean of work ability between the cancer survivors and their referents for both genders were found. In both groups, people with a higher level of education had better work ability; however, better educated men had a higher mean of work ability whereas similar differences were not significant among women. *Correlates of work ability* Older age, several diseases or injuries lowered the work ability. A better social climate at work and greater commitment to the work organization was related to better work ability among both genders. *Impairments in work ability* Among patients, 26% reported that their physical work ability, and 19% that their mental work ability had deteriorated due to cancer. Among women (older) age was associated with impaired physical work ability, among men; age did not increase the risk of impaired work ability. Patients who had chemotherapy had more than twice the risk of impaired physical work ability than those who had received other treatments. The higher the commitment to the work organisation, the less the risk of impaired work ability among both genders
Vartanian et al., 2006 [63] *Arch Otolaryngol Head Neck Surg*	To evaluate the socioeconomic effect of and risk factors for work-related disability due to head and neck cancer and its treatment	Cross-sectional study	Work ability, household income	$N = 301$ 78% male	Head and neck cancers	*Work ability and income* 33% of the patients became unable to work as a result of the cancer or its treatment, and 42% reported a significant decrease in household income. Almost two thirds of the patients were the main source of familial income before cancer diagnosis and treatment. After treatment, 53% of patients remained the main source of income *Factors associated with work disability* Factors associated with an increased risk for work disability were advanced clinical stage, combined treatment, pain, alcohol consumption, and low educational level. Multivariate analysis showed that only advanced clinical stage ($P = 0.02$), alcohol consumption ($P = 0.02$), and low educational level ($P = 0.007$) were associated independently with rates of disability
Verbeek et al., 2003 [15] *Occup Environ Med*	To assess the quality of rehabilitation of cancer survivors by occupational physicians. To relate the quality of the process of occupational rehabilitation to the outcome of return to work	Longitudinal Baseline (four to six months post diagnosis), 6 and 12 months follow-up cohort of occupational physicians (of the included cancer patients)	Sociodemographic and person-related factors; disease and treatment-related complaints; work and working conditions	*Cancer patients*: $N = 100$ 67% female mean age: 42 years ($\leq$55) *Physicians*: $N = 100$	Mixed diagnoses, 22% breast cancer, 23% cervix cancer	*Return to work* At the end of follow up, 67% of patients had returned to work. Time to return to work ranged from 4 to 651 days with a median of 293 days. There was a steady increase of return to work from 22% at work at inclusion to 49% at six months, and 67% at 12 months follow up. *Correlates of return to work* Overall physician's performance and continuity of care were related to return to work of patients. Overall optimal performance was also related to a small but significant higher level of satisfaction with care, both for patients and physicians
Villaverde et al., 2008 [30] *Occup Med*	To investigate employment- and work-related disability in a cohort of breast cancer patients to identify possible discrimination and other obstacles to remaining in work	Cross-sectional	Personal- and treatment-related characteristics, employment status	$N = 96$ 100% female mean age: 47 years (range 22–65)	Breast cancer	*Employment and return to work* In total, 80% of patients were unable to work after diagnosis, but 56% returned to work at the end of treatment. *Correlates of work after the end of treatment* The sequelae of the disease or its treatment and the stage of disease were independently associated with the ability to work after the end of treatment. *Cancer disclosure at work and support* The vast majority told the employers and co-workers about the cancer disease. 29% noticed changes in their relation with co-workers and managers, usually in a supportive way. None reported job discrimination
Yabroff et al., 2004 [68] *J Natl Cancer Inst*	To estimate the burden of illness in cancer survivors in a national, population-based sample	Cross-sectional, data from the 2000 National Health Interview Survey Comparison Group	Comorbid conditions, health and functional limitations, health utility, lost productivity, limitations in work ability and number of days lost from work	*Cancer patients*: $N = 1823$ 62% female *Comparison group*: $N = 5469$ 62% female	Mixed diagnoses (most prevalent: breast cancer, colorectal cancer and prostate cancer)	*Employment status and illness burden* Compared with matched control subjects, cancer survivors had significantly poorer outcomes across all health burden measures. Cancer survivors had lower utility values and higher levels of lost productivity and were more likely to report their health as fair or poor than matched control subjects. Cancer survivors reported significantly higher burden than did control subjects across tumor sites and across time since diagnosis for the majority of measures

Table 2
Factors significantly associated with a greater likelihood of being employed or return to work.

Work-related factors	perceived employer accommodation for cancer and treatments (e.g. return to work meeting with employer), flexible working arrangements counseling, training services, job replacement services, job search assistance and maintenance services, rehabilitation cancer disclosure to colleagues
Demographic factors	younger age and cancer sites of younger persons (e.g. genitourinary cancers, melanoma and Hodgkin's disease), higher levels of education male gender
Cancer and treatment-related factors	absence of surgery less physical symptoms lower length of sick leave continuity of care advice from doctor about work

cancer diagnoses of the patients recruited. Forty-seven studies were cross-sectional, 17 studies had a longitudinal design, and 23 studies were able to include a comparison group. The mean sample size (cancer survivors) was 496 (range 45–2259), though 9 studies included larger samples, mainly through use of national health insurance or cancer registry data. The mean age of patients was 50 years (range 14–88 years) (Tables 2 and 3) .

3.1. Prevalence of employment and return to work

Twenty-eight out of 64 studies reported data about rates of employment or return to work in cancer survivorship. Overall, on an average 63.5% of the participants (range 24–94%) managed to return to work depending on the period of time after cancer treatment. At six months following diagnosis, on an average 40% of patients had returned to work or had continued working during treatment (range 24–72%) [10–13]; at 12 months a mean of 62% had returned to work or had continued working during treatment (range 50–81%) [10–16]; at 18 months a mean of 73% had returned to work (range 64–82%) [10,12,17,18]; and at 24 months on an average 89% of patients had returned to work (range 84–94%) [19,20]. One study reported that 82% of women who had worked before their breast cancer diagnosis returned to work at a median follow-up of 36 months [21]. Another study showed that 67% of cancer patients were able to work five years after cancer diagnosis [22]. Several studies did not specify the time since cancer diagnosis or treatment completion until return to work [2,23–30].

Overall, studies indicated a steady increase of return to work from on an average 40% at six months post diagnosis to 62% at 12 months, 73% at 18 months, and to 89% at 24 months after cancer diagnosis. Compared to non-cancer comparison groups, research showed slightly different findings, particularly when time since treatment had been considered. Sanchez et al. [27] showed that 81% of those patients who returned to work sustained employment five years after diagnosis. Prostate cancer patients were less likely to be working six months compared to controls, but at 12 months post diagnosis, the likelihood of employment for cancer patients and cancer-free control subjects was not significantly different [31]. In contrast, although Taskila et al. [32] found that the employment rate among cancer patients before diagnosis (78%) was the same as in the cancer-free population, however, about 2.5 years after diagnosis, the employment rate of cancer survivors was significantly lower (64%) than in matched referents (73%) [32]. Breast cancer patients were found to be significantly less likely to be employed six months following diagnosis compared to healthy controls [11,33]. Ahn et al. [23] showed that employment decreased from 48% to 33% after breast cancer treatment and significantly less patients worked after treatment relative to the general population. Also among stomach cancer survivors, non-working was significantly higher (47%) than in the general population (37%) [34]. Similar findings were observed by Maunsell et al. [35] and Drolet et al. [36]: At three years after diagnosis, slightly more cancer survivors were unemployed or not working compared to cancer free comparison groups.

3.2. Factors related to employment and return to work

A previous review by Spelten et al. [3] documented that 62% of cancer patients (range 24–93%) manage to return to work depending on the period of time following treatment. Perceived employer accommodation for cancer and treatments was a strong and significant predictor for return to work. Recent studies seem to strengthen the findings by Spelten et al. [3]. Pryce et al. [13] found a return to work meeting with the employer as well as advice from doctor about work as factors significantly positive associated with return to work in cancer survivors. Moreover, counseling, miscellaneous training services, job replacement services, job search assistance and maintenance services [24] as well as perceived

Table 3
Barriers related to returning to work and to job loss.

Work-related barriers	non-supportive work environment manual work, company employment perceived employer discrimination because of cancer and treatment low income
Demographic barriers	higher age lower levels of education female gender
Cancer, treatment-related and psychological barriers	cancer type (liver, lung cancer, advanced blood and lymph malignancies, brain and CNS cancer sites, gastrointestinal cancers, pancreatic cancer, head and neck cancers) advanced tumor stage extensive surgery use of endocrine therapy overall poor health and disablement physically exhaustion and deterioration presence of fatigue and physical symptoms presence of comorbid mental diseases (e.g. depression)

employer accommodation [18] were significantly associated with a greater likelihood of being employed.

Further factors related to return to work were younger age and cancer sites of younger individuals [25,32,37,38], higher levels of education [25], continuity of care [15], absence of surgery [17], less physical symptoms [13], the length of sick leave [17] as well as male gender and ethnicity [38]. Higher employment levels in cancer survivors correlated with being single or separated, divorced or widowed [23]. Cancer types with a greater proportion of survivors working were genitourinary, melanoma and Hodgkin's disease [38]. Several studies reported the impact of physical and psychological symptoms on return to work. Pryce et al. [13] found higher levels of fatigue and overall stress significantly associated with return to work whereas Villaverde et al. [30] showed that the sequelae of the disease, cancer treatment and disease stage were independently associated with the ability to work after the end of treatment. Factors associated with working during treatment were the possibility of flexible working, cancer disclosure to colleagues and difficulties managing fatigue [13]. The findings by Chan et al. [24] indicated that 52% cancer survivors were successful employed after receiving vocational rehabilitation services.

3.3. Barriers related to not returning to work and to job loss

Non-supportive work environment, manual work, cancer types associated with an unfavorable prognosis, the presence of fatigue and physical symptoms, and perceived employer discrimination because of cancer and treatment have been previously reported as barriers for returning to work [3,35,39]. In the current review, a range of similar employment barriers and risk factors for unemployment and job loss in cancer patients was detected.

Overall, cancer survivors were found to have a significantly increased risk for unemployment [40–42] and were less likely to be re-employed [43,44]. A projected 13% of all survivors had quit working for cancer-related reasons within four years post diagnosis [45]. Amir et al. [17] found about 10% of cancer patients in a UK region stopped working after diagnosis. Peuckmann et al. [46] showed that 11% of patients stopped working or changed their job due to breast cancer; and findings by Stewart et al. [29] revealed that 41% of breast cancer patients were no longer working at on an average 9 years post diagnosis.

Several findings showed that between 47% and 53% of cancer survivors lost their job or quit working over a 12-month, 72-month period, respectively; and 26–50% of survivors lost their job or quit working within the first year post diagnosis [45,47,48]. However, between 23% and 75% of patients who lost their job were re-employed. Park et al. [48] showed that the mean time to job loss was 41 months, significantly lower in cancer patients than in non-cancer controls (50 months). The mean time to re-employment was 46 months [44]. Likewise, the mean time to re-employment was significantly longer in cancer patients than in the non-cancer comparison group (47 months vs. 32 months) [44].

Use of endocrine therapy was associated with a twofold increase risk of not having returned to work after two years post diagnosis [20]. Risk for unemployment was associated with extensive surgery [23], advanced tumor stage [2,11,18,20,23,45,47], chemo- and radiotherapy [21], higher age [21,34,40,48,49], female gender [24,34,48] and lower levels of education [2,21,24,28,32,47]. A range of cancer sites had been associated with a higher risk for unemployment and job loss. These cancer sites include liver cancer [2,44,47,48], lung cancer [32,38,44,48], advanced blood and lymph malignancies [32,44,45,48], brain and CNS cancer sites [32,44,45,48], gastrointestinal cancers [38,44,48], pancreatic cancer [44,48], head and neck cancers [38,45] as well as gynecological cancers [38].

Results furthermore revealed the significant impact of socioeconomic and work-related factors on unemployment such as low income [23,40,48,49], manual and non-sedentary work [40,47,49], company employment [48], union membership [36] and perceived employer discrimination, psychological or self-perceived constraints [18,21]. Working environment, physically exhaustion and deterioration were found as the most frequent reasons for not returning to work [20]. Findings by Bradley and Bednarek [22] revealed that poor health and disablement as frequent cause to stop working. Overall, the presence of comorbid diseases, a poor health status and depression have been found as risk factor for unemployment [18,23,40].

A higher percentage of cancer patients retired from their jobs post diagnosis compared to non-cancer controls [31,50]. A Danish study showed that patients had a significantly increased risk of early retirement pension compared to cancer-free controls [51]. Risk factors for early retirement included older age; dissimilated disease, manual job, and sickness leave the year before taking early retirement pension, physical and psychological comorbidity, low education and low income as well as cancer sites containing leukemia, prostate cancer and ovary cancer.

3.4. Sick leave and length of absence from work

Merely few studies have investigated the length of sickness absence in cancer, indicating a wide range from on an average 27 days in prostate cancer patients [52] to on an average 11 months in early-stage breast cancer survivors [19,21]. On the basis of the reported sick leave periods, the mean duration of absence from work was 151 days [17,19,27,49,52]. However, a recent study by Roelen et al. [53] reported that the mean duration of sickness absence due to breast cancer was 349 days and another study by Ohguri et al. [54] showed a mean duration of sick leave of 86 days (range 11–929 days). Balak et al. [19] reported that 35% of breast cancer patients were absent longer than one year.

Short et al. [45] reported that 41% of male and 39% female patients with mixed cancer sites who were working at the

time of diagnosis stopped working during cancer treatment. Patients older than 60 years reported a higher prevalence of sick leave [46]. At the end of cancer treatment, Molina et al. [37] found an age over 44 years, elementary school education, comorbidity, disease stage IV, presence of sequelae and having lung cancer significantly associated with sick leave. In contrast, compared with survivors belonging to a union, those patients who did not belong to a union and those who were self-employed were more likely to report no work absence [49].

No significant differences in current sick leave between cancer survivors and non-cancer controls were found by Gudbergson et al. [55] and by Drolet et al. [49]. The latter study showed that disease-free women had no longer length of sickness absence than women in the comparison group three years post diagnosis. Duration of absence from work was significantly longer in patients who underwent chemotherapy or multimodal treatment [10,19,21,27,37,49], who belonged to the most economically deprived group [17], who reported higher levels of fatigue, physical complaints, and higher workload [10], who were older and who reported work changes due to cancer [56].

3.5. Reduction in work hours, wages and work changes

The majority of studies that concentrated on working time reported a reduction in work hours – at least partially or over a time limited period – in cancer survivors [34]. Slightly more than 50% of survivors reduced their work schedule at least one time, although 86% of survivors returned to former work schedules [22]. Working women with breast cancer reduced their weekly hours worked by nearly 18% at six months following diagnosis [11]. Compared with the general population, cancer survivors reported reduced working hours significantly more difficulties with reduced working hours [23].

For both genders, significant effects of survivorship on the probability of full-time employment and hours were found [57]. However, it is noteworthy that again for both genders, these effects were primarily attributable to new cancers. There were no significant effects on the employment of cancer-free survivors [57]. Likewise, Peuckmann et al. [46] found a similar extent of employment (paid by the hour, temporary work, and average weekly hours) between patients and the general women population. However, cancer survivors of both genders worked an average of 3–5 h less per week than non-cancer controls [57]. The findings by Steiner et al. [28] showed that 57% of cancer survivors who remained employed after treatment, reduced work by more than 4 h per week with a mean reduction of 16 h per week. In a further study, the mean hours per week were 49 h for full-time workers, and 20 h for part time workers [22]. In contrast, Bradley et al. [33] showed that employed breast cancer survivors were even estimated to work 3.4 h more a week than other employed women. A reduction in work hours was significantly associated with advanced stages [11] more physical (e.g. lack of energy) and psychological symptoms (feeling useless, anxiety, depression) [28].

A significant proportion of patients had changed work due to cancer. Amir et al. [17] found 8% of breast cancer patients had changed to a different work place and Gudbergson et al. [56] showed that 17% of the sample reported work changes due to cancer. Similar results with regard to the percentage (15%) of women who reported work changes were found by Fantoni et al. [21]. Patients who reported work changes were significantly more frequently female and worked part time. Moreover, patients who had changed work had significantly poorer current work ability, reduced physical and mental work ability as well as significantly higher anxiety and depression [56].

Overall contrary findings have been found related to earnings and wages in cancer patients. No differences in annual household income levels as well as in the number of paid hours per week and in working time each week (full-time, part-time) between cancer survivors and non-cancer control subjects could be observed by Gudbergson et al. [58].

In contrast, recent studies found cancer to be associated with a 12% decline in overall earnings [41]. Breast cancer patients reported a 16% decrease in wages [23]. On average, working women lost 27% of their projected usual annual wages (median = 19%) after compensations received had been taken into account [59]. A higher percentage of lost wages was significantly associated with a lower level of education [41,59], lower social support, chemotherapy, self-employment, shorter tenure in the job, and part-time work. Furthermore, Syse et al. [41] found that leukemia, lymphomas, lung, brain, bone, colorectal, and head-and neck cancer resulted in the largest reductions in employment and earnings. One study showed significantly higher earnings in breast cancer survivors than among the non-cancer comparison group [33].

3.6. Work ability and perceived job strain

The concept of work ability emphasizes that individual work ability is a process of human resources in relation to work [60]. Thus, work ability can be defined as an individual's physical, psychological, and social resources for participation in any kind of paid work or self-employment. Work ability is dependent on mental and somatic health status as well as on social skills, level of education, motivation, work demands, the work environment, and the organization of the work [57,60].

Several studies investigated work ability following diagnosis and treatment, and found a reduction in physical or mental work ability up to 26% [23,31,34,57,58,61–63]. Even four years post diagnosis, Hansen et al. [64] showed that breast cancer survivors reported higher levels of age-adjusted work limitations compared to a non-cancer group of employed workers. In contrast, the current work ability improved significantly over time in a study by De Boer et al. [12]. In this study, work ability of women improved more

over time compared to male employees. Also, Taskila et al. [62] did not observe difference in the mean of work ability between cancer survivors and their referents for both genders. Work ability at six months after sick leave strongly predicted return to work at 18 months [12].

Risk for reduced work ability was associated with hematological neoplasias [12], chemotherapy and multimodal therapy [12,62,63] older age among women, diseases or injuries [62], as well as with work changes due to cancer [57]. In contrast, better work ability was found to be related to genitourological and gastrointestinal cancers [12], to a higher level of education [62], to better social climate at work and greater commitment to the work organization among both genders [62]. In comparison to non-cancer controls, cancer survivors did not differ significantly in their job or work strain [55]. However, female patients were found to experience more job strain than male patients [55]. Furthermore, cancer survivors who had changed their work due to cancer reported significantly higher demands caused by tasks of work and overall work load [56].

3.7. Career changes, job satisfaction, and employer accommodation

Following a diagnosis of cancer, 56% of patients who returned to work reported changes in occupational role [28]. In a study of 378 women with breast cancer, who were assessed nine years post diagnosis, about one forth of patients reported a career change, 12.5% retired early as a result of cancer, 41% felt the cancer had altered their priorities and ambitions at work, and 12% reported that they were unable to fulfill their work or career potential [29]. However, another 26% of the women felt that cancer had made them more goal focused and 6.5% reported a positive career change [29]. A study by Gudbergson et al. [61] revealed no differences in work engagement between cancer patients and the comparison group.

The majority of patients told employers and co-workers about the cancer disease [30], whereas Stewart et al. [29] reported that only 41% of the sample had told their cancer diagnosis to their boss or supervisor at work. Bouknight et al. [18] showed that 87% of breast cancer patients perceived their employer as accommodating to their cancer and treatment. Similar results found that cancer survivors reported only few workplace barriers on returning to work [28]. About 29% of patients noticed changes in their relation with co-workers and managers, however, usually in a supportive way [30]. Changes in patient's relationship with co-workers and managers were also found among 21% of survivors by Molina et al. [37]. Cancer patients had received most support from their co-workers [65], however, 39% of women and 29% of men hoped for more support particularly from the occupational health care personnel.

Few studies, however, reported difficulties in returning to work. Findings indicated that 2% of breast cancer survivors reported reduced opportunity for promotion [23]; and one fifth of those survivors who returned to work and stayed in the same employment reported deterioration in job satisfaction and career prospects [17]. Schultz et al. [38] reported that 7% of cancer survivors had experienced job discrimination such as getting fired or forced to quit, denied promotion, denied employment or the inability to obtain health insurance. Patients who changed their job due to cancer not only had higher demands caused by tasks of work and work load, but also lower support from colleagues [56]. Moreover, cancer survivors were more likely to file job loss claims and differential treatment related to workplace policies [66].

3.8. Physical and psychological disablement and quality of life

The impact of cancer and cancer treatments may be particularly evident at the workplace. Cancer survivors were significantly more likely as non-cancer controls to report fair or poor health, psychological disabilities, limitations of activities of daily living, functional limitations, and, among those under the age of 65, being unable to work because of a health condition [67,68].

Bradley and Bednarek [22] as well as Short et al. [45,69] found cancer-related disabilities in 10%, 20% of the samples, respectively and half of the patients with disabilities were working [45]. In a recent study, 27% of male and 32% of female survivors reported work disabilities [69]. For both genders, the rate of work disability was significantly higher in the cancer sample compared to non-cancer controls [69]. The increase in disability for survivors with any new cancers was significantly greater than the increase in disability for cancer-free survivors [69]. Cancer survivors were found to be more likely to have comorbid diseases than controls, particularly evident among male patients, who had a significantly worse subjective health status and higher somatic symptom levels than non-cancer controls [58]. Gudbergson et al. [61] in addition found statistically lower rates of vigor domains among cancer patients, and a significantly poorer health status, greater numbers of disease symptoms, more anxiety, and reduced physical QoL. Limitations were most frequently reported by long term breast cancer survivors in the following activities: managing 'heavier work at home, taking a short walk with a 'rather healthy speed, climbing stairs, doing the grocery, and taking the bus [46]. In addition, going outside the house, walking around at home, taking a bath, getting dressed, and managing light work at home were reported by 65% of patients as troublesome [46].

Cancer-related fatigue is a profound fatigue related to cancer or its treatment and has been recognized as a common and debilitating complaint among cancer survivors [70]. Several studies have found fatigue and exhaustion to impact both housework and gainful work. In nearly half of the patients, fatigue and exhaustion were the most frequent problems reported and cancer survivors had more difficulties with

fatigue and exhaustion compared to the general population [23]. Cancer survivors reported significantly more fatigue in performing both housework and gainful work compared to population-based control group [34]. Hansen et al. [64] showed that fatigue explained 71% of the contribution of overall symptom burden. However, a recent study revealed that fatigue was reported in 13% of patients and neither postponed partial return to work nor full return to work [19], although another study found that among women who had returned to work, 77% suffered from fatigue [21]. Few studies have focused upon psychosocial aspects in return to work. The lowest level of psychosocial distress and the highest levels of physical and mental functioning, and QoL were found in women who continued to work through treatment, followed by women who discontinued to work through treatment but returned to work [26]. Likewise, highest level of psychosocial distress and lowest levels of physical and mental functioning, and QoL were found in women who stopped working after the cancer diagnosis [26]. Among fully employed patients with hematological malignancies, 73% reported good QoL compared to 22% of those on disability insurance and 28% of those on part-time work. Age and employment status were significantly associated with QoL [14]. In contrast, being employed was found to be negatively associated with body

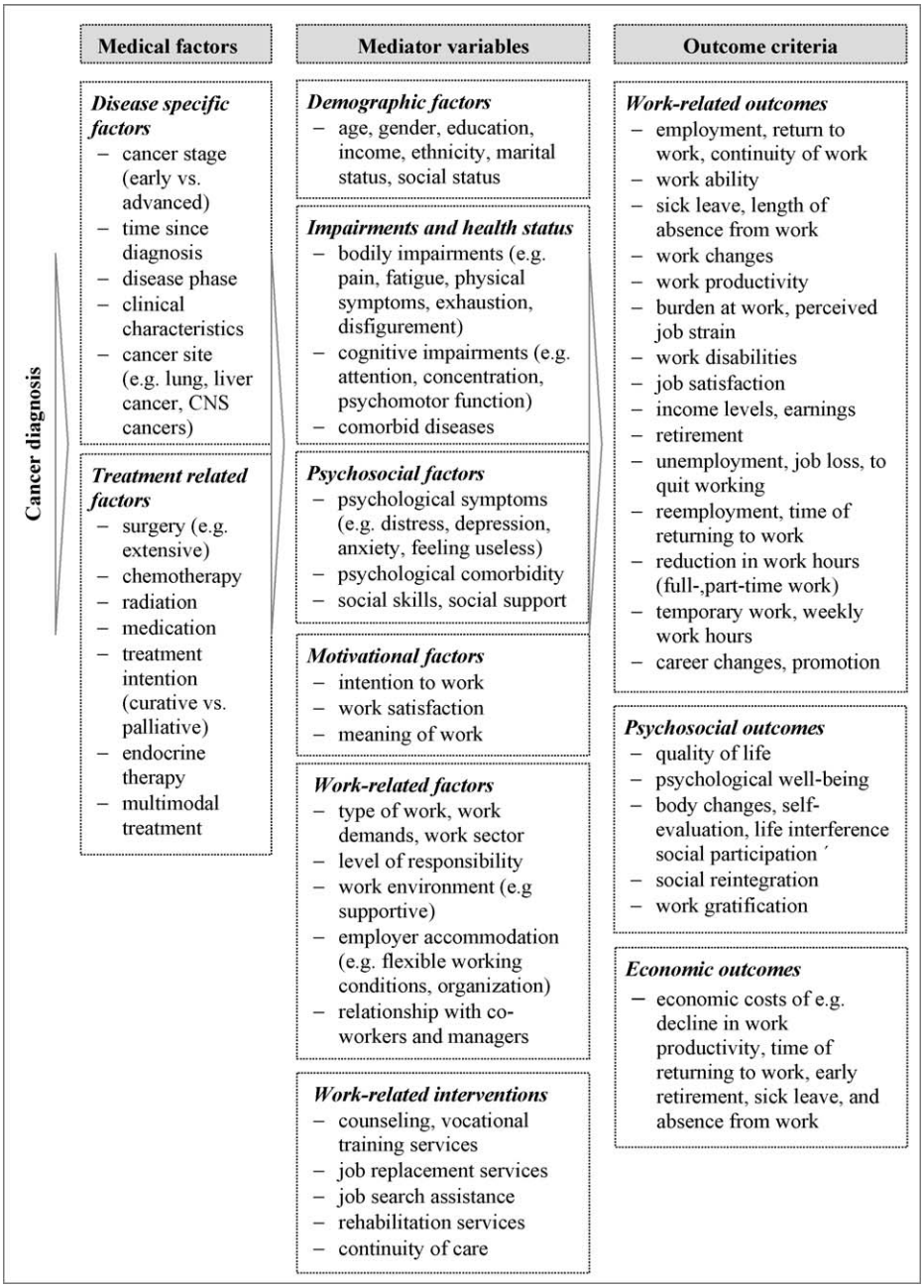

Fig. 1. Independent, mediating factors and outcome criteria related to research about work in cancer survivorship.

changes, negative self-evaluation, negative outlook and life interference [71]. Furthermore, cancer survivors who had changed their work due to cancer had significantly higher levels of anxiety and depression as well as significantly poorer physical and mental QoL [58].

4. Research model for the investigation of work-related aspects in cancer survivorship

Fig. 1 shows a research model including a range of independent factors, mediating factors and outcome criteria that have guided research about work and employment in cancer survivorship through recent years. Following the diagnosis of cancer, disease specific factors such as early vs. advanced cancer stage, and cancer site as well as treatment-related factors such as surgery and multimodal treatments have been frequently included as independent variables. This review identified a large number of mediating variables related to six categories. These categories include (1) demographic factors such as age, gender, education, and income; (2) impairments and health-related factors such as pain, fatigue, physical symptoms; (3) psychosocial factors such as distress, depression, anxiety and the availability of social support; (4) motivational factors such as individual meaning of work; (5) work-related factors related to the type or nature of work, work demands and responsibilities; and (6) and variables associated with work-related interventions and care such as vocational training and rehabilitation services. Work-related outcome criteria consist of a wide range of variables such as continuity of work, employment and return to work, work ability, absence from work and career changes. Further outcome variables refer to dimensions of quality of life, social reintegration and psychological well-being as well as – though less frequently – to economic variables such as costs of decline in work productivity.

5. Discussion

This literature review aimed to provide an overview over the current state of knowledge about cancer survivorship issues related to employment and work-related aspects. Sixty-four studies published between 01/2000 and 11/2009 were included into this review and analyzed in detail with regard to frequency of employment and return to work, factors related to employment and return to work, barriers related to not returning to work and job loss, absence from work, reduction in work hours, wages and work changes, work ability and perceived job strain, career changes, and employer accommodation, as well as physical and psychological disablement and QoL.

An increasing number of cancer patients are likely to continue working or return to work after cancer treatment completion. There is an increasing recognition of the employment and work consequences following cancer treatment [8]. Unfavorable consequences may include unemployment or adverse work changes, career changes and a variety of physical and functional disabilities as well as increasing psychological distress or mental disorders, which also may adversely affect a patient's work ability, working conditions, and work satisfaction. However, since work has the potential to help patients to regain a sense of normalcy, of being valued, of meaning, and of reintegration into society, work may comprise a range of positive consequences for the recovery and the psychological well-being of cancer survivors [72]. Findings from qualitative research show that patterns of return to work and work changes are rather diverse and complex [73].

Although important and significant findings have emerged in previous studies on work and employment in cancer survivorship, only limited knowledge exists about the middle and long-term impact and interaction effects of treatment-related physical, demographic and psychosocial factors as well as of work-related aspects on employment and return to work in cancer survivors. In particular, the impact of psychosocial factors such as socioeconomic status on return to work is under investigated. Furthermore, economic aspects of work-related problems such as absence from work, decline in work productivity, and early retirement have been only marginally considered so far. Feuerstein and Harrington [74] suggested within the recommendations for the U.S. National Occupational Research Agenda (NORA) the implementation of epidemiological studies on work and employment in cancer survivors, the identification of modifiable risk factors for unemployment, the detection and long-term surveillance of problems in affected workers as well as evidence based cost effective approaches.

From a psychosocial perspective the following research implications derived from the literature review:

The investigation of the impact of different and multimodal cancer treatments on physical, cognitive and psychosocial functioning and on work-related outcomes such as work ability, work productivity, employment and work changes using longitudinal approaches including various working conditions as well as early and more advanced stage cancer patients.

The investigation of self-reported cognitive impairments and fatigue following different cancer treatments relevant to work and employment and the exploration of possible neuropsychological correlates.

Development of valid measures of cancer- and treatment-induced work-related experiences and impairments for both cancer survivors, and employers considering physical, psychological, sociological aspects, as well as indicators that can be used for economic analyses.

The exploration of experiences of work ability and employment in cancer survivors from the perspective of employers. It is essential for the development of vocational interventions to gain information about the frequency of work-related impairments and problems of cancer survivors

in different companies and work sectors, and to gain knowledge about how employers deal with work-related problems among cancer survivors.

The exploration of economic effects and costs of work disability, work-related problems, decline in work-productivity and absence from work among cancers survivors through health economic analyzes of cancer-related productivity loss.

Development and evaluation of counseling interventions as well as rehabilitative occupational interventions to help patients return to work and to better adapt to work changes and new occupational responsibilities.

6. Conclusion

Developing a better understanding of cancer and treatment-induced work-related problems will facilitate cancer survivorship research. Developing new measures of work-related aspects in cancer survivors is critical to improving the understanding and assessment of central dimensions of work and occupational aspects in cancer survivorship. Although significant findings have emerged using existing measures of cancer and treatment-induced work-related aspects in cancer patients, the importance of work ability and employment, and the relationship between work ability, employment and physical, psychosocial, and cognitive functioning will be clarified by the development and validation of measures that are appropriate to cancer survivors. Despite the importance of work and employment-related issues in cancer survivorship, at present there are little attempts to investigate this area from a multidisciplinary perspective and understanding including psycho-oncological/psychosocial, neuropsychological, sociological and economic expertise. The identification of indicators of work-related problems and the use of enhanced assessment strategies and economic analyses are recommended and an essential step emerging from current research findings. Profound understanding of cancer and treatment-induced impairments and their impact on daily activities and work is an essential basis for the development of educational, rehabilitative and occupational interventions in cancer care. A better understanding of cancer and treatment-induced physical, cognitive and psychosocial treatment consequences related to work-related problems will help to develop interventions and educational programs for patients, health care professionals and employers to better address the needs of individuals with cancer in their professional life.

Reviewers

Professor Peter Herschbach, Munich Technical University, Department of Psychosomatic Medicine & Psychotherapy, Munich, Germany.

Dr. Angela E.M. de Boer, Coronel Institute for Occupation Health, Amsterdam, Netherlands.

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Biography

Anja Mehnert, Ph.D., is a research associate at the Department of Medical Psychology at the University Medical Center Hamburg-Eppendorf, Germany, since 1999. In 2005, she completed her Ph.D. (summa cum laude) and worked at the Department of Psychiatry and Behavioral Sciences at Memorial Sloan-Kettering Cancer Center, New York, as a postdoctoral research fellow (2007–2008). She has been principal investigator and co-investigator in several funded psycho-oncological research projects. Her academic qualification is documented by more than 30 research papers in national and international journals. Research topics included psychological aspects of predictive genetic testing for hereditary breast and ovarian cancer susceptibility; neuropsychological functioning and quality of life in the course of cancer treatment; prevalence of psychosocial distress, psychiatric disorders, need and utilization of psychosocial support in cancer patients, and work-related aspects in cancer survivorship.