D8.4 Models and good practices to improve cancer survivors' return to work in the MS

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Abbreviations and Acronyms

CCC	Comprehensive Cancer Centre
EC	European Commission
EU	European Union
RTW	Return to work
QOL	Quality of Life
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PI(C)O	Population, Intervention, (Comparison), Outcome
MMAT	Mixed Methods Appraisal Tool

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Executive Summary

Approximately 36% of the 4.4 million people diagnosed with cancer in Europe each year are of working age between 20 and 64 years. Considering the different return-to-work rates in Europe and the importance of work for the quality of life and health of individuals and for society, this review aims to provide an overview of the predictors of the return to work (RTW) process in Europe and to identify best practices presented in the included studies.

A systematic literature search was conducted in Embase, PubMed, and Web of Science in February 2023. The present review included cohort and cross-sectional studies, randomized controlled trials, and qualitative studies in German or English published since 2013. The outcome of interest was RTW and predictive factors that were associated with RTW among European cancer survivors of working age (study cohort $n \geq 200$). Two reviewers carried out the screening, data extraction, and quality assessment independently.

After completion of the screening process, the review included 76 papers — 12 with a qualitative design and 64 with quantitative methods. The included studies examined cancer survivors with various cancer diagnoses in 17 European countries regarding their RTW status. Predictive factors for RTW were identified. These factors were related to the social system, treatment, disease status, health behaviors, and the individual's psychosocial, work, and sociodemographic situation. These results can be used by providers to identify survivors at risk, reduce barriers, and guide cancer survivors through the RTW process. The studies that were identified did not provide evidence for best practices.

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Introduction

According to the World Health Organization, approximately 4.4 million people in Europe were newly diagnosed with cancer in 2020. Overall, there is a trend toward increasing numbers of cancer diagnoses due to demographic aging and increased survival[1–3]. As survival periods increase, it becomes even more important to take into account the burden represented by a cancer diagnosis, as the Global Burden of Disease Study ranked cancer as the second leading cause for disability-adjusted life years worldwide in 2019[4].

In view of these developments, it is crucial to address the challenges that cancer survivors face. There are many definitions of cancer survivorship; the present study defines cancer survival as the period from the time point of diagnosis until death[5,6]. In this context, Mullan (1985)[5] examined the different phases of cancer survivorship and divided them into acute, prolonged, and permanent survival. An important part of cancer survivorship, especially the permanent survival phase, revolves around the survivor's employment status, as 36% of new cancer diagnoses in Europe occur in the working-age population (20–64 years)[1,5,7]. Employment is a self-efficacy and identity-promoting factor that influences people's health, well-being, and quality of life (QOL)[8–10]. Cancer often leads to a temporary withdrawal from working life due to the treatment and side effects. The review by Pascual and Duffau (2022)[11] reported heterogeneous time points for return to work (RTW) among patients who had undergone surgery for cancer. In addition to the consequences for the individual cancer survivor, Hofmarcher et al. (2020)[2] indicated high estimates of indirect costs due to loss of work. The indirect costs of loss of productivity as a result of sickness absence or permanent disability due to cancer morbidity were estimated to be €20 billion in Europe in 2018[2]. Studies in European countries reported different RTW rates for cancer survivors and examined work-related, system-specific, health behavior–related, sociodemographic, psychosocial, and diagnosis-specific and treatment-specific predictors associated with the process[12,13].

However, there is currently a lack of an up-to-date overview that takes all of these predictors into account in European studies; the most recent dates back to 2018, and is limited to studies with various cancer diagnoses[14]. In view of the topic's increasing relevance, the present study addresses the following research question: What are the predictors for RTW among European cancer survivors? The research objective of this paper is to provide an overview of predictors, in order to contribute to the development of cancer survivorship programs, taking time points ofpredictive factors into account. The review includes a categorical classification of the predictors as well as an

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assignment to the phases of a patient pathway (pre-diagnosis, diagnosis, treatment, rehabilitation and follow-up).

Methods

The systematic literature review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)[15].

2.1 Screening process

The development of the search strings for the three databases PubMed, Web of Science and Embase complied with the population, intervention, comparison, and outcome (PI(C)O) scheme (Table A1). The systematic search of the three databases was carried out on February 7, 2023.

After identification of papers in the databases, the studies identified were imported into Rayyan, a systematic review tool[16]. One of the reviewers (SS) verified Rayyan's automatic duplicate detection. Two independent reviewers (SS, CB) carried out title/abstract screening in Rayyan and full-text screening in Excel. In the case of disagreement regarding inclusion, the two reviewers consulted a third reviewer (CK).

2.2 Inclusion and exclusion criteria

Since the authors are fluent in German and English, the review included papers in those languages. The last review on this topic took into account articles from 2010 to 2017, only including studies with various different cancer diagnoses, so this review aimed to synthesize cancer-specific and generic cancer studies from the last 10 years in order to provide a current overview[14]. The population of interest was European cancer survivors of working age, excluding childhood cancer. Due to precision of effect estimates, the present review excluded studies with a cohort $n < 200$ for all study designs except qualitative designs, like done in other reviews, e.g., de Boer et al. (2020)[17]. RTW was the outcome of interest, along with an examination of predictive factors. The study designs included were randomized controlled trials, cross-sectional studies, cohort studies, and qualitative studies (Table 1). However, the reviewers also took into account the literature in the identified reviews, using manual searching. The restrictions on study designs and the study cohort were added after the study protocol had been published in PROSPERO (ID: CRD42022382332)[18].

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Table 1: Eligibility criteria

Eligibility criteria
• Full text in German or English • Published from 2013 onwards up to February 7, 2023 • Population: cancer survivors of working age in European countries (no childhood cancer) • Study population: $n \geq 200$ • Outcome: RTW • Cohort studies, randomized controlled trials, cross-sectional studies, qualitative designs

2.3 Data extraction and quality assessment

The reviewers tested interrater reliability using 10% of the studies included for data extraction and quality assessment. Two reviewers then performed data extraction in an Excel data sheet and quality assessment using the Mixed Methods Appraisal Tool (MMAT). This quality assessment tool was used to examine selection bias, performance bias, study limitations, and risk of bias due to missing results (e.g., "Are there complete outcome data?")[19]. In addition, the reviewers reported any inconsistencies.

As there is a lack of universal operationalization of RTW, heterogeneous outcomes and their associations were assessed — e.g., disability pension and early retirement. Work ability was not defined as an RTW outcome. The data extraction table therefore contained the RTW operationalization, study characteristics, RTW rates, time points of measurement, and identified predictors and best practices. Significant associations ($p < 0.05$) between the outcome and the predictors were reported, with the direction of effect. In addition, the reviewers separately summarized the results of the studies that had a qualitative design.

Results

The systematic search returned a total of 9,610 records. After duplicates had been excluded, the reviewers assessed 7,293 papers for title/abstract screening. In the title/abstract screening process, the reviewers excluded 7,065 records, resulting in 228 full texts being sought for retrieval. Thirty-seven of these records were conference abstracts, abstracts, or not available with full text, leading to 191 studies in the full-

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text screening. Thirty-eight studies did not examine an outcome relating to RTW; 39 were non-European studies; two did not have a suitable study design, 25 had a study cohort *n* < 200, 12 did not explore any predictive factors, one study was published before 2013, and two full texts were not available in German or English. Four more records were included by screening the detected reviews, resulting in 76 papers being included in this review (Figure 1).

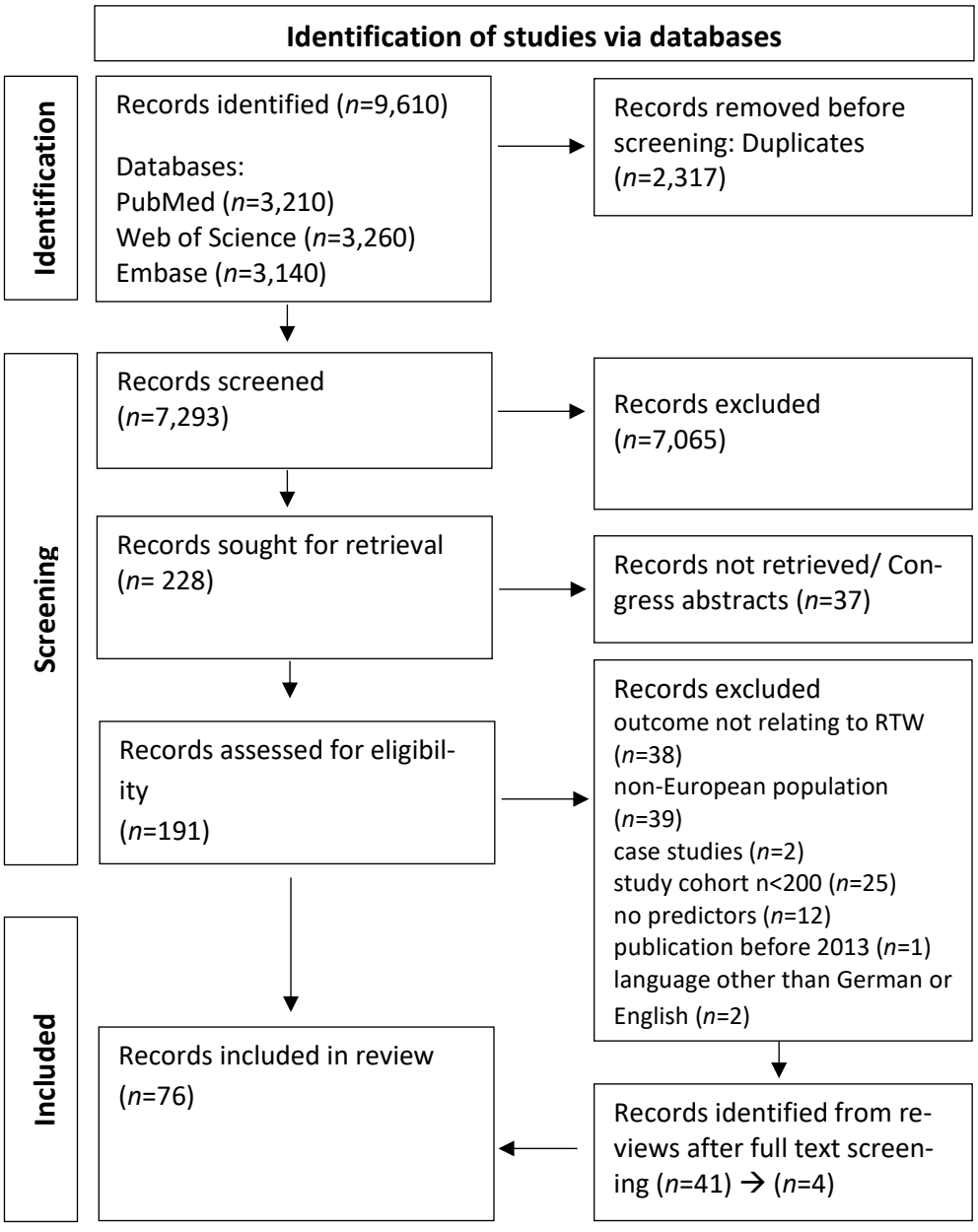

Figure 1: PRISMA flow chart

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3.1 Study characteristics

Among the 76 studies included, 12 (16%) applied qualitative approaches[20–31] — eight using interviews[20–25,27,28], three using focus groups[26,29,30], and one with an open-ended questionnaire[31]. The majority of the studies (*n* = 43) were cohort studies (57%)[12,32–73]; 24% (*n* = 18) used cross-sectional designs[74–91]; and three had other designs (one quasi-experimental design[92], one interventional study[93], and one with a mixed-methods approach[94]).

Among the studies included, 63% analyzed both female and male cancer survivors[12,20–24,27–29,31,33,34,36,37,40,41,44,45,48,51,54,56–59,62,63,66–70,74,76,77,79–81,83–85,87–90,92–94], only 7% examined male cancer survivors[35,42,71–73], and 30% examined only female cancer survivors[25,26,30,32,38,39,43,46,47,49,50,52,53,55,60,61,64,65,75,78,82,86,91].

Twenty-two studies explored various different cancer types[12,20,22,23,41,56–59,63,66,67,69,74,77,81,85,87,88,92–94], and 50 studies were cancer-specific — including breast cancer[25,26,30,38,39,43,47,49,50,52,53,55,60,61,64,65,75,82,86,91], prostate cancer[35,42,71–73], sarcoma[31,36], head and neck cancer[54,62,76,79,80], hematological malignancies[28,34,51,83,84], lung cancer[89], brain and spinal cord cancer[24,68,70], thyroid cancer[90], and gynecological[32,78] and colorectal cancer[33,37,40,44,45,48]. One study specifically examined rare cancers[27], one focused on early-stage cancers[46], one featured advanced cancer stages[21], and one study did not further define the study cohort[29].

The age span of the study cohorts ranged between 18 and 65 years. Two studies specifically analyzed young adult cancer survivors[56,77].

The studies included cohorts in different countries: 20 in Germany[12,34,36,43,49,56–59,65,66,69,71–73,76,89,92–94], 12 in the Netherlands[21–23,27–30,44,45,61,90,91], 11 in Denmark[37,38,50–54,63,67,81,85], 10 in Sweden[25,26,32,33,40,55,64,68,70,79], seven in Norway[24,42,48,75,77,78,83], five in France[39,46,47,74,82], three in the United Kingdom[20,35,41], two in Italy[87,88], and one each in Ireland[62], Portugal[60], and Switzerland[31]. Three studies analyzed data from various European countries[80,84,86].

A total of 73 different study cohorts were examined. Mehnert et al. (2013, 2017)[58,59], Paltrinieri et al. (2020, 2022)[87,88], and Ullrich et al. (2017, 2018)[72,73] each reported two sets of results for one study cohort.

There is no consistent operationalization of RTW, leading to different end points being used in the studies included. For ease of reporting, the present review summarized the outcomes into non-RTW or RTW. Details of the outcomes can be found in the data extraction table (Table A2). In 71% of the studies, the outcomes were self-reported[12,20–31,34–36,39,41–43,46,47,49,56–60,62,65,66,69,71–80,82–84,86–94], while 29% were registry-based studies[32,33,37,38,40,44,45,48,50–55,61,63,64,67,68,70,81,85].

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Most qualitative studies applied thematic content analysis[20–24,26–31], and one used a comparative similarities–differences technique[25]. Among the quantitative studies, two reported frequencies[63,93], while most used regression models to identify predictors[12,32–62,65–68,70,71,73–75,77–79,81–92,94]. There was one study with a multistate model[64], one performed univariate analysis[76], and three performed bivariate analysis[69,72,80] (Table A2).

3.2 Predictors of return to work

The studies that were included identified predictors related to the treatment, disease, social system, health behavior, and the patient's psychosocial, work, and sociodemographic situation. This classification has been applied similarly in other reviews[14]. The included studies did not provide evidence for best practices for return to work processes.

3.3 Quantitative studies

3.3.1 Sociodemographic predictors

Four studies reported a positive association between having children or carer responsibilities and RTW[48,49,74,91], while three studies showed a negative association of this with RTW[35,39,75]. Some studies did not observe any association with family status[47,55,56,88]. However, three studies reported negative associations with being divorced, separated, or single[35,38,88], while eight studies did not identify any association between marital status, living with a partner, or support by the partner and RTW[12,39,47,48,50,52,60,75]. The results of the studies included also showed inconsistencies regarding associations with the age of the cancer survivors[51,55,61,74]. Eighteen studies reported a positive association between younger age and RTW[12,35,36,47,58,60,64,68,69,72,73,75,78,83,86,89,90,93]. In contrast, six studies showed positive associations between higher age and RTW[33,38,44,49,52,88]. A few studies did not show any associations between RTW and age or, in one study, between RTW and menopausal status[38,42,48,56,59,70,76,77,82,86,91]. A higher educational level was positively associated with RTW in some studies[12,33,38,46,48,49,51,54,55,60,64,77,86,90]. However, other studies did not find any association between years of education or health literacy and RTW[36,37,41,50,52,56,65,68,70,75,88,92]. A higher income was negatively associated with RTW in two studies[54,61], but was positively associated with RTW in other studies[37,38,46,47,52,69,82,88,91]. Some other studies did not find any association between RTW and income[50,59,60,68,70,73,89]. Bennett et al. (2018)[35] reported positive associations between being non-white and RTW. Higher socioeconomic status was positively associated with RTW[47,71,72]. Female sex was negatively associated with RTW in five studies[51,68,77,83,84], but more often did not show any associations with RTW; the same also applied to gender[12,33,36,48,50,56,68,70,76,88]. Lindbohm et al. (2014)[86] examined differences in RTW rates between countries. The results showed negative associations

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with RTW for cancer survivors living in Denmark (in comparison with Finland) and positive associations with RTW for survivors living in Norway or Iceland (in comparison with Finland)[86]. The Swedish cohort studies by Beermann et al. (2022)[33] and Kvillemo et al. (2017)[55] found negative associations with RTW for cancer survivors who were not born in Sweden. A cohort study in Denmark reported a negative association with RTW for cancer survivors born outside of Denmark[38]. The study by Bennett et al. (2018)[35] in the United Kingdom observed a negative association between living in Scotland and RTW outcomes and a negative association between living in Northern Ireland and RTW outcomes. The type of residential area did not show any associations with RTW[48,55,60], with the exception of one cohort study in the United Kingdom, which showed negative associations with RTW for cancer survivors who live in areas of greater deprivation[35].

3.3.2 Work-related predictors

Manual work showed negative associations with RTW[12,38,82], as well as lower occupational class, blue-collar work, or being an associate professional compared to a professional, employee, or clerk[47,65,69,74,80,82]. Alleaume et al. (2018)[74] additionally reported on negative associations between working in the private sector and RTW. Being self-employed was reported to correlate positively with RTW in seven studies[12,35,36,44,61,62,69]. In contrast, Böttcher et al. (2013)[92] and Paltrinieri et al. (2020)[88] did not report any significant associations between RTW outcomes and type of occupation. With regard to the type of contract, some study results favored working full-time (versus part-time) at diagnosis or follow-up[41,47] and being flexible in the work schedule[41,59,85,91]. Paltrinieri et al. (2020)[88] did not report any significant association with the type of contract. Depending on social class —calculated as an index including education, household net income, and occupational position — job requirements were positively or negatively associated with RTW[59]. A high workload showed a negative association with RTW[66] in one study, but having occupational stress did not show any association in the study by Böttcher et al. (2013)[92]. Receiving support in the workplace showed positive associations with RTW in three studies[69,86,91]. Kollerup et al. (2021)[85] did not identify an association between RTW and psychological help at the workplace. A lack of appreciation and harassment at work were negatively associated with RTW[93]. Heinesen et al. (2017)[81] and Mehnert et al. (2017)[58] reported negative associations with job dissatisfaction and RTW. Seven studies reported on positive associations with RTW and working before diagnosis, treatment, or rehabilitation and having a direct trajectory back into employment[37,45,65,69,76,79,83]. Periods of sick leave [33,37,48,55,58,59,64,68,70,73] or unemployment[37,38,48,65,92], or an increased risk of early retirement[92], were negatively associated with RTW. Mehnert and Koch (2013)[59] did not find any association with unemployment before diagnosis[59]. A change in perceived work productivity or higher total work ability was positively associated with RTW[41,58,73,91,92]. Mehnert and Koch (2013)[59] did not identify any association between self-perceived

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work ability and RTW outcomes. An intention to return to work was positively associated with RTW at the beginning of rehabilitation and at follow-up[59,69,71]. The work-related predictors can be assigned to the time points before diagnosis, during diagnosis, treatment, rehabilitation and follow-up of the patient pathway.

3.3.3 Psychosocial and health behavior-related predictors

Rosbjerg et al. (2021)[67] reported that moderate physical activity levels at the start of treatment and during leisure time were positively associated with RTW. In addition to physical activity, studies examined predictors related to the mindset of the cancer survivors. Having greater control over the disease at work was positively associated with RTW[41], while believing that one's personal life is more important or wanting to retire showed negative associations with RTW[58,73,82,91]. Neuroticism showed a negative association with RTW[75]. While smoking was negatively associated with RTW in two studies[46,76], Dahl et al. (2019)[77] did not find any association between smoking and RTW. The psychosocial and health behavior-related predictors can be assigned to the time points during treatment and follow-up of the patient pathway.

3.3.4 Disease-related predictors

Having symptoms at the time of diagnosis and receiving a late diagnosis were negatively associated with RTW in two studies[35,52]. There were inconsistencies with regard to the elapsed time since diagnosis. The study by Bonilla et al. (2022)[36] reported a negative association between elapsed time and dropping out of work, but a positive association between elapsed time and disability pension. Tamminga et al. (2019)[91] and Dahl et al. (2019)[77] also reported negative associations between increased time since diagnosis and RTW.

Some of the studies examined associations with tumor types. Having melanoma skin cancer (versus various other cancer types) showed a positive association with RTW[88]; being diagnosed with cancer of the lips, mouth, or salivary glands (in comparison with the pharynx) was positively associated with RTW[62]; having a bone sarcoma or other soft-tissue sarcomas (versus other histological types), and having a retroperitoneal/abdominal tumor (versus thoracic and upper and lower limbs) showed negative associations with RTW in sarcoma patients[36]. Hematological cancer and sarcoma (in comparison with various other cancer types) showed a negative association with RTW[56], and having multiple myeloma or acute leukemia in comparison with other hematological malignancies showed negative associations with RTW[51]. In contrast, ten studies did not find any associations between RTW and the tumor site or characteristics of the tumor[12,33,36,37,48,50,54,64,70,92]. Having a poor cancer prognosis, higher cancer stage, severe disease status, distant metastases, and lymph-node involvement were negatively associated with RTW[12,33,35–37,44,46–49,52,55,61,64,70,73,74,82,89], but in some studies, associations with tumor stage or tumor size were not

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found[36,38,40,48,50,52,54,60,64,68,70,71,89,90,92]. Partial remission or having stable disease (versus complete remission), remission, and absence of tumor were positively associated with RTW[36,57,58]. Having a second cancer[83], presence of metastases after 2 years (no significant association after 1 year)[45], and adverse cancer events[59,64,74,77,84] showed negative associations with RTW. Weight loss in overweight breast cancer patients showed a positive association with RTW[46], having problems with bowel and urinary function showed a negative association with RTW[35], and a clear voice in patients 1 year after a laryngectomy was positively associated with RTW[69]. A lower functional level or physical QOL[37,41,42,47,68,69,75,86,88], having pain[58,64,74,76,78,86,93], fatigue[34,64,71,75,76,82,83,86,89,90,93], insomnia, post-diagnostic infection[64], difficulties in swallowing or with the voice or speaking[76,79], sequelae of head and neck cancer, constipation due to urological cancer[41], having a stoma[45], detrimental interactions[59], and weight loss in underweight patients[46] were negatively associated with RTW. Four studies did not find associations between side effects and RTW[47,75,77,78]. Better individual health or QOL was positively associated with RTW[49,76,77] while a poor mental health status or mental QOL[45–47,51,57,58,60,64,74,76–78,82,83,86,93,94], prediagnostic comorbidities[33,47,52,64,70], comorbidities at follow-up[35,46,51,54,56,68,74–78,82,86], and excess weight[46] were negatively associated with RTW. A higher Karnofsky performance status had a positive association with RTW[58,59]. In contrast, some studies found no associations with excess weight[77], comorbidities[37,38,49,64,68,70,78,90], physical functioning[59,70,71,73], or health status[41,42,46,59,60,68,69,90,92]. Hjorth et al. (2023)[50] examined the impact of single nucleotide polymorphisms after chemotherapy and identified a negative association between CYP3A5 rs776746 homozygotes (versus wild types) and RTW in breast cancer survivors. The disease-related predictors can be assigned to the time points before diagnosis, during diagnosis, rehabilitation and follow-up of the patient pathway.

3.3.5 Treatment-related predictors

Most treatment-related predictors referred to the treatment of breast cancer patients. Endocrine therapy had positive associations with RTW in comparison with no endocrine therapy or with combinations with other therapies (e.g., chemotherapy)[60,61,82]. Not receiving systemic treatment combinations was also negatively associated with RTW[82]. Receiving chemotherapy as a single therapy (versus no systemic therapy), receiving adjuvant human epidermal growth factor receptor 2 (HER2) therapy, and receiving combinations of chemotherapy and trastuzumab were negatively associated with RTW[46,47,64,75,82,88]. Targeted and adjuvant therapy showed negative associations with RTW in two studies[52,60]. The cohort study by Plym et al. (2019)[64] did not identify any associations with endocrine therapy and RTW in breast cancer survivors, but found a negative association with receiving radiotherapy. Hequet et al. (2022)[82] also reported negative associations between radiotherapy and RTW in breast cancer survivors. With regard to surgical treatment options, Paalman et al. (2016)[61]

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found a decreased risk of not returning to work in patients who received radiotherapy followed by a mastectomy, while a mastectomy combined with radiotherapy after chemotherapy or an axillary lymph-node dissection increased the risk of not returning to work. Mastectomy and axillary lymph-node dissection, in comparison with lumpectomy or sentinel lymph-node biopsy, were negatively associated with RTW[46,47,52,60,64,82]. In head and neck cancer survivors, an absence of laryngectomy, tracheostomy, and feeding tube showed a positive association with RTW[76] and not receiving chemotherapy[62]. Negative associations with RTW were reported in colorectal cancer survivors who received chemotherapy[44], adjuvant therapy[45], and radiotherapy[44], who did not receive curative surgery[37], who had a local or unknown procedure (versus rectal resection)[37], who had an abdominoperineal resection (versus anterior resection)[40], needed a reoperation[40], and had postoperative complications[37,40,45]. In patients with sarcoma, negative associations with RTW were reported in patients who received combined therapy (surgery, systemic radiotherapy) versus surgery alone[36]. Survivors of cancer in the brain or spinal cord who needed adjuvant therapy, biopsy, or were suffering from sequelae of the treatment showed negative associations with RTW, but repeat surgery due to a complication did not show any association[68,70]. Chemotherapy and treatment sequelae were negatively associated with RTW in various cancer types[32,74,88,93]. The study by Rick (2022)[66] reported a positive association with a higher number of chemotherapy cycles and RTW. Many treatment decisions did not show any significant association with RTW in 11 studies[38,40,42,47,50,56,57,60,76,77,88]. The treatment-related predictors can be assigned to the treatment phase of a patient pathway.

3.3.6 System-related predictors

Dayan et al. (2022)[43] reported that receiving social-service counseling was positively associated with RTW, while Rashid et al.[89] and Singer et al. (2013)[69] did not find any significant associations with the uptake of the service. Two other cohort studies in Germany identified a positive association between a gradual reintegration of cancer survivors into the workplace and RTW[65,66], and the study by Singer et al. (2013)[69] found positive associations between receiving a combination of in-patient and outpatient rehabilitation and RTW after total laryngectomy. Arndt et al. (2019)[12] and Heuser et al. (2018)[49] reported negative associations with RTW among cancer survivors who took part in a rehabilitation program. Two studies in Denmark examined the effect of reforms on the rates of retirement and disability pension. The study addressed the patient pathway in diagnosis, therapy, and rehabilitation. Both studies reported better RTW outcomes afterwards[53,63]. The study by Pearce et al. (2014)[62] in Ireland reported positive associations with RTW for not having medical insurance and for private insurance status. The system-related predictors can be assigned to the time points of rehabilitation and follow-up in the patient pathway.

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3.4 Qualitative studies

3.4.1 Psychosocial and health-behavior related predictors

Obtaining support and having a sense of being understood by co-workers and others — e.g., an occupational physician — were reported to support the RTW process[20–24,28–30]. Cancer survivors stated that gaining confidence and control over their lives and having social contacts at work, or feeling empowered, supported their RTW process[21,24,31]. Other facilitating psychosocial predictors mentioned were personalized guidance and awareness of legislation on the part of health-care professionals[27], participation in psychotherapy/rehabilitation programs or sports[23,28], and a fear of losing one's job otherwise[28]. Having contact with an occupational physician was not only described as a facilitator; some cancer survivors reported a lack of support and understanding for their wish to RTW on the part of occupational physicians[21,23,27–29]. Discouragement from the social network, having no support, or feeling overprotected hindered cancer survivors from RTW[20,24,31]. Personal predictors such as losing work confidence[24,29] and being too tough on oneself[28], a change of priorities, and taking the opportunity to pause, also prevented cancer survivors from RTW[23,25].

3.4.2 Work-related predictors

Having an opportunity to plan the RTW process, be flexible in work adjustments, discuss the limitations, and not be required to search for a new job were mentioned as facilitating predictors, as well as having a nonphysical job[20–22,24,28–30]. In contrast to those taking an opportunity to pause, some cancer survivors even missed the workplace and were glad to return to a regular daily routine again[25,31]. In addition, having a blue-collar job, already having negative work relationships, uncertainty about one's own work ability, difficulties in combining treatment plans and work, and, in some cases, prejudices about recurrent cancer on the part of the employer were perceived as barriers to RTW[28–30].

3.4.3 Disease and treatment-related predictors

In addition to work-related and psychosocial predictors, cancer survivors mentioned side effects of the disease or treatment, concerns about possible infections, and a poor prognosis as being barriers to RTW. In contrast, cancer survivors perceived a good prognosis and having no side effects as being facilitators for RTW[21–26,28–31].

3.4.4 Sociodemographic predictors

Higher age, having to take care of the household or family members, and the financial situation hindered cancer survivors to RTW[20,22,23,28–31].

3.4.5 System-related predictors

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Cancer survivors expressed a need for better information and a better understanding of their specific situation[21,24,27,28].

3.5 Quality assessment

Using the MMAT allowed to assess all study designs using a single tool. The first group of studies assessed consisted of quantitative, non-randomized studies (cohort and cross-sectional); the second group comprised qualitative studies; and the last group involved mixed-method approaches. Most of the studies had a clear research question and adequate data to answer it. Outcome measurement showed the most deficiencies, as many studies did not further define the assessment or operationalization of RTW[21–23,27,28,36,46,55,58,64–66,78,80,82,85] (Table A2). The studies that were included examined many independent variables, leading to some discrepancies in the tables and reporting of results in certain studies[36,82]. The reviewers wrote a comment in the quality assessment table when this was the case. Details of the quality assessment are presented in the supplementary material (Table A3).

Discussion

The present systematic review identified predictors related to the disease, treatment, social system, health behavior, and workplace, and also psychosocial and sociodemographic predictors, with some differing over the time course of the disease. System-related predictors included country-specific programs supporting RTW and rehabilitation. Psychosocial and health behavior–related predictors covered physical activity, self-efficacy, lifestyle decisions, and attitude regarding RTW. Treatment and disease-related predictors included treatment decisions, side effects, consequences, and comorbidities. Work-related predictors included workplace characteristics, ability to work, the intention to return to work, and the work situation before and after diagnosis. Studies reported on age, education, income, region, and family status as sociodemographic predictors. Most studies included the most frequent cancer entities, such as breast, prostate, and colorectal cancer. The studies examined cancer survivors in a total of 17 European countries.

Sociodemographic predictors such as age, family status, and income showed inconsistent results, being positively or negatively associated with RTW. This result does not align with the findings of another review, which reported on associations between older age and non-RTW[17]. One explanation for this might be the large number of studies included in the review, resulting in more heterogeneous populations, social systems, and cancer diagnoses. Cancer entities differ in their age of manifestation and severity, which may be an explanation for varying associations between RTW and age.

With the different social systems in the European countries included — e.g., regulations on social welfare — various incentives are present for cancer survivors to RTW.

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Income, family status, and age may also play a role in this context, since these predictors may be connected to the local social system. Consequently, it is rather difficult to take sociodemographic predictors into account at the European level, and research is needed on system-specific regulations. Stakeholders need to be aware of the social system and population-specific factors and how to address sociodemographic predictors for the RTW process in the relevant system.

Utilization of social-service counseling showed positive associations with RTW in the study by Dayan et al. (2022),[43] and it may play an important role in the provision of the support needed for cancer survivors. However, in the qualitative studies, cancer survivors reported a lack of knowledge among professionals about RTW and the relevant legislation. Some cancer survivors even reported that professionals were discouraging and did not take their wish for RTW into consideration[21,23,27–29]. In view of the qualitative results, merely implementing support services may not be sufficient, and targeted counseling that takes the individual patient's journey into account is necessary in order to better implement the potential of these services. To provide holistic counseling, professionals need to be sensitized to the different dimensions of RTW trajectories, taking into account the amount and quality of psychosocial support, as well as RTW legislation.

Since Arndt et al. (2019)[12] and Heuser et al. (2018)[49] reported negative associations between RTW and rehabilitation, it also seems important to reflect the survivors' situation depending on their cancer type and ability to work. One explanation for these results might be a higher rate of prescription of rehabilitation measures for cancer survivors with more fatal cancers and intensive therapy, who are not able to RTW afterwards. Another explanation might be the time point of measurement. The association might be negative while cancer survivors are still in rehabilitation, but cancer survivors may have a greater ability to work after completing rehabilitation and RTW afterwards.

Individual consideration of the cancer survivor's situation also appears to be relevant for work-related predictors. Many studies reported significant findings on the need for flexible work adjustment and support from colleagues and employers. Employers may be relevant stakeholders in this process. Since being employed before the diagnosis showed positive associations with RTW, cancer survivors who were not previously employed appear to need even more support in order to reenter the labor market. Survivors who are at risk can also be identified — by their type of work, for example, since manual work showed negative associations with RTW. Educational status and income can be linked to these observations, as already reported in the review by Paltrinieri et al. (2018)[14]. As the European Commission has a stated aim to achieve the goal of having 78% of the working-age population in employment by 2030, predictors can be used to improve European labor law regulations on RTW processes for cancer survivors[7].

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Treatment and disease-related predictors differed between the cancer entities, and side effects differed over time — e.g., the study by Rick (2022)[66] reported a positive association between RTW and a higher number of chemotherapy cycles. As a possible explanation, the author mentioned the large number of breast cancer survivors who RTW and often receive a higher number of chemotherapy cycles[66]. Specific consideration of disease-related and treatment-related predictors for cancer is becoming increasingly important in differentiating RTW processes in other diseases with high indirect costs, such as cardiovascular diseases. Therapy, treatment, rehabilitation, and follow-up measures vary and show different associations with RTW[95,96]. Cancer entity–specific research is needed in order to adequately address disease-related and treatment-related predictors in the RTW process, as stated in the review by Tan et al. (2022)[97].

The assignment of the predictors to the different phases of the patient pathway showed the need of an earlier intervention for return to work-support. Understanding the predictors and the different time points can help to develop tailored support during the whole patient journey including the early identification of cancer survivors at risk for non-RTW as well as early support for the cancer survivors.

A few limitations need to be considered to interpret the results of the present study. The lack of a standardized definition and assessment of RTW was a barrier to synthesizing the results, as well as the different study designs and methods. The studies assessed heterogeneous RTW outcomes (e.g., disability pension, employment status, and labor market affiliation) and their associations at many different time points, which may also be an explanation for inconsistencies. Studies based on registries or administrative data typically provided a better representation of the patient journey and labor market affiliation than cohort studies with self-reported RTW outcomes. Including different European countries also led to difficulties in synthesis, due to the various social systems, making it complex to derive universal predictors at the European level. Variations in measurements, statistical analyses, and adjustments might lead to inconsistencies in the results, so that the variation of predictors differing over time needs to be interpreted cautiously. In addition, interpretations in a causal framework need to be made cautiously.

Critical reflection on the methodological approach used in the present review is essential for interpreting the results. The search string was created in multiple phases and based on an exploratory literature search. However, the possibility cannot be excluded that additional terms, or the use of further databases, might have led to even more results. Further studies may have been excluded by the restriction of the publication language to full texts in English and German. In addition, the eligibility criteria of a cohort size of $n \geq 200$ might have led to the exclusion of studies with rare cancer

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entities, which might have provided more specific predictors for RTW in the population of rare cancer survivors. The MMAT tool also offered the option of rating bias with “yes,” “no,” or “can’t tell.” Although there were only a few studies without a clear research question or adequate data, qualitative differences that are not queried in detail by the items may still exist[98].

This review has been able to provide a systematic overview of predictors for RTW among cancer survivors in Europe. The results can be used to generate supportive measures for cancer survivors in their RTW process and to identify cancer survivors who are at risk of not returning to work due to their cancer history. It is apparent that the RTW process is characterized by many individual predictors and interactions between them, requiring flexible structures for the development of support measures. In view of the increasing incidence of cancer and improved chances of survival, social systems need adjustments in order to address cancer survivors’ challenges — e.g., cancer survivorship programs, as mentioned in the key actions of Europe’s Beating Cancer Plan[99]. Knowledge about the predictors assigned to the patient pathway and classification of them can help the providers who are involved to address barriers to RTW among cancer survivors. There is a need of awareness-raising and training for involved providers including social staff and employer. Additionally, more research is needed on ways of addressing the barriers identified in the different social systems and how cancer survivors could be supported in the patient pathway by the providers involved.

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Supplements

Table A1: Search string for PubMed, Web of Science, Embase

Table A2: Data extraction table

Table A3: Quality assessment of the included studies

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Table A1: Search string for PubMed, Web of Science, Embase

PubMed	((("carcinoma"[Title/Abstract] OR "neoplasms"[MeSH Terms] OR "neoplasms"[Title/Abstract]) AND "cancer"[Title/Abstract]) OR "sarcoma"[Title/Abstract] OR "krebs*"[Title/Abstract] OR "Karzinom"[Title/Abstract] OR "Sarkom"[Title/Abstract] OR "tumor*"[Title/Abstract] OR "oncolog*"[Title/Abstract] OR "onkolog*"[Title/Abstract] OR ((("cancer survivors"[MeSH Terms] OR "cancer survivor"[Title/Abstract]) AND "patient"[Title/Abstract]) OR "survivor*"[Title/Abstract])) AND ("return to work"[MeSH Terms] OR "return to work"[Title/Abstract] OR ("work"[Title/Abstract] AND "resumption"[Title/Abstract]) OR ("employment"[MeSH Terms] OR "employment"[Title/Abstract]) OR ("unemployment"[MeSH Terms] OR "unemployment"[Title/Abstract]) OR "employment, supported"[MeSH Terms] OR "employment supported"[Title/Abstract] OR "non-employment"[Title/Abstract] OR "job"[Title/Abstract] OR "vocation"[Title/Abstract] OR "career"[Title/Abstract] OR "karriere"[Title/Abstract] OR ("work"[Title/Abstract] AND "rehabilitation"[Title/Abstract]) OR ("workplace"[Title/Abstract] AND "integration"[Title/Abstract]) OR ("workplace"[Title/Abstract] AND "reintegration"[Title/Abstract]) OR ("vocation*"[Title/Abstract] AND "reintegration"[Title/Abstract]) OR ("vocation*"[Title/Abstract] AND "integration"[Title/Abstract]) OR "rehabilitation, vocational"[MeSH Terms] OR "rehabilitation vocational"[Title/Abstract] OR ("vocation*"[Title/Abstract] AND "rehabilitation"[Title/Abstract]) OR "occupation"[Title/Abstract] OR ("occupation*"[Title/Abstract] AND "rehabilitation"[Title/Abstract]) OR ("occupation*"[Title/Abstract] AND "integration"[Title/Abstract]) OR ("occupation*"[Title/Abstract] AND "reintegration"[Title/Abstract]) OR "retirement"[Title/Abstract] OR "pension"[Title/Abstract] OR "disability pension"[Title/Abstract] OR "erwerb*"[Title/Abstract] OR "rente*"[Title/Abstract] OR "wiedereingliederung"[Title/Abstract] OR "wiederaufnahme"[Title/Abstract] OR ("berufliche"[Title/Abstract] AND "rehabilitation"[Title/Abstract]) OR ("berufliche"[Title/Abstract] AND "integration"[Title/Abstract]) OR ("berufliche"[Title/Abstract] AND "reintegration"[Title/Abstract]) OR ("betriebliche"[Title/Abstract] AND "reintegration"[Title/Abstract]) OR "ruckkehr"[Title/Abstract] OR "arbeit*"[Title/Abstract] OR "Beruf"[Title/Abstract] OR "arbeitslosigkeit"[Title/Abstract] OR ("teilhabe"[Title/Abstract] AND "arbeit*"[Title/Abstract]) OR ("teilhabe"[Title/Abstract] AND "beruf*"[Title/Abstract])) AND ("predictor"[Title/Abstract] OR "prognostic factor"[Title/Abstract] OR "factor"[Title/Abstract] OR "influence"[Title/Abstract] OR "association"[Title/Abstract] OR "prädiktor"[Title/Abstract] OR "faktor"[Title/Abstract] OR "einfluss"[Title/Abstract] OR "determinant"[Title/Abstract] OR "facilitator"[Title/Abstract] OR "barrier"[Title/Abstract] OR "risk"[Title/Abstract] OR "risk factor"[Title/Abstract]) AND (("english"[Language] OR "german"[Language]) AND 2013/01/01:2023/12/31[Date - Publication])
Web of Science	1: TS=("cancer survivor*" OR carcinoma OR cancer OR sarcoma OR Krebs* OR Karzinom OR Sarkom OR Tumor* OR Oncolog* or Onkolog* or neoplasm) 2: TS=("return to work" OR vocation OR employment OR (work AND resumption) OR unemployment OR "supported employment" OR non-employment OR job OR career OR Karriere OR (work AND rehabilitation) OR (workplace AND integration) OR (workplace AND reintegration) OR (vocation* AND reintegration) OR (vocation* AND integration) OR "vocational rehabilitation" OR (vocation* AND rehabilitation) OR occupation OR (occupation* AND rehabilitation) OR (occupation* AND integration) OR (occupation* AND reintegration) OR retirement OR pension OR “disability pension” OR erwerb* OR rente* OR wiedereingliederung OR Wiederaufnahme OR (berufliche AND rehabilitation) OR (berufliche AND integration) OR (berufliche AND reintegration) OR (betriebliche AND reintegration) OR ruckkehr OR arbeit* OR (Teilhabe AND Arbeit) OR (Teilhabe AND Beruf) OR Beruf OR Arbeitslosigkeit) 3: TS=(Predictor OR Prognostic Factor OR factor OR influence OR association OR Determinant OR Facilitator OR Barrier OR risk OR risk factor OR prädiktor OR Faktor OR Einfluss) 4: (TS=(survivor*)) OR TS=(patient) 5: #1 AND #2 AND #3 AND #4 6: #1 AND #2 AND #3 AND #4 and 2023 or 2022 or 2021 or 2020 or 2019 or 2018 or 2017 or 2016 or 2015 or 2014 or 2013 (Publication Years) 7: #1 AND #2 AND #3 AND #4 and 2023 or 2022 or 2021 or 2020 or 2019 or 2018 or 2017 or 2016 or 2015 or 2014 or 2013 (Publication Years) and English or German (Languages)
Embase	1 exp 'cancer survivor'/ 2 'cancer survivor*'.ab,ti. 3 sarcoma.ab,ti.4 "Krebs*".ab,ti. 5 Karzinom.ab,ti. 6 Sarkom.ab,ti. 7 "Tumor*".ab,ti. 8 "oncolog*".ab,ti. 9 predictor.ab,ti. 10 'prognostic factor'.ab,ti. 11 influence.ab,ti.

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	12 association.ab,ti. 13 factor.ab,ti. 14 determinant.ab,ti. 15 facillitator.ab,ti. 16 barrier.ab,ti. 17 risk.ab,ti. 18 'risk factor'.ab,ti. 19 pradiktor.ab,ti. 20 faktor.ab,ti. 21 exp return to work/ 22 exp vocational rehabilitation/ 23 exp employment/ 24 exp work resumption/ 25 exp supported employment/ 26 exp unemployment/ 27 'return-to-work'.ab,ti. 28 'vocational rehabillitation'.ab,ti. 29 (integration and workplace).ab,ti. 30 (integration and vocation*).ab,ti. 31 (integration and occupation*).ab,ti. 32 (reintegration and workplace).ab,ti. 33 (reintegration and vocation*).ab,ti. 34 (reintegration and occupation*).ab,ti. 35 retirement.ab,ti. 36 pension.ab,ti. 37 employment.ab,ti. 38 non-employment.ab,ti. 39 'supported employment'.ab,ti. 40 unemployment.ab,ti. 41 job.ab,ti. 42 career.ab,ti. 43 Karriere.ab,ti. 44 (work and rehabilitation).ab,ti. 45 occupation.ab,ti. 46 (occupation* and rehabilitation).ab,ti. 47 'disabillity pension'.ab,ti. 48 "Erwerb*".ab,ti. 49 "Rente*".ab,ti. 50 Wiederaufnahme.ab,ti. 51 (Berufliche and rehabilitation).ab,ti. 52 (berufliche and reintegration).ab,ti. 53 ruckkehr.ab,ti. 54 "Arbeit*".ab,ti. 55 Beruf.ab,ti. 56 "vocation*".ab,ti. 57 work resumption.ab,ti. 58 (vocation* and rehabilitation).ab,ti. 59 "onkolog*".ab,ti. 60 einfluss.ab,ti. 61 exp malignant neoplasm/ 62 neoplasm.ab,ti. 63 patient.ab,ti. 64 survivor*.ab,ti. 65 (9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 60) 66 (63 or 64) 67 cancer.ab,ti. 68 carcinoma.ab,ti. 69 (1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 59 or 67 or 68) 70 (21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58) 71 (65 and 66 and 69 and 70) 72 limit 71 to ((english or german) and yr="2013-Current")

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Table A2: Data extraction table

Author(s) and publication year	Study design	Country	*n*	Age	Sex	Cancer type	Time point(s) of measure-ment	Outcomes	Operationalization of RTW	Analysis	Summary statistics	Predictors	No association, adjustments
Alleaume et al. (2018) [74]	cross-sectional	France	969	18-54 years	female and male	various	2 and 5 years after diagnosis	chronic neuro-pathic pain, employ-ment (re-tention), working hours, fa-tigue, men-tal health functioning, self per-ceived health sta-tus, comor-bidity	self-reported no employ-ment reten-tion = no em-ployment 5 years after di-agnosis	logistic regressio n	81.6 % em-ployed 5 years af-ter diag-nosis (from those em-ployed at diagno-sis)	being younger than 40 or older than 50 at diag-nosis, pos. having de-pendent children, neg. working in private sec-tor, pos. socio-pro-fessional status (exe-cution), pos. poor cancer prognosis, pos. adverse cancer event, pos. receiving chemother-apy, pos. comorbidi-ties, pos.	wages at diagnosis + adjust-ments: gender, comorbid-ity, prog-nosis, ad-verse event in the 5 years af-ter diag-nosis

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												poor mental health score, pos. chronic neuropathic pain, pos.	
Armaou et al. (2018) [20]	qualitative design (methods: interviews)	United Kingdom	23	mean: 50 (20-65 years)	female and male	various	at least 2 weeks post treatment initiation	RTW plans, feelings about RTW, goals, barriers to RTW	self-reported RTW = defined as a process of getting ready and able to return	thematic analysis	NA	support from co-workers, pos. (but, concerned about being overprotected) support of others, pos. discouragement of others, neg. flexibility at work, pos. having financial benefits, pos. having a non-physical job, pos. not being required to	x

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												search for a new job, pos.	
Arndt et al. (2019) [12]	cohort study	Germany	1558	mean: 50.1 at diagnosis (18-54 years)	female and male	various	5 to 15 years after cancer diagnosis	changes in employment status, financial difficulties	self-reported employment status = returned to former job, uptake of a new job, unemployment, disability pension, early retirement (not cancer-related), other reasons	logistic regression	63% returned to old job	younger age at diagnosis, pos. less advanced stage of disease at diagnosis, pos. higher education, pos. non-manual work, pos. self-employment, pos. participating in an oncological rehabilitation, neg.	tumor site, marital status, type of (neo)adjuvant therapy, gender, sex
Baloch et al. (2022) [32]	cohort study	Sweden	247	19-64 years	female	gynecological cancer	2 years after external pelvic radiotherapy	disability pension	registry-based disability pension = full or partial reduction in work capacity (at least 25%) because of sickness or disability (Binary: granted/not granted)	regression analysis	27 % disability pension	radiation-induced gastrointestinal syndromes, pos.	x

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Beerda et al. (2022) [21]	qualitative design (method: interviews)	The Netherlands	15	mean: 52 (range: 41-64 years)	female and male	advanced cancer (various)	during incurable stage of cancer	changes in work situation, meaning of work, role of the employer in RTW and experienced support, dutch (longterm) sick leave legislation, work related needs and recommendations	self-reported not further defined	thematic analysis	NA	be part of society, pos. gaining confidence, pos. support from colleagues, pos. having support/ a central person of contact, pos. OPs and employers too eager with suggesting disability pension, neg. having to apply for a new job, neg. feeling empowered, pos. lack of attention for work in hospitals, neg. being understood by employer,	x

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												pos. side effects of treatement / disease, neg.	
Beermann et al. (2022) [33]	cohort study	Sweden	6679	18-62 years (biggest group: 56-60 years)	female and male	colorectal cancer	up to 5 years after diagnosis	sickness absence, disability pension	registry-based disability pension = dichotomized 0 or >0 days/year	logistic regression	year 5: 17.3 % in disability pension	higher age, neg. country of birth not sweden, pos. lower educational level (<12 years), pos. higher cancer stage, pos. ≥ 2 Charlson comorbidity 3 years prior to diagnosis, pos. pre-diagnostic	sex, cancer type + adjustments (not further defined)

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												mental morbidity, pos. > 30 days of sickness absence in the second year before diagnostic, pos.	
Behringer et al. (2016) [34]	cohort study	Germany	1706	median: 34 (range: 18-60 years)	female and male	hodkin Lymphoma	5 years after end of therapy	fatigue, progression free survival, overall survival, employment, financial problems, frequency of medical consultation	self-reported employment = full time, at least or less than half time, retirement pension, homemaker, unemployed, disability pension, other --> for regression dichotomized: working or in education/ not working	logistic regression	21.2 % not working at year 5	fatigue, neg.	adjustments: age, sex, GHSG stage (at follow-up time points: baseline employment status, treatment outcome)
Bennett et al. (2018) [35]	cohort study	United Kingdom	35823	up to 60 years	male	prostate cancer	between 18 and 42 month after diagnosis	employment status	self-reported moving from employment to unemployment, from emploment to retirement, remaining in emploment	logistic regression	81.4 % remained in employment 6.2 % moved to unemployment 11.4 %	from employment to unemployment: late stage at diagnosis, pos. greater	x

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											moved into retirement	comorbidity, pos. problems with bowel and urinary function, pos. having symptoms at diagnosis, pos. living in areas of greater deprivation, pos. being divorced/ separated,pos living in Scotland, pos. from employment to retirement: higher age, pos. living in Northern Ireland, pos. higher stage at diagnosis, pos.	

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												having carer responsibilities, pos. non-white, neg. being self-employed, neg.	
Bohn et al. (2022) [75]	cross-sectional	Norway	1361	mean: 56 years	female	breast cancer	8 years after diagnosis	reduced work status	self-reported change in work status= reduced work status (not holding paid work at survey anymore) and maintained work status	logistic regression	63% maintained work status	older age at diagnosis, pos. > 2 comorbid condition vs. 0, pos. lower cognitive function, pos. more fatigue, pos. neuroticism, pos. not living with children, neg. chemotherapy alone vs. no systemic treatment, pos.	living with partner, years of education, sleep problems, neuropathy, pain, arm symptoms, breast symptoms, depressive symptoms, fear of cancer recurrence, health literacy

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Bonilla et al. (2022) [36]	cohort study	Germany	364	25% were 18–39 years, 39% were 40–54 years, and 36% were > 55 years	female and male	sarcoma	12 months after study inclusion (not further defined)	receiving disability pension, drop out of work, limitations at the workplace	self-reported disability pension and drop out of work (not further defined)	logistic regressions, generalized linear regression	not in employment during follow up: 21.3 %	disability pension:higher age groups, pos.self-employed vs. other occupational groups, neg. increasing time with diagnosis, pos. diagnosis of "other soft tissue sarcoma" vs. other histological types, pos. retroperitoneal/abdominal tumors vs. thoracic and upper and lower limbs, pos. higher grades, pos. drop out of work:self-employment vs.	disability pension: sex, school educationdrop out of work: sex, age, school education, site, grading at diagnosis, treatment status at t0

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												other occupational groups, neg. more time since diagnosis, neg. bone sarcomas and other soft tissue sarcomas vs. liposarcoma patients, pos. partial remission or stable disease vs. complete remission, neg. combined therapy including surgery plus (systemic) radiotherapy vs. surgery only, pos.	
Böttcher et al. (2013) [92]	quasi-experimental design	Germany	333	mean: 49.4 years	female and male	various	1 year after end of rehabilitation	non-RTW	self-reported non-RTW = not returned to their old job, begin of a new job or	logistic regressions	21 % no RTW	unemployment at the beginning of rehabilitation, pos. elevated risk of early retirement,	education, type of occupation, household income, cancer

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									begin of occupational retraining			pos. limited self-assessed work-ability, pos.	site, tumor stage, depression, effort-reward imbalance (ERI) occupational stress (SIBAR), duration of sick leave, occupation related intervention

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Broemer et al. (2021) [76]	cross-sectional	Germany	231	mean (at diagnosis): 54.63 years (at time point 3-12 month after diagnosis)	female and male	head and neck cancer	3 to 12 month after diagnosis	functional characteristics, psychological characteristics, employment status, rehabilitation status, physician reported outcomes	self-reported employment status= employed vs. unemployed	univariate analysis	after 6 month: 63.6 % unemployed after 17 month: 56.4 % unemployed	after 6 month: lower tumor stage, pos. absence of laryngectomy or tracheostomy or feeding tube, pos. difficulties in swallowing, neg. voice difficulties, neg. fatigue, neg. anxiety, neg. depressive symptoms, neg. smoking, neg. diminished global QOL, neg. after 17 month: being employed after 6 month, pos. additional disease	sex, age at diagnosis, time since diagnosis, diagnosis, therapy, drinking alcohol

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												burden, neg. absence of trachestomy or feeding tube, pos. difficulties with pain and speaking on the phone, neg. higher levels of fatigue, anxiety, depressive symptoms and lower QOL, neg.	

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Carlsen et al. (2013) [37]	cohort study	Denmark	4343	18-63 years	female and male	colorectal cancer	1 year postdiagnosis	RTW after sickness absence, sickness absence, retirement	registry-based labor market status= work, sickness absence, unemployment and disability.	cox proportional hazard model	1 year after operation: 62 % were in work, 32 % were sick listed, 6 % were unemployed	RTW after sickness absence: previous periods of work, pos. previous periods of sickness absence, neg. previous periods of unemployment, neg. stage II or III (vs. I), neg. having no curative surgery (vs. yes), neg. having local or unknown procedure (vs. rectal resection), neg. having postoperative complications, neg. transition into retirement: being unemploye	education, type of cancer (rectal or colon), comorbidity + adjustments for RTW after sickness absence: SES, confounder and clinical variables

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												d, pos. disposal income (second lowest, second highest or highest vs. lowest), neg. stage II (vs. I), pos. ASA II or III (vs. I), pos.	
Carlsen et al. (2014) [38]	cohort study	Denmark	14750	18 years and older (biggest group 47-52 years)	female	breast cancer	2 years after diagnosis	risk of unemployment	registry-based not in work = receipt of unemployment benefit (both full-time and part-time) or social income	cox regression	two years after treatment, 81% part of the work force: 72% in work, 10% unemployed,13% on sick	unemployment before diagnosis, pos. low education, pos. low income, pos. manual work, pos. single vs. married/ cohabiting, pos. country of	treatment, comorbidities (physical and mental), menopausal status, tumor size, no. of positive lymph nodes

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											leave, remaining 5 % were students, in labor market arrangements, or on other kind of leave	birth (other vs. Denmark), pos. older age, neg.	
Caumette et al. (2021) [39]	cohort study	France	3004	median: 48 (range: 23-56 years)	female	breast cancer	2 years after diagnosis	RTW, decrease in working time	self-reported RTW, not further described	logistic regression	about two thirds of the women worked full-time two years after diagnosis, 17 % changed to a part time job, 18% were still working part-time	living with a partner, neg. single without dependent children vs. living with a partner and having dependent children, pos.	perceived support by the partner, marital status + adjustments for age, household income, stage, comorbidities, treatments and their side effects

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Chen et al. (2015) [40]	cohort study	Sweden	2815	median (at diagnosis): 55 years	female and male	rectal cancer	median of 6 years after diagnosis	disability pension	registry-based disability pension = information from the MiDAS database	poisson regression	10 years after diagnosis: 23.3% received disability pension	abdominoperineal resection vs. anterior resection, pos. any postoperative complications (within 30 days), pos. surgical complications, pos. reoperation, pos.	tumor stage, preoperative or postoperative treatment, non-surgical complications, hospital volume + adjusted for sex, age at diagnosis, calendar period, educational level, region, sick leave before and unemployment 1 year before diagnosis

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Cooper et al. (2013) [41]	cohort study	United Kingdom	290	mean: 55 (range: 28-65 years)	female and male	various	6 and 12 month after treatment	RTW	self-reported RTW = paid employment	regression analysis	10 % of head and neck cancer patients did not RTW between 6-8% of patients with urological, gynecological and breast cancer did not RTW	breast cancer: greater control over the effect of their cancer at work, pos. working full time (vs. part time), pos. gynecological cancer: treatment impairs ability to work, neg. head and neck cancer: perceiving greater consequences as a result of their cancer, neg. greater level of physical functioning, pos. urological cancer: constipation, neg.	academic attainment, illness perceptions (in relation to work), anxiety and depression + adjustments: treatment type and mutually

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												flexible work, pos.	
Dahl et al. (2019) [77]	cross-sectional	Norway	1189	median (at survey): 49 (range 27-65 years)	female and male	various	2 to 30 years after diagnosis	employment status, current work-ability	self-reported employment status= not employed (work assessment allowance, disability pension, others like students or homemakers) vs. employed (full and part time and on sick leave)	logistic regression	75 % employed	longer time since first cancer diagnosis, pos. higher mean number of adverse effects, pos. female sex, pos. lower level of basic education, pos. comorbidity, pos. depression and lower level of general health, pos.	age at survey, treatment group, fatigue, smoking, obesity

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Dahl et al. (2020) [78]	cross sectional	Norway	354	median (at diagnosis): 39 years (range: 24-58); median (at survey): 50 years (range: 33-67)	female	cervical cancer	5 to 12 years after diagnosis	occupational status, disability pension, fatigue, anxiety and depression, health related QOL, neurotoxicity, workability	self-reported disability pension, not further defined	logistic regression	24 % disability pension	age at survey, pos. having musculoskeletal disease, pos. depression, pos. pain, pos.	cardiovascular disease, chronic fatigue, sleep, lymphedema
Dahl et al. (2014) [42]	cohort study	Norway	264	mean: 59.2 years	male	prostate cancer	3 months after radical prostatectomy	work status, health related QOL	self-reported full time work, part time, sick leave, rehabilitation, job seeking, disability pension, retirement pension --> defined as stable/improved or declined after 3 month	logistic regression	73 % improved / stable work status	change in physical QOL, neg.	age, surgical method, change in mental QOL
Dayan et al. (2022) [43]	cohort study	Germany	456	biggest group 50-59 years	female	breast cancer	5 years after surgery	awareness and use of social service counselling, financial problems, role functioning, clinical	self-reported employment= full time, part time, less than part time, housewife, unemployed, disability retirement, retirement, other	logistic regression	70 % in employment	receiving social service counselling, pos.	adjustment: employment at baseline, age, chemotherapy, disease progression

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								data, employment status					
de Wind et al. (2021) [44]	cohort study	The Netherlands	12007	mean (at diagnosis): 55.4 years	female and male	colorectal cancer	2 to 4 years after diagnosis	loss of paid employment, unemployment benefits, social welfare, disability pension	registry-based loss of paid employment= transition from paid employment to receiving disability benefits, unemployment benefits and social welfare	cox regression	37 % loss of paid employment after 4 years	disability benefits: receiving chemotherapy, pos. receiving radiotherapy, pos. higher cancer stage, pos. being older >60, neg. being self-employed, neg. unemployment benefits: higher cancer stage, neg. being self-employed, neg. loss of paid employment: receiving radiotherapy, pos.	disability benefits: surgery, targeted; unemployment benefits: surgery, chemotherapy, targeted loss of paid employment: surgery, chemotherapy, targeted

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												higher cancer stage, pos. higher age >60 , neg.	
den Bakker et al. (2020) [45]	cohort study	The Netherlands	317	mean: 54.4 years	female and male	colorectal cancer	1 and 2 years after the start of sick leave	RTW	registry-based RTW= binary yes or no (yes: at least 28 days of full work resumption after the sick leave ended with no loss of earning capacity)	logistic regression	year 1: 37.2 % RTW year 2: 67.5 % RTW	after 1 year: receiving adjuvant therapy, neg. having a stoma, neg. emotional distress, neg. after 2 years: presence of metastases, neg. emotional distress, neg. postoperative complications, neg. direct trajectory	after 1 year: metastases, postoperative complications after 2 years: company size

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												of RTW, pos.	
Di Meglio et al. (2020) [46]	cohort study	France	1869	mean (at diagnosis): 46.8 years	female	breast cancer (early stage)	2 years after diagnosis	non-RTW	self-reported non-RTW, not further defined	logistic regression	21.3 % non-RTW	overweight, pos. primary or lower education (vs. college or higher), pos. household income <3000€/month, pos. Charlson 1+, pos. anxiety (vs. non-case), pos. being a current smoker, pos. tumor stage III vs. I, pos. breast surgery vs. partial surgery, pos. adjuvant	adjustments: Body Mass Index, human epidermal growth factor receptor 2, metabolic equivalent of task) age, menopausal status, depression, physical activity, axillary surgery, (neo)adjuvant chemotherapy, adjuvant

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												anti Her2 therapy, pos. association of weight changes with non-RTW: underweight: weight loss, pos. overweight: weight loss, neg. association	endocrine therapy
Duijts et al. (2017) [22]	qualitative design (method: semi-structurd telephone interviews)	The Netherlands	28	mean: 52 (range: 28-62 years)	female and male	various	1 to 2 years after diagnosis	perspectives and experiences regarding RTW	self-reported not further defined	thematic analysis	NA	fatigue, neg. type of contract, pos. or neg. age, pos. or neg. flexibility, pos. attitude of employer/ colleagues, pos. Or neg. counseling from OP, pos. concerns	x

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												about prognosis, neg. influence from social network, pos. or neg. financial factors, pos. or neg.	
Dumas et al. (2020) [47]	cohort study	France	1874	mean (at diagnosis): 47 years	female	breast cancer	2 years after diagnosis	non-RTW	self-reported non-RTW= binary varibale, grouping full and part time	logistic regression	21.3 % non-RTW	working part time, pos. older than 50 years, pos. mastectomy and axillary node dissection, pos. received combinations of chemotherapy and trastuzumab, pos. stage II & III breast cancer, pos. prediagnosis comorbidities, pos.	chemotherapy, partnership, number of children, work-life imbalance, radiotherapy, severe breast morbidity, severe physical fatigue, severe cognitive fatigue, severe systemic therapy adverse effects

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												lower occupational class and income, pos. severe physical toxicity as per CTCAE, pos. severe arm morbidity, pos. anxiety, pos. depression, pos. severe emotional fatigue, pos.	adjustments: treatment variables, clinical and socio-economic covariates, CTCAE toxicities, PROs (t1)
Granstrom et al. (2020) [79]	cross-sectional	Sweden	295	mean: 55 (range: 33-61 years)	female and male	oropharyngeal cancer	15 month after diagnosis	work situation, QOL	self-reported working = working full time, part time, studying; not working = on sick leave, unemployed, retired, other	logistic regression	72 % working	working 1 month before diagnosis, pos. having swallowing difficulties, neg. having trouble talking on the phone, neg.	x

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Groeneveld et al. (2013) [23]	qualitative design (method: interviews)	The Netherlands	10	mean: 56 years	female and male	various	after completing an 12 week posttreatment exercise program (chemotherapy)	RTW and work performance, physical exercise program after treatment	self-reported RTW= binary (yes or no, not further defined)	thematic analysis	NA	having no financial urge, neg. contact with an OP, pos. or neg. change of priorities, neg. physical exercise, pos. or neg.	x
Handschel et al. (2013) [80]	cross-sectional	Germany, Austria, Switzerland	1652 (755 working at diagnosis)	missing	female and male	oral cancer	not further described (but RTW rates at 3, 6, 12 and more than 12 month)	RTW	self-reported RTW= binary (RTW or no RTW), not further defined	bivariate analysis	37 % of blue collar workers RTW 59 % of white collar workers RTW	blue collar workers, neg.	x
Hass et al. (2018) [93]	intervention study (non-randomized)	Germany	228	intervention group: mean 48.7 yearscontrol group: mean 50.1 years	female and male	various	after finishing the rehabilitation program	RTW, psychological burden, barriers for RTW	self-reported not futher defined	descriptive, not further described	18.2 % retraining recommended, 38.6 % recommendation for gradual reintegration, 11.4 % temporary par-	fatigue, neg. psychological burden, neg. missing appreciation or mobbing, neg. age/ close to pension, neg. pain, neg. consequences of treatment, neg.	x

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											tial disability pension, 14.5 % full disability pension, 17.6 % short-term incapacitated for work without further recommendation	postoperative lymphedema, neg.	
Hauglann et al. (2014) [48]	cohort study	Norway	1480 (740 pairs)	mean (at diagnosis): 51 years	female and male	colorectal cancer	9 to 14 years after diagnosis	sick leave and disability pension	registry-based disability pension= being granted a benefit due to reduced work-ability of 50%)	regression models	at the end of observation period: 36% of patients in disability pension	distant cancer, pos. low level of education, pos. unemployment at diagnosis, pos. long sick-leave in the year prior of diagnosis, pos. not having children <18 at home, pos.	regional cancer, cancer site, residence area, marital status, gender, age

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Heinesen et al. (2017) [81]	cross-sectional	Denmark	2457	mean: 51.3 years	female and male	various	3 years after diagnosis	employment	registry-based employed = working for most of the year (not further explained)	regression models	3 years after diagnosis: 82.5 % employed	pre-cancer job dissatisfaction with mental demands, neg. (correlation is driven by the high-educated) job dissatisfaction with physical demand or superior, neg. association (correlation is driven by low-educated)	controls include indicators of missing information on the job dissatisfaction variables (and the ability to work variables), and dummies for cancer type, cancer stage at diagnosis, comorbidity, gender, age, family type, local unemployment rate 3 years after diagnosis, year of diagnosis

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Hequet et al. (2022) [82]	cross-sectional	France	969	median (at questionnaire): 50 years (range: 28-91 years)	female	breast cancer	1 and 2 years after treatment	non-RTW, work capacity	self-reported non-RTW, not further defined	logistic regression	97% working at the time of diagnosis, 31% continued work during treatment, 69% took at least 1 sick leave, among these 83% RTW at time of the questionnaire	1 year after treatment: treatment with combination of chemotherapy and trastuzumab vs. chemotherapy plus endocrine therapy, pos. endocrine therpay alone and none vs. chemotherapy plus endocrine therapy, neg. manual workers, pos. lower income, pos. Fatigue, pos. 2 years after treatment: occupational category: technicians and	age, sequelae after treatment

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												associate professionals, clerks, self-employed, manual worker vs. professionals and managers, pos. comorbidities, pos. anxiety symptoms, pos. change of priorities, pos. stage III vs. stage I, pos. radiotherapy yes vs. no, pos. mastectomy plus axillary dissection vs. conservative surgery plus sentinel node dissection, pos. no combination of	

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												systematic treatments, pos.	
Hernaes et al. (2021) [83]	cross-sectional	Norway	225	mean (at questionnaire): 52 years; mean (at diagnosis): 40 years	female and male	lymphoma	up to 18 years after treatment	employment status, work situation, work-ability	self-reported employment status= full time workers (having a full time job, being self-employed or on sick leave), part time workers (part time job), not employed (unemployment insurance, disability insurance, temporary disability insurance, homemaker) --> for follow up binary: being employed or not	logistic regression	at time of survey: 69% employed	employed before HDT-ASCT, pos. female sex, neg. higher age at survey, neg. second cancer, neg. chronic fatigue, neg. anxiety, neg.	no association with working part time: sex, age, second cancer, chronic fatigue

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Heuser et al. (2018) [49]	cohort study	Germany	577	older than 18 years (biggest group: 50-54 years)	female	breast cancer	40 weeks after surgery	RTW	self-reported RTW = binary (yes/no)	logistic regression	64 % return to previous job	intermediate secondary school education/entrance certificate for a university of applied sciences vs. university entrance certificate, pos. 55-59 vs. 15-44, pos.children, pos.rehabilitation, neg. better individual health status, pos. UICC stage II-IV vs. I, neg.	family status, native language, health insurance status, comorbidities, ASA classification
Hjorth et al. (2023) [50]	cohort study	Denmark	1964	median: 46 years	female	breast cancer	6 months to 10 years after surgery	RTW, stable labor market attachment	registry-based RTW= 4 consecutive weeks of work stable labor market attachment= 12 consecutive weeks of work	cox regression	94% and 93% RTW after 10 years	CYP3A5 rs776746 homozygotes vs. wildtypes, neg.	covariates: patient, tumor, and treatment characteristics included age group,

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													comorbidities, education level, cohabitation/marital status, household income, ER status combined with endocrine therapy, double/triple negative tumors, TNM stage, grade (in ductal and lobular tumors), surgery type, and intended radiotherapy
Horsboel et al. (2013) [51]	cohort study	Denmark	1741	median: 46 (range: 19-55 years)	female and male	hematological cancer	followed until RTW, emigration, permanent withdrawal from labor	RTW	registry-based RTW= four consecutive weeks without receiving benefits	cox regression	65 % RTW during study period	type of hematological malignancy (MM, AML/ALL vs. HL), neg.	comorbidity, household inocme, ethnicity, family type

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							market, death, or 26 February 2012					use of antidepressants or anxiolytics, neg. women vs. men, neg. age (46-50 vs. 1-45, pos. and 51-55 vs. 41-45), neg. higher educational level, pos.	
Jensen et al. (2019) [52]	cohort study	Denmark	16886	less than 64 years at diagnosis	female	breast cancer	1 year after diagnosis	RTW	registry-based RTW= being self-supporting one year after diagnosis of breast cancer	poisson regression	63% with history of psychiatric medication had RTW one year later, 69% with no history of psychiatric medication RTW	prior use of psychiatric medication, neg. high income, pos. older age, pos. disease severity, neg. later year of diagnosis, neg. mastectomy vs.lumpectomy, neg. adjuvant treatment vs. none, neg. higher	marital status, tumor size, educational attainment + adjustment for demographic, clinical, and socioeconomic variables

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												lymph node involvement, neg.	
Juul et al. (2022) [84]	cross-sectional	13 European countries	2037	median (at survey): 47 (range: 25-84 years)	female and male	hodkin Lymphoma	after participating in a randomized controlled trial (1964-2004, 5 to 45 years after diagnosis)	employment situation	self-reported employment situation= not employed (homemaker, student/pupil, unemployed, disabled, retired, other) vs. employed	logistic regression	69.7 % employed	female sex, pos. increasing age at diagnosis and survey, pos. lower educational level, pos. relapse, pos.	cancer stage, treatment type, country
Khan et al. (2023) [53]	cohort study	Denmark	69 403	median (in the year before diagnosis): 64 years	female (+ male controls)	breast cancer	diagnosed between 2004 and 2006, follow up until 2013 for early retirement	long term survival, early retirement, weeks of unemployment	registry-based early retirement= reduced workability due to health state	cox proportional hazard regression	15 % reduced risk of early retirement	reduced risk after reform	x

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Kjær et al. (2013) [54]	cohort study	Denmark	2436	median: 52 years	female and male	head and neck cancer	1 year after diagnosis	affiliation to the Danish work market	registry-based 5 groups: early retirement due to disability, pensioner due to age (65 years), self selected anticipatory pensioner, unemployed, employed	logistic regression	21 % unemployed 1 year after diagnosis	unemployment (specific: early retirement): short or medium education, pos. disposable income in the first and second to third quartiles, pos. living alone, pos. comorbidity score or ≥3, pos.	cancer-related factors (tumor site or stage) + adjustments: age, gender, year of diagnosis
Kollerup et al. (2021) [85]	cross-sectional	Denmark	3285	mean: 50 years	female and male	various	3 years after diagnosis	RTW	registry-based employment, not further defined	logistic regression	x	flexible work schedule, pos.	psychological help at the workplace + control variables: cancer type, cancer stage at diagnosis, comorbidity, gender, age, level of

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													education, job type, family type, and diagnosis year, pre-cancer work experience, job seniority, pre-cancer job dissatisfaction, and post-cancer ability to work
Kvillemo et al. (2017) [55]	cohort study	Sweden	3547	biggest group: 51-55 years	female	breast cancer	5 years after diagnosis	diagnosis-specific sickness absence, disability pension	registry-based disability pension, not further defined	logistic regression	year 5: breast cancer accounted for 12% of disability pension days	prediagnostic sickness absence, pos.advanced cancer, pos.born outside Sweden, pos.education below university level, pos.56 to 60 years vs. 46-50 years, pos>61	family situation, type of living area

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												years vs. 46-50 years, neg.	
Leuteritz et al. (2020) [56]	cohort study	Germany	505	mean (at diagnosis): 29.7 (range: 18-39 years)	female and male	various	12 month after completion of treatment	employment status and work-related characteristics	self-reported employment status= employed (full time, part time, self-employment), student or in vocational training, unemployed, disability pension, other non-employed --> for logistic regression binary (change in employment status or no change in employment status)	logistic regression	83.4 % RTW or continued work during treatment	having comorbid disease, neg. tumor type (hematological cancer and sarcoma), neg.	gender, age, educational degree, having children, time since diagnosis, number of therapies

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Liaset & Kvam (2018) [24]	qualitative design (method: interviews)	Norway	4	missing	female and male	brain tumor	after treatment	experience of RTW process	self-reported employment status= seeking for employment, part time, full time	thematic analysis	NA	fatigue symptoms, neg. gaining control and be social, pos. loss of work confidence, neg. missing information about long term effects, neg. support of family and friends, pos. having the ability to adjust work task and positions, pos. having limitations in working task while looking for a job, neg. having no support from the employer, neg.	x

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												having support from the employer, pos.	
Lieb et al. (2022) [57]	cohort study	Germany	430	mean: 52.4 (range: 20-64 years)	female and male	various	during hospitalization and after 12 month	work status, mental health parameters	self-reported non-working = non-RTWk after 1 year or being unemployed or being at sick leave 12 month after hospitalization vs. working = RTW after 1 year and not on sick leave 12 month after hospitalization	logistic regression	73.7% RTW	absence of a tumor, neg. lower distress, neg. lower depression, neg.	treatment status

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Lilliehorn et al. (2013) [25]	qualitative design (method: interviews)	Sweden	56	mean: 49 (range: 31-60 years)	female	breast cancer	after completing radiation treatment (between 18 and 24 month)	experience of diagnosis, contact with health care system, everyday life before diagnosis, expectations of future life, work situation	self-reported work situation= work situation before diagnosis, sick-listing periods, relationship to the workplace, plans and ideas about RTW, experiences in RTW process	comparative similarities-differences technique	NA	feeling too fragile to work, neg. taking an opportunity to pause, neg. perceiving the workplace as a discouraging place, neg. needing a pause, neg. "loosing the taste of work", neg. work as a structure, pos. missing work, pos.	x

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Lindbohm et al. (2014) [86]	cross-sectional	Finland, Norway, Denmark, Iceland	1111	25-57 years at time of diagnosis; 26-63 years at time point of measurement	female	breast cancer	1 to 8 years after cancer diagnosis	non-employment	self-reported non-employment= early retirees (disability based or non disability based), other non-employed	logistic regression	82 % employed	retired early: older age, pos. having other chronic diseases, pos. living in Denmark, pos. lower education (compared to college/university), pos. weak support from colleagues, pos.having moderate or a lot pain, pos. physical QOL <40, pos. other non-employed: having a chronic disease, pos. living in Denmark, pos. living in Norway or Iceland, neg. lower	retired early: living in Norway or Iceland, having support from the supervisor, anxiety, depression, fatigue, mental QOLother non-employed: age, support from the colleagues, anxiety, depression

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												education (only comprehensive school), pos. weak support from supervisor, pos.having moderate or a lot pain, pos. often fatigue symptoms, pos. physical QOL <40, pos. mental QOL <50, pos.	

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Mehnert & Koch (2013) [59]	cohort study	Germany	750	mean: 48.7 years	female and male	various	at the beginning of rehabilitation, at the end, 12 month after	employment	self-reported RTW= "Are you currently working?" (yes/no)	logistic regression	75.7 % RTW	cancer recurrence/cancer progress/metastasis, neg. higher Karnofsky status, pos. detrimental interactions, neg. sick leave, neg. intention to RTW, pos. perceived employer accomodation, pos. job requirements (among cancer survivors in higher social class), pos.	age, income, number of functional impairments, pain, physical QOL, mental QOL, unemployment, self perceived work-ability

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Mehnert et al. (2017) [58]	cohort study	Germany	750	mean: 48.7 years	female and male	various	at the beginning of rehabilitation, at the end, 12 month after	employment scope and status, sickness absence, job satisfaction, work-ability	self-reported early retirement, not further defined	logistic regression	12 month after rehabilitation: 12.5 % retirement pension (temporary or permanent)	increased age, pos. pain, pos. Karnofsky performance status at t0, neg. remission, neg. on sick leave, pos. desire to retire early, pos. absenteeism (90 days or more), pos. perceived work productivity (reduced or better), neg. work satisfaction, neg. mental QOL, neg.	x

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Monteiro et al. (2019) [60]	cohort study	Portugal	242 (employed before diagnosis)	median (at diagnosis): 54.9 years (of all included 462)	female	breast cancer	3 and 5 years after diagnosis	employment status	self-reportednon-employment= unemployment (unemployed and housewives), early retirement (with less than 65 years), normal retirement, sick leave	logistic regression	among the prior employed, after three years: 70.2% employed, after five-years: 66.9% employed	at 3 years: older age, pos. higher educational level, neg. hormone therapy, neg. targeted therapy, pos. at 5 years: older age, pos. higher educational level, neg. depression, pos. axillary surgery, pos.	marital status, income, residence, anxiety, cancer stage, breast surgery, chemotherapy, radiotherapy
Nilsson et al. (2013) [26]	qualitative design (method: focus groups)	Sweden	23	mean: 53 years; median: 54 years (range: 37-62 years)	female	breast cancer	3 to 13 months after breast care surgery	reflections regarding RTW	self-reported full time, part time, sick leave, unemployment	thematic analysis	NA	uncertainty of the treatment side effects, neg. fearing infections, neg. suffering from fatigue, neg. emotional consequences (anxiety, low-spiritedness, lack of	x

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												mental energy, depressive mood), neg.	
Olischläger et al. (2023) [27]	qualitative design (method: interviews)	The Netherlands	16	mean: 49 (range: 30-64 years)	female and male	rare cancer (defined as occuring in fewer than 6 per 100 000 people per year)	up to 5 years after diagnosis	experience with RTW and rare cancer, specific challenges	self-reported RTW, not further defined	thematic analysis	NA	lack of understanding/knowledge from HCPs in the type of cancer, neg. lack of awareness regarding type of cancer, neg. awareness among the impact of legislation, pos. being forced to do research on their own, neg. no support from occupational physician especially regarding rare cancer diagnosis,	x

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												neg. personalized guidance, pos.	
Paalman et al. (2016) [61]	cohort study	The Netherlands	26120	up to 55 years at diagnosis	female	breast cancer	0 to 2 years after diagnosis, 2 to 5 years after diagnosis, 5 to 7 years after diagnosis, 7 to 10 years after diagnosis	loss of paid employment, disability benefits, unemployment benefits and social welfare	registry-based combined measure of work-related events= loss of paid employment, receiving disability pension, unemployment benefits or welfare	regression models	after 10 years 65.5 % at least one work-related event	up to 10 years: younger patients, pos. higher stage, pos. self-employed, neg. axillary lymph node dissection, pos. mastectomy and radiotherapy after chemotherapy, pos. mastectomy after radiotherapy, neg. hormone therapy, neg. in the first 5 years: higher	adjustments for treatment effects: age, time since diagnosis, individual income before diagnosis, self-employment, subsequent cancer events adjustments for other effects: age, income before diagnosis, self-employment

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												stage, pos. increased tertile of personal income before diagnosis, pos. at 7-10 years: age group 45-50 at diagnosis, pos.	
Paltrinieri et al. (2022) [87]	cross-sectional	Italy	266	average: 51.1 years	female and male	various	4 to 5 years after diagnosis	RTW, work accomodations, workload	self-reported RTW= returned without any difficulty, returned with some difficulty, non-RTW	logistic regression	without any difficulties: 52.6%, some difficulties: 42.5%, lost their job: 4.9%	x	adjusted for age and sex

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Paltrinieri et al. (2020) [88]	cross-sectional	Italy	266	156 up to 50 years, 110 over 50 years	female and male	various	4 to 5 years after first diagnosis	RTW, sick leave pattern	self-reported non-RTW= returned without difficulty or not at all	logistic regression	52.6 % returned with no difficulty, 42.5 % returned with some difficulty, 4.9 % non-RTW	older age, neg. being divorced, pos.having an income from 36 153 to 70 000 euro or over 100 000, neg. having an uncertain type of company, pos. having melanoma skin cancer, neg. receiving chemotherapy, pos. having physical limitations, pos.	gender, having children, educational level, type of employment, type of contract, number of workers, surgery, radiotherapy, hormone therapy
Pearce et al. (2014) [62]	cohort study	Ireland	264	mean (at diagnosis): 52 years; median: 53 (range: 23-81 years)	female and male	head and neck cancer	1 and 5 years after diagnosis	patient demographics, cancer diagnosis, support needs during and after treatment, QOL, work and financial situation	self-reported workforce participation (dichotomized)	logistic regression	60 % RTW after 1 year, 65 % after 5 years	1 year after diagnosis: having no medical card status, pos. cancer of lips, mouth, salivary (compared to pharynx), pos.	5 years after diagnosis: cancer site, employer, health insurance, chemotherapy

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												being self-employed at time point of diagnosis, pos. private insurance status, pos. not receiving chemotherapy, pos. 5 years after diagnosis: having no medical card status, pos.	
Pedersen et al. (2020) [63]	cohort study	Denmark	111773	20-60 years	female and male	various	5 years before and 5 years after reform	disability pension	registry-based disability pension= binary (yes = by first grant)	descriptive (risk differences)	before reform: 10 561 disability pension (RD: 9.71) after reform: 2570 disability pension (RD: 7.63) --> risk difference 5	reform, neg.	adjustments: gender, age, education, income, ethnicity, comorbidity, sick leave

											years after reform: -2.05		

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Persoon et al. (2019) [28]	qualitative design (method: interviews)	The Netherlands	15	median: 48 (range: 30-59 years)	female and male	hematological cancer	1 to 5 years after treatment	RTW process, work perceptions, barriers to and facilitators of RTW, solutions to improve RTW	self-reported RTW, not further defined	thematic analysis	NA	impairments due to cancer treatment, neg. physical impact of the disease (fatigue, weakend immune system e.g.), neg. mental impact (e.g., cognitive functioning), neg.temperament and personality functions (e.g., being too tough for oneself), neg.absence of side effects, pos. recovery of side effects, temperament and personality functions, pos. taking	x

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												care of household and/or children, neg. commuting, neg.psychotherapy or rehabilitations programs or sports, pos. gaining required information, pos. discuss perceived limitations with supervisors/colleagues, pos.plan RTW, pos. no possibilitiy of work adjustments, neg. already negative work relations existing, neg. missing understanding from supervisors, colleagues and costumers,	

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												neg. not having physically heavy work, pos. keeping in touch with and having support from supervisors/colleagues, pos. occupational physician, pos. lack of RTW support from hospital, neg. social support, pos. fear of loosing job or financial difficulties, pos.	

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Plym et al. (2019) [64]	cohort study	Sweden	16603	median (at diagnosis): 53	female	breast cancer	5 years after diagnosis	sick leave and disability pension	registry-based disability pension, not further defined	multistate model	15 % of women with breast cancer at year 5 on sick leave, disability pension or were deceases	post diagnostic cancer metastasis, pos. post diagnostic mental disorder, pos. post diagnostic fatigue, pos. pain, pos. insomnia, pos. post diagnostic infection, pos. over 45 years, pos. education lower than 12 years, pos. prior sick leave, pos. lymph node involvement N1, N2+, pos. chemotherapy, pos. mastectomy, pos. ALND (vs. SNB only), pos.	endocrine therapy, ER status, tumor size, lymphedema, inflammatory disease, cardiovascular disease, musculoskeletal disease + adjustments: age at diagnosis, calender year of diagnosis, highest level of education, region of residence, sick leave 1-2 years prior diagnosis, hospitalization for the medi-

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												radiother-apy, pos.	cal condi-tion of in-terest in the 5 years prior to diagnosis, treatment and tu-mor char-acteristics
Rashid et al. (2021) [89]	cross-sectional	Germany	232	mean: 54.3 (range: 32-64 years)	femal e and male	lung cancer	minimum after 1 year of surviving after diag-nosis	employ-ment sta-tus, inten-tion to RTW and RTW	self-reported RTW = binary (yes/no)	logistic regressio n	51 % did not RTW	older age at diagnosis, neg. UICC stage II, III or IV (in compar-ison with stage I), neg. fatigue, neg.	disease status, in-come, use of social service counsel-ling
Rick (2022) [66]	cohort study	Germany	787	median control group: 59; me-dian gradual	femal e and male	various	6 month after medical rehabiliati on	work reten-tion, work-ability, work loads	self-reported RTW (Würz-burger Screening Bo-gen, not fur-ther defined)	logistic regressio n	control group: 51.3 % RTWgrad ual rein-tegration	gradual re-integration, pos. work load, neg. number of	x

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				reinter-gration group: 57							group: 94 % RTW	chemother-apy cycles, pos.	
Rick et al. (2021) [65]	cohort study	Germany	396	median: 50 years	femal e	breast cancer	6 to 9 months af-ter end of rehabilita-tion	occupation al reintegratio n	self-reported occupational reintegration, not further defined	logistic regressio n	82 % working	employ-ment at the time of the diagnosis, pos. job pre-served af-ter medical rehabilita-tion, pos. employee status vs. blue-collar worker, pos. gradual re-integration according to the Ham-burger model, pos.	vocational training, university degree
Rosbjerg et al. (2021) [67]	cohort study	Denmark	217	mean: 52 years (work-ing/ part time sick leave group);	femal e and male	various	12 month after base-line (initia-tion of chemo-therapy)	work status	registry-based work status= at work (full or part time and part time sick leave), not at work (sickness ab-sence com-pensation,	logistic regressio n	at base-line: 38 % working, 71 % working at 12 month after baseline	high to moderate level of daily physi-cal activity at baseline, pos. being physical active in	adjust-ments: age, gen-der, edu-cation level, baseline work sta-tus, treat-

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				mean: 50 years (full time sick leave group)					permanent exit or death)			the leisure time, pos.	ment intention, performance status, pre-illness physical activity RTW self efficacy index as a mediator was rejected
Ryden et al. (2020) [68]	cohort study	Sweden	381	mean: 41.4 years	female and male	low-grade glioma	1 and 2 years after index date (date of surgery)	sick leave compensation, RTW	registry-based RTW= as soon as no longer compensation was received, return could be partial or complete	logistic regression	52 % RTW after 1 year 63 % RTW after 2 years	after 1 year: previous absence from work, neg. older age, neg. lower functional level, neg. receiving adjuvant therapy, neg. after 2 years: lower functional level, neg. previous absence	income, education, sex, history of seizure, history of depression, tumor size

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												from work, neg. biopsy (as opposed to resection), neg. female sex, neg. comorbidity, neg.	
Singer et al. (2014) [94]	mixed methods	Germany	491	average: 46 years (range: 19-55 years)	female and male	various	baseline at start of treatment and 15 month after	mental health, retirement	self-reported early retirement= receiving a full health-related early retirement pension according to the German Statuatory Pension Insurance scheme	poisson regression model	incidence rate of early retirement 7.2 per 100 person years	above poverty threshold and depression, pos. below poverty threshold and anxiety, pos.	below poverty threshold and adjustment disorders, depression or alcohol dependence + adjustments: age, sex, living situation, education, baseline employment, somatic comorbidity
Singer et al. (2013) [69]	cohort study	Germany	231	30-60 years (biggest	female and male	patients with laryngectomy	1 and 3 years after	employment status	self-reported employment	bivariate analyses (Chi2 &	1 year: 13 % working,	1 year after laryngec-	gender, vocational training,

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				group: 50-60 years)		(not cancer specific)	laryngectomy		status= working, in training, homemaker, early retirement, disability pension	Mann-Whitney)	2 years: 15 % working, 3 years: 14 % working	tomy:working before laryngectomy, pos.employees or clerks vs. blue-collar workers, pos.good physical function (ERTC QLQ-C30), pos.clear voice (PLTT15), pos.help from colleagues, pos.RTW perceived as important goal at begin of rehabilitation, pos.2 years after laryngectomy:working before laryngectomy, posage under 50 years,	type of voice replacement, harmful substances at workplace, help from responsible offices, alcohol dependency, distress at the end of rehabilitation

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												pos.meaning of work perceived as important at begin of rehabilitation, pos.RTW perceived as important goal at begin of rehabilitation, pos.inpatient and outpatient rehabilitation vs. only inpatient, only outpatient or none, pos.3 years after laryngectomy:age under 50 years, pos.self-employment before laryngectomy, pos.higher equivalised	

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												household income before laryngectomy, pos.help from colleagues, pos.	
Tamminga et al. (2016) [90]	cross-sectional	The Netherlands	223	mean: 49.5 years	female and male	thyroid cancer	within 6 month after diagnosis	employment outcomes and work changes, insurance outcomes, associated factors, QOL	self-reported non-RTW= no employment	logistic regression	71 % employed	higher age at time of survey, pos. lower educational level, pos. higher level of fatigue, pos.	cancer stage, comorbidity, depression, anxiety
Tamminga et al. (2019) [91]	cross-sectional	The Netherlands	906	mean (at survey): 54.3 years	female	breast cancer	between 10 and 5 years after diagnosis	adverse work outcome	self-reported adverse work outcome= working 20% less in hours, combination with early retirement, stopped working, receiving disability benefits or unemployment benefits, being sick-listed without employment contract, household tasks, no	logistic regression	36 % with adverse work outcome 5-10 years after diagnosis	time since breast cancer diagnosis, pos. having sufficient financial resources, neg. higher total work-ability, neg. higher number of children to take care of, neg. feeling supported at	age

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									paid employment			work during treatment and thereafter, neg. ability to adjust working hours, neg. not desiring to work less hours if that were to be financially feasible prior to diagnosis, pos. thinking of work as less important, pos.	
Thurin et al. (2020) [70]	cohort study	Sweden	956	mean: 48 years	female and male	meningioma	2 years after surgery	RTW	registry-based RTW= any work-related activity	logistic regression	57.3 % working 2 years after surgery	net days absent year before surgery, neg. history of depression, neg. tumor grade II or III, neg. new deficit postoperative, neg.	sex, age, income, education, history of seizure, comorbidity, functional level, re-operation because of compli-

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													cation, tumor size, skull base
Ullrich et al. (2022) [71]	cohort Study	Germany	519	average : 57 years	male	prostate cancer	12 and 36 month after rehabilitation	work status, changes in work status due to cancer, working hours, interpersonal relationships at work	self-reported not working= unemployment, disability pension, retirement	logistic regression	72.6 % working at 36 month	older age, pos. low or middle socio-economic status, pos. higher symptom burden due to fatigue, pos.expressing unambitious or resigned working behavior at the beginning of rehabilitation, pos.	tumor stage, physical functioning, being ambitious, being unclear about work behavior, having the intention to apply for a disability pension

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Ullrich et al. (2017) [72]	cohort Study	Germany	711	mean: 56.8 (range: 40-64 years)	male	prostate cancer	12 month after rehabilitation	RTW intentions, perceived work readiness, work status, job stability	self-reported RTW= operationalized by criteria suggested for use within the German rehabilitation setting: (a) having returned to work, (b) less than 12 weeks of sick leave in the year following the rehabilitation measure, and (c) not having applied and not intending to apply for a disability pension after the rehabilitation measure	bivariat (Chi2)	62% RTW	younger age, pos. higher SES, pos.	x

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Ullrich et al. (2018) [73]	cohort study	Germany	711	mean: 57 (range: 40-64 years)	male	prostate cancer	12 month after rehabilitation	RTW, work status, time until RTW	self-reported non-RTW= unemployed, disability pension, retirement	logistic regression	87 % RTW	older age, pos. tumor stage III, pos. sick leave of 6 weeks and more in the years proceeding the rehabillitation program, pos. perceived work-inability, pos. lacking capacity to former job and related working tasks, pos. intention to apply for disability pension, pos.	income, QOL/ global health status, physical functioning, occupational stress

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van Egmond et al. (2017) [29]	qualitative design (methods: focus groups)	The Netherlands	17	mean: 51 (range: 31-58 years)	female and male	not further described	1 to 6 years after diagnosis	job loss experience, guidance by insurance physicians, motivation for work and meaning of work, psychosocial, work-related and cancer-related barriers and facilitators for RTW, experiences with RTW	self-reported employment status= unemployed, voluntary job, fixed contract, temporary contract	thematic analysis	NA	side effects of treatments, neg. combining treatment plans and work, neg. no work arrangements, neg. feeling forced to stop working by circumstances or employer, neg. lack of confidence, neg. receiving support and guidance from their environment, pos. uncertainty about work-ability, neg. housekeeping next to work, neg. starting slowly and gradually,	x

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												pos. employers doubts, neg. prejudices of the employer for cancer recurrence, neg. physician advise not to RTW, neg.	

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van Maarschalkerweerd et al. (2020) [30]	qualitative design (method: focus groups)	The Netherlands	19	39-59 years	female	breast cancer	5 to 10 years after diagnosis	RTW and barriers and facilitators, employment changes, social support, interventions for RTW, meaning of work, control of the RTW process	self-reportedRTW= full time, part time	thematic analysis	NA	blue collar work, neg.little flexibility in working hours, neg.high workload, neg.high expectations from employer, neg. fatigue, neg. concentration, neg. memory problems, neg. depression, neg.taking care of family members, neg. recession, neg. age, neg.support of colleagues and employer, pos.receiving a good prognosis, pos.	x

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Zambrano et al. (2020) [31]	qualitative design (method: open ended questionnaire)	Switzerland	15	average (at participation): 42.7 (range: 27-55 years); average (at diagnosis): 36 (22-48 years)	female and male	soft tissue and bone sarcoma	up to 20 years after treatment	motivation and experiences of RTW	self-reported questions= "What do you think were the main challenges that you faced as you returned to your occupation and why? How has the illness made an impact (positive or negative) since you returned to your occupation?"	inductive approach to thematic analysis	NA	gaining distance from the illness, pos. lack of understanding, neg. not having significant disease or treatment-related symptoms anymore, pos. getting control and structures, pos. having contact with others, pos. having a place in society, pos. growing as individuals, pos. income and financial independence, pos.	x

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Table A3: Quality assessment of the included studies

Quantitative non-randomized								
Author(s), publication year	**Are there clear research questions?**	**Do the collected data allow to address the research question?**	**Are the participants representative of the target population?**	**Are measurements appropriate regarding both the outcome and intervention (or exposure)?**	**Are there complete outcome data?**	**Are the confounders accounted for in the design and analysis?**	**During the study period, is the intervention administered (or exposure occurred) as intended?**	**Comment**
Alleaume et al. (2018)[74]	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	
Arndt et al. (2019)[12]	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	
Baloch et al. (2022)[32]	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	
Beermann et al. (2022)[33]	Yes	Yes	Yes	Can't tell	Yes	Yes	Yes	
Behringer et al. 2016)[34]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Bennett et al. (2018)[35]	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	
Bohn et al. (2022)[75]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Bonilla et al. (2022)[36]	Yes	Yes	Yes	No	No	Yes	Yes	Inconsistencies in table and text
Böttcher et al. (2013)[92]	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	
Broemer et al. (2021)[76]	Yes	Yes	Can't tell	Yes	Yes	No	Yes	
Carlsen et al. (2013)[37]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Carlsen et al. (2014)[38]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Caumette et al. (2021)[39]	Yes	Yes	Yes	Can't tell	Yes	Yes	Yes	
Chen et al. (2015)[40]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	

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Cooper et al. (2013)[41]	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	
Dahl et al. (2014)[42]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Dahl et al. (2019)[77]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Dahl et al. (2020)[78]	Yes	Yes	Can't tell	Can't tell	Yes	Yes	Yes	
Dayan et al. (2022)[43]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
De Wind et al. (2021)[44]	Yes	Yes	Yes	Can't tell	Yes	Can't tell	Yes	
Den Bakker et al. (2020)[45]	Yes	Yes	Yes	Yes	Yes	Can't tell	Yes	
Di Meglio et al. (2020)[46]	Yes	Yes	Yes	Yes	No	Yes	Yes	
Dumas et al. (2020)[47]	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	
Granstrom et al. (2020)[79]	Yes	Yes	Yes	Yes	Yes	Can't tell	Yes	
Handschel et al. (2013) [80]	No	Yes	Can't tell	Can't tell	Can't tell	Can't tell	Yes	
Hass et al. (2018)[93]	Yes	Yes	Can't tell	Can't tell	Can't tell	Can't tell	Can't tell	
Heinesen et al. (2017)[81]	Yes	Yes	Can't tell	Can't tell	No	Yes	Yes	
Hequet et al. (2022)[82]	Yes	Yes	Can't tell	Yes	No	Yes	Yes	Inconsistencies in table and text
Hernaes et al. (2021)[83]	Yes	Yes	Can't tell	Yes	Yes	Can't tell	Yes	
Heuser et al. (2018)[49]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Hjorth et al. (2023)[50]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Horsboel et al. (2013)[51]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Jensen et al. (2019)[52]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Juul et al. (2022)[84]	Yes	0	Can't tell	Yes	Yes	Can't tell	Yes	
Khan et al. (2023)[53]	Yes	Yes	Yes	Can't tell	Yes	Yes	Can't tell	
Kjær et al. (2013)[54]	Yes	Yes	Yes	0	Yes	Yes	Yes	

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Kollerup et al. (2021)[85]	No	Yes	Yes	Can't tell	Yes	Yes	Yes	
Kvillemo et al. (2017)[55]	Yes	Yes	Yes	Yes	Yes	Can't tell	Yes	
Leuteritz et al. (2020)[56]	Yes	Yes	Can't tell	Yes	Yes	Can't tell	Yes	
Lieb et al. (2022)[57]	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	
Lindbohm et al. (2014)[86]	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	
Mehnert & Koch (2013)[59]	Yes	Yes	Can't tell	Can't tell	Yes	Can't tell	Yes	
Mehnert et al. (2017) [58]	Yes	Yes	Can't tell	Yes	Yes	Can't tell	Yes	
Monteiro et al. (2019)[60]	Yes	Yes	No	Yes	Yes	Yes	Yes	
Paalman et al. (2016)[61]	Yes	Yes	Yes	Yes	Can't tell	Yes	Yes	
Paltrinieri et al. (2020)[88]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Paltrinieri et al. (2022)[87]	No	Yes	Yes	Yes	Yes	Yes	Yes	
Pearce et al. (2014)[62]	Yes	Yes	Yes	Can't tell	Yes	Can't tell	Yes	
Pedersen et al. (2020)[63]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Plym et al. (2019)[64]	No	Yes	Yes	Can't tell	Yes	Yes	Yes	
Rashid et al. (2021)[89]	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	
Rick (2022)[66]	Yes	Yes	Can't tell	Yes	Yes	Yes	Can't tell	
Rick et al. (2021)[65]	Yes	Yes	Can't tell	Can't tell	Can't tell	Yes	Yes	
Rosbjerg et al. (2021)[67]	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	
Rydén et al. (2020)[68]	Yes	Yes	Yes	Yes	Yes	Can't tell	Yes	
Tamminga et al. (2016)[90]	Yes	Yes	Can't tell	Yes	Yes	Can't tell	Yes	

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Tamminga et al. (2019)[91]	Yes	Yes	Can't tell	Yes	Yes	Can't tell	Yes	
Thurin et al. (2020)[70]	Yes	Yes	Yes	Can't tell	Yes	Yes	Yes	
Ullrich et al. (2017)[72]	Yes	Yes	Can't tell	Can't tell	Yes	Yes	Can't tell	
Ullrich et al. (2018)[73]	Yes	Yes	Can't tell	Yes	Yes	Can't tell	Yes	
Ullrich et al. (2022)[71]	Yes	Yes	Can't tell	Yes	Yes	Can't tell	Yes	

Qualitative studies								
	Are there clear research questions?	**Do the collected data allow to address the research question?**	**Is the qualitative approach appropriate to answer the research question?**	**Are the qualitative data collection methods adequate to address the research question?**	**Are the findings adequately derived from the data?**	**Is the interpretation of results sufficiently substantiated by data?**	**Is there coherence between qualitative data sources, collection, analysis and interpretation?**	**Comment**
Armaou et al. (2018)[20]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Beerda et al. (2022)[21]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Duijts et al. (2017)[22]	Yes	Yes	Yes	Yes	Can't tell	No	Yes	
Groeneveld et al. (2013)[23]	Yes	Yes	Can't tell	Can't tell	Yes	Yes	Yes	
Liaset & Kvam (2018)[24]	Yes	Can't tell	Yes	Yes	Yes	No	Can't tell	
Lilliehorn et al. (2013)[25]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Nilsson et al. (2013)[26]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Olischläger et al. (2023)[27]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Persoon et al. (2019)[28]	Yes	Yes	Yes	Can't tell	Yes	Yes	Yes	

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Van Egmond et al. (2017)[29]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Van Maarschalkerweerd et al. (2020)[30]	Yes	Yes	Yes	Yes	Can't tell	No	Can't tell	
Zambrano et al. (2020)[31]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	

Mixed Methods								
	Are there clear research questions?	**Do the collected data allow to address the research question?**	**Is there an adequate rationale for using a mixed methods design to address the research question?**	**Are the different components of the study effectively integrated to answer the research question?**	**Are the outputs of the integration of qualitative and quantitative components adequatly interpreted?**	**Are divergences and inconsistencies between quantitative and qualitative results adequately addressed?**	**Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?**	**Comment**
Singer et al. (2014)[94]	Yes	Can't tell	Yes	Yes	Yes	Can't tell	Can't tell	

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