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ORIGINAL ARTICLE

Outcomes across the return-to-work process in PC survivors attending a rehabilitation measure—results from a prospective study

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Abstract
Purpose Approximately 60% of patients are able to work following a cancer diagnosis. The return-to-work (RTW) process after disability can be conceptualized as a multi-phase construct. This study investigated RTW outcomes throughout the RTW process among survivors of prostate cancer (PC) attending a cancer rehabilitation measure.
Methods The study was based on a sample of 837 employed PC survivors enrolled in a longitudinal multicenter study. Data was collected at the beginning of the rehabilitation measure, at the end and at 12-month follow-up by means of self-report questionnaires. We compared outcomes with regard to age (<60 and ≥60 years) and socio-economic status (SES; lower, middle, higher) using *t* tests or univariate ANOVA for metrical and chi-square test or Fisher's exact test for categorical variables.
Results In the off-work phase, most survivors reported positive expectations regarding future work, including responsiveness of their work environment. Nevertheless, one fourth intended to apply for a disability pension. At 12-month follow-up, the RTW rate was 87% and 62% when applying more conservative criteria of RTW. Among survivors who had returned to work, most reported stability of the work situation. Survivors with lower SES showed least favorable outcomes throughout the RTW process, while older age was less consistently of negative impact.
Conclusions Survivors reported many favorable RTW outcomes, but low SES might be a barrier at various stages of the RTW process. Thus, special attention must be paid to the role of social inequalities during rehabilitation and work reintegration to help survivors managing the RTW process.

Keywords Prostate cancer · Oncology · Return-to-work · Social inequality · Rehabilitation · Psycho-oncology

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Introduction

In Germany, approximately 494,000 men and women were newly diagnosed with cancer in 2012, of which 38% were of working age (15–64 years) [1]. Cancer survivors are reported to benefit from their return-to-work (RTW), as it gives financial security, restores social life, helps to regain a sense of normalcy, and positively affects quality of life [2, 3]. The international rate of 63.5% [4] demonstrates that a substantial part of cancer survivors works 1 year post diagnosis. A growing body of evidence suggests that the probability of RTW is impacted by various socio-demographic, medical, psychosocial, and work-related factors [4, 5]. Next to the prevalence of RTW as a standard outcome in occupational research, international prospective studies on cancer and employment measure outcomes such as partial or full RTW, absenteeism, work (dis)ability and productivity, and job satisfaction [6]. An evidence-based model of work and cancer emphasizes the importance of such RTW outcomes in order to capture a complete picture of patients' RTW experiences after a cancer diagnosis [6]. A conceptual framework of occupational

reintegration by Wasiak et al. [7] proposes a developmental understanding of RTW after disability. The authors conceptualize the RTW process as a multi-phase construct comprising four phases ("off-work," "work reintegration," "maintenance," and "advancement"), with the relevance of work-related outcomes depending on the RTW phase observed. When evaluating the RTW process, the authors suggest work-related expectations, perceptions, and motivations to be used both as outcomes and predictor variables in the "off-work" phase [7]. Literature on cancer and work confirms patient's perceptions and motivational factors to be of high predictive value for successful occupational reintegration [8, 9]. Taking into account that such factors might be modifiable, it seems pivotal to get a better understanding of what cancer survivors' expectations across the off-work phase are.

Prostate cancer (PC) is the most common malignancy among men in economically developed countries [10]. In Germany, approximately 63,700 men were newly diagnosed with PC in 2012 [11]. As detection of PC in earlier stages (e.g., prostate-specific antigen test) and developments in treatment protocols lead to better prognoses, the survival rate of PC patients is one of the highest among all types of cancers, and in the future an increasing population of men will be affected in working age [11]. Due to the meaning of work for psychosocial well-being and health, returning to paid work among this group of cancer survivors is increasingly important. Nevertheless, the number of studies explicitly focusing on RTW after PC is limited. RTW rates are reported to be 72% at 6 months and 81% at 12 months after diagnosis [12]. With regard to the RTW process, existing literature shows various problems being faced after a PC diagnosis: Men often had to take sick leave [13, 14], reported impaired work ability related to physical and cognitive constrains [12, 15], and reduced their working hours [12]. Prospective studies show that work-related outcomes may improve over time: Work ability and working hours were increased at 12 months after diagnosis, but without achieving full performance levels [12, 15]. Better knowledge on these problems and deeper insights into the RTW process after PC would help health care professionals and social workers to adequately support survivors in returning to work.

A recent review of the effectiveness of interventions to promote RTW after cancer underlines the success of multidisciplinary programs in helping patients to return to work [16]. Pursuant to the social law in Germany, cancer patients have the right to participate in a medical rehabilitation measure, depending on criteria of rehabilitation need and prognosis [17]. Such programs are mainly facilitated within an inpatient clinical environment, generally last 3 to 4 weeks and are based on multimodal treatment concepts. Facilitating RTW within medical rehabilitation measures has been an important point of interest for the German Pension Insurance Agency [18]. In the cancer rehabilitation setting, occupation-oriented rehabilitation concepts for individuals with work-related problems are increasingly emphasized.

Internationally, research of employment consequences resulting from a cancer diagnosis has mostly investigated mixed samples (gender, cancer sites) [19]. Within Germany, no study has prospectively examined the RTW process from PC survivors' point of view. Therefore, based on the multi-phase conceptualization of RTW by Wasiak et al. [7], the present article aims to provide knowledge on RTW outcomes among PC survivors, beginning with outcomes of the "off-work" phase (during a cancer rehabilitation measure) and those relevant to the phase of "work reintegration" (12-month follow-up). Owing to the frequently reported impact of age and socio-economic status (SES) on RTW outcomes in following a cancer diagnosis [4–6], we systematically compared subgroups based on these factors.

Material and methods

Study design and study population

Data were collected within a prospective multicenter study with three points of measurement: at the beginning and the end of the rehabilitation measure and at follow-up of 12 months after the end of the measure. Our study aimed to evaluate the effects of a cancer rehabilitation measure in PC survivors after radical prostatectomy with particular regard to RTW outcomes. The study protocol was approved by the local ethics committee of the General Medical Council of Hamburg (PV3547) and the department of data security of the German Pension Insurance Agency.

Between October 2010 and June 2012, PC survivors were consecutively recruited in four rehabilitation clinics by the treating physicians during the first clinical appointment. Survivors were eligible for study participation if they met the following inclusion criteria: localized PC (stages T1–4 with no evidence of lymphogenic or distant metastasis), treated with radical prostatectomy, starting rehabilitation not later than 14 days after the end of acute treatment, working age (18–64 years), paid employment before surgery, and written informed consent provided for study participation, data analysis, and publication. The upper age limit was set at 64 years as those survivors reached the age of 65 years at 12-month follow-up (age limit for old age pension in Germany at the time of study implementation). Exclusion criteria were complementary. Furthermore, survivors were not eligible if they were in early retirement or had applied for a pension, had excessive psychological or physical stress or showed cognitive impairments (as assessed by rehabilitation physicians), had a second cancer diagnosis that required treatment, or had no basic German fluency.

Data were collected by means of patient questionnaires (self-report), medical records, and physicians' assessment of functional outcomes. Survivors who had consented to study

participation received the first two questionnaires from their treating physician. At 12-month follow-up, the third questionnaire was mailed to the respondents.

Measurement of outcomes

RTW outcomes were selected in view of the conceptualization of RTW as an evolving process as proposed by Wasiak et al. [7]. The authors suggest various RTW outcomes, with the taxonomy of outcomes being based on the multi-phase concept of RTW and the dimensions "activities" and "participation" of the World Health Organization's International Classification of Functioning, Disability and Health (ICF) [7, 20]. In our study, we focused on outcomes related to the "off-work" phase (e.g., RTW intentions, perceived work readiness) and the "work reintegration" phase (e.g., work status, job stability). To measure outcomes, the administered questionnaires comprised validated scales as well as study-specific items. Study-specific items were adapted from previous studies on RTW after cancer [9].

"**Off-work**" **phase—outcomes regarding expectations on RTW (beginning and end of rehabilitation)** We assessed motivational factors (when to return to work, intention to apply for a disability pension) and need for occupation-related interventions during rehabilitation using the Screening Instrument Work and Occupation (German Abbrev.: SIBAR [21]). Expectations regarding the probability to return to the former job (job suitability), the supportiveness of the work environment and the preparedness for RTW were measured by study-specific items.

"**Work reintegration**" **phase—outcomes regarding work re-entry (12-month follow-up)** We collected data on current work status (working part- or full-time vs. not working) and the exact date of work re-entry after the rehabilitation measure to assess the RTW rate and duration of sick leave (in weeks). As we were interested in how the RTW rate would be affected by application of more conservative criteria, RTW was operationalized by criteria suggested for use within the German rehabilitation setting [22]: (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.

We used the SIBAR [21] to assess duration of sickness absence in the preceding year and status of disability pension (filed, applied for, intention to apply for). Perceived work ability compared to lifetime best was measured by a single-item scale (0–10 points possible) from the Work Ability Index (WAI [23]). Modus of the occupational reintegration (time until RTW in months, use of a graded RTW scheme), work situation (workplace and job duties, hours worked), and possible changes of interpersonal relationships at work were measured by study-specific items.

Socio-demographic, disease- and treatment-related variables (beginning of the rehabilitation) Survivors reported on age, marital status, education level, occupation type, part- or full-time job, and monthly household net income. To assess SES (lower, middle, higher), an adapted version of a composite SES indicator based on primary and secondary education, type of occupation, and monthly household net income (Winkler Index, [24]) was used. Furthermore, the sample was dichotomized at a cut-point in the sixth decade (<60 or ≥60 years of age). The cut-point was set at 60 years (baseline) as labor force participation rates of men aged 60–64 years have declined substantially in the last decades across Europe [25], and the German pension system allows early retirement on a state pension at a minimum age about 60–63 years [26]. Therefore, beyond cancer diagnosis, survivors aged 60 plus belong to a vulnerable group in transition from work to retirement.

Information on UICC cancer stage, time since diagnosis (via punch biopsy), Karnofsky performance status (0–100%), surgical procedure (radical prostatectomy), and rehabilitation setting were obtained from rehabilitation physicians and medical records at the beginning of the rehabilitation measure.

Statistical analysis

Descriptive analyses were conducted to examine sample characteristics and to describe RTW outcomes of the "off-work" and "work reintegration" phase for the whole sample and subgroups based on age (<60 and ≥60) and SES (lower, middle, higher). Statistical differences between these subgroups were assessed by chi-square test or Fisher's exact test for categorical variables, and t test (two-tailed) or univariate ANOVA for metrical variables. Cramer's phi (for variables with two manifestations) and Cramer's v (k manifestations) were evaluated as standardized effect sizes for categorical variables (φ), and Cohen's delta (d) or partial eta^2 (η_p^2) for metrical variables. Effect sizes were interpreted according to Cohen's guidelines [27]. All significance tests were two-sided using a significance level of $\alpha < 0.05$. All analyses were performed using the statistical package SPSS version 18.0.

Results

Recruitment strategies and nonresponder analysis

Recruitment During the study period, 1798 PC survivors of working age treated with radical prostatectomy were admitted to the four participating clinics. Of these, 961 survivors were

not eligible for study participation due to the following exclusion criteria: early retirement or having applied for a pension in 511 cases, unemployment in 186, lymphogenic or distant metastasis in 76, no German fluency or cognitive impairments in 61, refusal of study participation in 46, and other reasons in 81. Therefore, 837 survivors met the inclusion criteria and completed the first two questionnaires. Of those, 714 returned the follow-up questionnaire (response rate: 85%). As three survivors did not report their work status, 711 cases were assessable for analyses at 12-month follow-up.

Nonresponder analyses Differences between responders and nonresponders at the time of follow-up were assessed for potential socio-demographic, medical and psychological differences. On average, responders were significantly older and more commonly married (57 years, 84% married) than nonresponders (56 years, 74% married) at the beginning of rehabilitation. However, a logistic regression analysis showed that age and family status could only explain a small part of the response variation (Nagelkerkes R^2 0.047).

Baseline characteristics of PC survivors

Of 837 survivors, most were married, approximately one third had a blue-collar job and the mean age was 57 years (range 40–64). Most survivors had been diagnosed within the last 3 months preceding the beginning of the rehabilitation measure, with UICC tumor stage 2 being most prevalent.

The two subgroups based on age comprised 555 survivors (66%) younger than 60 years and 282 (34%) aged 60 years or above. With respect to the three subgroups based on SES, 167 survivors (20%) were of lower, 434 (53%) of middle, and 225 (27%) of higher SES (Table 1).

"Off-work" phase: RTW outcomes

Expectations at the beginning of the rehabilitation measure (*N* = 837) Most survivors anticipated job suitability (in terms of returning to the same job) and expected their RTW within latest 3 months following the rehabilitation measure. One fourth intended to apply for a disability pension. In comparison, the respective intention was most frequent in survivors of older age (≥60 years) and lower SES. Expectations of faster RTW and job suitability were most prevalent in survivors of higher SES. Younger survivors (<60 years) more commonly expressed the need for occupational interventions during the rehabilitation measure. Overall, effects of group differences were small (range .120–.209; Table 2).

Expectations at the end of the rehabilitation measure (*N* = 837) Most survivors assumed supportiveness and acceptance of the work environment regarding their RTW. In comparison, younger age (<60 years) and lower SES were related to more bother about employers' and/or co-workers' reactions. Survivors of lower and middle SES less frequently

Table 1 Characteristics of the study sample (*N* = 837)

	Whole sample (*N* = 837)	
Age (M, SD)	837	56.8 (4.6)
Age groups (%)	837	
Up to 60 years		66.3
60 years and older		33.7
Married (%)	826	81.2
Education (%)	812	
Up to 9 years		45.6
10 years		22.7
12–13 years		31.7
Time on work prior to surgery (%)	810	
Full-time		95.8
Part-time		4.2
Type of occupation (%)	826	
Blue-collar job		35.1
White-collar job		49.0
Self-employed or public servant		15.8
Monthly household net income (%)	799	
<2000 €		18.8
2000–<3000 €		35.2
3000–<4000 €		25.9
4000 € or more		20.2
Socio-economic status (SES) (%)	826	
Higher		27.2
Middle		52.5
Lower		20.2
Tumor stage at diagnosis (UICC) (%)		
Stage 1	835	11.8
Stage 2		67.7
Stage 3		20.5
Time since diagnosis (%)[a]	837	
0–3 months		87.8
4 months or more		12.2
Karnofsky performance status (%)	837	
≤70		35.2
80		41.2
≥90		23.5
Surgical procedure (radical prostatectomy) (%)	837	
Open (retropubic/perineal)		51.8
Endoscopic		12.8
Robot-assisted (DaVinci)		35.5

The Karnofsky status measures the patient's functional status and ability to perform activities of daily living on 0% (dead) to 100% (normal; no complaints, no evidence of disease)

UICC International Union against Cancer

[a] PC diagnosis via punch biopsy

Table 2 RTW outcomes of the "off-work" phase ($N = 837$) with special consideration of subgroups (age, socio-economic status)

	Whole sample		Age						Socio-economic status (SES)							
			<60 years		≥60 years				Lower		Middle		Higher			
	$N = 837$		$N = 555$		$N = 282$				$N = 167$		$N = 434$		$N = 225$			
	n	%	*n*	%	*n*	%	*p*	φ/d	*n*	%	*n*	%	*n*	%	*p*	φ/η^2
Expectations at the beginning of the rehabilitation measure																
Expected time until RTW																
≤1 month	227	27.6	144	26.5	83	29.7	.218[a]	.073	24	14.7	94	22.1	105	47.1	*<.001*[a]	.209
≤3 months	424	51.6	291	53.6	133	47.7			90	55.2	248	58.4	83	37.2		
>3 months	158	19.2	102	18.8	56	20.1			43	26.4	77	18.1	34	15.2		
No RTW	13	1.6	6	1.1	7	2.5			6	3.7	6	1.4	1	0.4		
Expectation to return to the former job (% yes)[c]	688	82.6	457	82.8	231	82.2	.834 [b]	.007	118	70.7	354	81.9	206	92.4	*<.001*[b]	.195
Intention to apply for a disability pension (% yes)	197	24.2	111	20.5	86	31.4	*.001*[b]	.120	58	35.8	101	24.1	34	15.7	*<.001*[b]	.164
Need for occupational interventions during rehabilitation (% yes)	149	18.4	117	21.8	32	11.7	*<.001*[b]	.124	31	19.4	76	18.1	39	17.7	.913 [b]	.015
Expectations at the end of the rehabilitation measure																
Perceived preparedness for RTW (M, SD)[d]	826	2.3 (0.9)	550	2.4 (0.8)	276	2.2 (0.9)	*.040*[e]	0.152	162	2.6 (0.9)	429	2.3 (0.8)	224	2.1 (0.9)	*<.001*[f]	.032
Supportiveness of employer regarding … (% yes)[g]																
Graded job involvement	593	80%	406	80.2	187	79.6	.834[b]	.008	115	72.8	311	79.7	163	88.6	*.001*[b]	.137
Flexible working conditions	422	58%	278	55.8	144	62.6	.085[b]	.064	61	38.9	221	57.9	138	76.7	*<.001*[b]	.262
Bother regarding reactions of… (% yes)[h]																
Employer	77	10.4	62	12.2	15	6.5	*.018*[b]	.017	22	14.3	45	11.4	8	4.4	*.007*[b]	.117
Supervisors	85	7.9	44	9.1	12	5.3	.083[b]	.065	14	9.2	31	8.1	10	6.0	.555[b]	.041
Co-workers	22	3.5	23	4.5	3	1.3	*.026*[b]	.082	2	1.3	18	4.5	6	3.2	.180[b]	.068

The italic numbers are the significant *p*-values

[a] Fisher's exact test

[b] Chi-square test

[c] Scale (1 "definitely no" to 5 "definitely yes") dichotomized into "definitely no to uncertain" vs. "probably/definitely yes"

[d] Scale 1 "very good" to 5 "very bad"

[e] *T* test, two-tailed

[f] Univariate Anova

[g] Only patients who reported to have an employer ($N = 740$), scales (1 "yes," 2 "undecided," 3 "no") dichotomized into "yes" vs. "undecided/no"

[h] Only survivors who reported to have an employer ($N = 740$), supervisors ($N = 711$) or co-workers ($N = 744$)

expected the employer's responsiveness to graded job reintegration (a scheme which allows for gradual reintegration into working life) and flexible job conditions, if needed. Younger survivors (<60 years) and those of higher SES showed the most favorable perceptions of preparedness for RTW. However, effects of group differences were found to be small (range .018 to .262; Table 2).

"Work reintegration" phase: RTW outcomes

Outcomes related to work re-entry 12 months after attending the rehabilitation measure (*N* = 711) The RTW rate at follow-up was 87 and 62% when using a more conservative approach of RTW success [22]). The RTW rate was higher in younger survivors, and the RTW rate based on more conservative criteria was higher both in survivors of younger age (<60 years) and higher SES. Nevertheless, all effects of the group differences were small (range .122 to .200; Table 3).

Outcomes related to work experiences 12 months after attending the rehabilitation measure (*N* = 618) Survivors, who returned to work, mainly reported positive outcomes in terms of time until RTW, stability of the work situation compared to pre-surgery (workplace, job duties, and hours worked), and interpersonal relationships at work. Nevertheless, prolonged sickness absence (>6 weeks) and actions related to a disability pension within the last 12 months were prevalent in approximately one quarter of survivors. In comparison, survivors of older age (≥60 years) reported faster RTW, but more frequently adjusted time on work (weekly working hours) and intended to apply for a disability pension. Younger survivors (<60 years) more commonly experienced changes in the relationship to employers. Survivors of the lower SES showed least favorable work participation in terms of slowest RTW, longest sick leave periods in the 12 months following the rehabilitation measure, and lowest levels of perceived work ability. Survivors of higher SES least often took actions for a disability pension and most frequently reported stability of their work situation. Effects for all group differences were found to be small (range .029 to .214, Table 4).

Discussion

This prospective multicenter study evaluated RTW outcomes of 837 PC survivors as they progress through the RTW process, beginning with the start of a cancer rehabilitation measure and extending to the time at 12 month after the measure. Based on a multidimensional approach of RTW [7], we covered a broad range of phase-based outcomes and paid particular attention to survivors' expectations and intentions regarding future work, work status,

Table 3 RTW outcomes of the "work reintegration" phase (*N* = 711) with special consideration of subgroups (age, socio-economic status)

	Whole sample		Age						Socio-economic status (SES)							
			<60 years		≥60 years				Lower		Middle		Higher			
	N = 711		*N* = 465		*N* = 246				*N* = 139		*N* = 371		*N* = 193			
	n	%	*n*	%	*n*	%	*p*	φ	*n*	%	*n*	%	*n*	%	*p*	φ
RTW rate																
Returned to work	618	86.9	427	91.8	191	77.6	*<.001*[a]	.200	116	83.5	324	87.3	172	89.1	*.308*[a]	.058
Not returned to work	93	13.1	38	8.2	55	22.4			23	16.5	47	12.7	21	10.9		
RTW rate adjusted to conservative criteria[b]																
Returned to work	413	62.3	298	66.4	115	53.7	*.002*[a]	.122	74	58.3	198	57.7	135	73.0	*.002*[a]	.140
Not returned to work	250	37.7	151	33.6	99	46.3			53	41.7	145	42.3	50	27.0		

The italic numbers are the significant *p*-values

[a] Chi-square test

[b] Using criteria following Bürger et al. [22]. Only survivors who gave information on each criteria included in the applied operationalization of successful RTW (*N* = 663)

Table 4 RTW outcomes of the "work reintegration" phase ($N = 711$) with special consideration of subgroups (age, socio-economic status)

	Returned to work		Age						Socio-economic status (SES)							
			<60 years		≥60 years				Lower		Middle		Higher			
	$N = 618$		$N = 427$		$N = 191$				$N = 116$		$N = 324$		$N = 172$			
	n	%	*n*	%	*n*	%	*p*	φ/d	*n*	%	*n*	%	*n*	%	*p*	φ/η^2
Time until RTW																
Immediately	194	31.6	121	28.5	73	38.6	*.030*[a]	.107	23	19.8	83	25.9	85	49.7	*<.001*[a]	.214
≤1 month	103	16.8	71	16.7	32	16.9			13	11.2	54	16.8	36	21.1		
>1 month	317	51.6	233	54.8	84	44.4			80	69.0	184	57.3	50	29.2		
Graded job involvement (% yes)	220	35.8	158	37.2	62	32.8	.297[a]	.042	48	41.4	123	38.3	48	28.1	*.032*[a]	.106
Change of job situation																
Same job duties in the same workplace	576	93.4	397	93.2	179	93.7	.593[b]	.056	110	94.8	293	90.7	167	97.1	*.021*[b]	.096
New job duties in the same work place	22	3.6	17	4.0	5	2.6			4	3.4	18	5.6	0	0.0		
New workplace	11	1.8	6	1.4	5	2.6			1	0.9	7	2.2	3	1.7		
Other	8	1.3	6	1.4	2	1.0			1	0.9	5	1.5	2	1.2		
Change of time on work (weekly working hours)																
Same working hours	563	92.1	393	93.6	170	89.0	*.018*[b]	.115	107	93.0	298	93.1	152	89.4	.162[b]	.074
Reduced	40	6.5	20	4.8	20	10.5			5	4.3	18	5.6	17	10.0		
Higher	8	1.3	7	1.7	1	0.5			3	2.6	4	1.3	1	0.6		
Changes in the relationship with... (% no)[c]																
Employer	538	93.1	366	91.5	172	96.6	*.037*[a]	.107	109	95.6	284	91.6	139	93.9	.316[a]	.064
Supervisors	492	91.3	344	90.3	148	93.7	.205[a]	.055	103	93.6	262	90.0	121	91.7	.512[a]	.050
Co-workers	537	94.0	381	94.1	156	94.0	.964[a]	.002	108	98.2	277	92.6	146	93.6	.110[a]	.088
Duration of sick leave in the last 12 months																
No or 0–5 weeks	465	75.6	318	74.8	147	77.4	.790[a]	.028	76	65.5	237	73.8	146	84.9	*<.001*[b]	.121
6–25 weeks	116	18.9	83	19.5	33	17.4			28	24.1	65	20.2	23	13.4		
>25 weeks	34	5.5	24	5.6	10	5.3			12	10.3	19	5.9	3	1.7		
Application for a disability pension																
Application filed	15	2.5	4	1.0	11	5.9	*<.001*[b]	.169	0	0.0	10	3.2	5	2.9	*.026*[b]	.092
Intended	127	21.0	80	19.1	47	25.3			29	25.4	73	23.3	25	14.5		
Not intended	463	76.5	335	80.0	128	68.8			85	74.6	230	73.5	142	82.6		
Perceived work ability (M, SD)[d]	615	7.5 (1.8)	426	7.4 (1.8)	189	7.6 (1.8)	.213[e]	.108	115	7.0 (1.7)	322	7.5 (1.8)	172	7.9 (1.6)	*<.001*[f]	.029

The italic numbers are the significant *p*-values

[a] Chi-square test

[b] Fisher's exact test

[c] Only survivors who reported to have an employer ($N = 539$), supervisors ($N = 578$) or co-workers ($N = 571$)

[d] Scale 0 "lowest work ability (compared to lifetime best)" to 10 "best work ability (compared to lifetime best)"

[e] *T* test, two-tailed

[f] Univariate ANOVA

changes in the survivor's work situation, perceived responsiveness of the work environment, and aspects of work participation, such as subjective work ability and length of sickness absence.

Regarding the "off-work" phase, our findings showed that most PC survivors think positively about their reintegration into working life and are willing to return to work. Nevertheless, the intention to apply for a disability pension is a known risk factor for return to work and work maintenance after disability [8, 21, 22], and in our study one fourth of survivors reported respective intentions. Depending on the individual's expectations, goals are set at the beginning of the cancer rehabilitation measure and a suitable treatment program is established [17, 18]. Our results underline the importance of assessing such intentions, both at the start of rehabilitation and as it progresses, to promote successful RTW.

With respect to the "work reintegration" phase, the RTW rate of 87% at 12-month follow-up was similar to the rate of 81% reported by a previous study in PC survivors [12]. In approximately one third of survivors, a gradual work involvement scheme was used following the rehabilitation measure. Findings from a large German cohort showed that graded RTW promotes labor participation and reduces the risk of long-term work disability in employed patients who are not able to perform full job duties after having attended a rehabilitation measure [28].

Furthermore, in our study, over 90% of survivors reported stability of the workplace, job tasks, and hours worked after having returned to work. A previous study on cancer survivors' work situation showed similar results, with most prostate cancer survivors not having changed their work situation and 10% having changed employers [31]. Consistent with studies on emotional and practical support cancer patients receive from their work environment [4, 29], a substantial number of survivors expected and experienced responsiveness and acceptance of employers, supervisors, and co-workers regarding their RTW.

To estimate the extent to which age and SES might impact outcomes throughout the RTW process, we systematically compared survivor subgroups. In our study, both factors could be identified as gradients in employment expectations and consequences among PC survivors. Regarding age (<60 vs. ≥60 years), the most relevant differences were found for lower employment prospects (affecting both the RTW rate and the RTW rate adjusted for more conservative criteria) and higher intentions to apply for a disability pension in older survivors. However, we did not find older age to be a clear and consistent indicator for suboptimal RTW across the measured outcomes. With respect to groups based on (lower, middle, and higher) SES, we found a considerable number of outcomes to be influenced by SES. With exception of few variables, survivors of lower SES showed the least favorable RTW patterns, while those with higher SES performed best. In line with previous studies on employment in cancer populations, these findings draw attention to a social stratification perspective. Internationally, studies highlight the impact of social inequality on RTW after a cancer diagnosis; for example, lower education, manual work and income decrease the probability of RTW [5, 4, 30]. Due to social variability in RTW processes, special attention must be paid to the social status of survivors, both during rehabilitation measures and aftercare, in order to adequately help survivors manage the RTW process. Although our results provide first insights into socio-economic differences in the RTW process, a comprehensive understanding of underlying mechanisms would be helpful in addressing the challenge to tackle social inequality in occupational reintegration after cancer.

Studies in the field of RTW research mainly focus on RTW after breast cancer diagnosis, and in a considerable number of studies with mixed gender samples, the percentage of women exceeds 60% [19]. This is, to our knowledge, the first study on the RTW process in PC survivors within the German rehabilitation setting. Strength of our study is the homogeneous (localized PC treated with radical prostatectomy, working age) and large sample size. We excluded survivors who had temporarily or permanently left the labor force prior to surgery to achieve a cleaner picture of RTW outcomes. Therefore, our results can not be interpreted for patients with metastasis whose treatment schemes are more complex or patients who involuntarily exited the labor market before surgery (e.g., unemployment) and struggle with re-employment after the rehabilitation measure. Based on the multicenter design, consecutive recruitment strategy, systematic documentation of nonresponders, and a high response rate at all times of measurement, we consider our results to be valid for employed PC survivors who participated in a cancer rehabilitation measure.

In conclusion, in this article we have analyzed work expectations and consequences of a PC diagnosis throughout different phases of the RTW process. Our research was based on a conceptual framework of occupational reintegration by Wasiak et al. [7] supporting a developmental understanding of RTW. Overall, most survivors reported positive expectations regarding future working life in the "off-work" phase and showed favorable outcomes regarding their occupational reintegration at 12-month follow-up. Survivor's age proved to be of less impact in outcomes across the RTW process than SES; it was shown that survivors with low socio-economic position are more often negatively affected in various domains. The question of social inequality in RTW after cancer is of high relevance both on the societal and individual level, and should receive more attention in the setting of cancer rehabilitation and respective research.

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Author's contributions AU collected data, prepared data for statistical analyses, conducted statistical analyses and literature search, and wrote the manuscript. CB was the principal investigators of the study; she designed the study's concept and supervised the data collection, analyses, and writing of the manuscript. HMR collected data, prepared data for statistical analyses, and revised the manuscript. UO, CK, MR, and CHA recruited patients, collected data, and revised the manuscript. All authors have read and approved the final manuscript.

Compliance with ethical standards

Conflict of interest The authors declare that they have no competing interests.

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