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ORIGINAL ARTICLE

Worksite adjustments and work ability among employed cancer survivors

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Abstract
Objectives This study was conducted to determine how many cancer survivors (CSs) make worksite adjustments and what kinds of adjustments they make. Changes in work ability among employed CSs were explored, and clinical, sociodemographic, and work-related factors associated with the current total work ability were studied.
Methods CSs of the ten most common invasive types of cancer for men and women in Norway completed a mailed questionnaire 15–39 months after being diagnosed with cancer. Included in the analyses were all participants who worked both at the time of diagnosis and at the time of the survey and who had not changed their labor force status since diagnosis (n=563). The current total work ability was compared to the lifetime best (0–10 score).
Results Twenty-six percent of the employed CSs had made adjustments at work, and the most common adjustment was changing the number of work hours per week. Despite the fact that 31% and 23% reported reduced physical and mental work abilities, respectively, more than 90% of the CSs reported that they coped well with their work demands. The mean total work ability score was high (8.6) among both men and women. Being self-employed and working part-time at the time of diagnosis showed significant negative correlations with total work ability, while a favorable psychosocial work environment showed a significant positive correlation. CSs with low work ability were more often in contact with the occupational health service and also made more worksite adjustments than others.
Conclusion The prospects of future work life seem optimistic for Norwegian employed CSs who return to work relatively soon after primary treatment.

Keywords Public health · Adaptations · Work capacity · Workplace health promotion

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Introduction

Forty percent of persons diagnosed with cancer in Norway are between 20 and 65 years old and thus are of working age [1]. Studies on the employment of cancer survivors (CSs) document that 60–70%, on average, return to work after primary treatment [2]. Work ability may be defined as the combination of a person's mental and somatic health, plus the social skills needed for doing any kind of paid work or for self-employment [3, 4]. The ability is usually self-rated in relation to current demands at the workplace. In general, occupational rehabilitation not only means improving work ability by enhancing the worker's physical, mental, and social capacities/capabilities, but it also means adjusting job demands and environmental resources to these capacities/capabilities.

To offer effective occupational rehabilitation for CSs, knowledge about factors that influence work ability is important, as is knowledge of what kind of work adjustments are needed for this group of workers. Studies have documented that self-reported work ability is an important predictor of return to work among CSs [5], and a recent review study [6] showed that clinical factors are important for the work ability of survivors. Few studies have investigated the relationships between work-related factors and work ability and the occurrence of worksite adjustments in CSs.

The objectives of this retrospective cohort study among employed Norwegian CSs with diverse types of cancer were to investigate the following:

- The percentage of employed CSs who make worksite adjustments and what kinds of adjustments are made; and
- Changes in work ability among employed CSs and what clinical, sociodemographic, and work-related factors are associated with current total work ability.

Materials and methods

Our group has recently been involved in two projects concerning work ability and return to work in CSs. The first project concerned a sample of breast, prostate, and testicular CSs with good prognosis treated at the Norwegian Radium Hospital [7]. The other is the Cancer and Living Conditions Project investigating the living conditions of CSs of working age in Norway using registry data, qualitative interviews, and mailed questionnaires [8, 9]. The results presented here are based on data collected from the mailed questionnaires of that study, which was commissioned by the Norwegian Cancer Society and carried out by the Fafo Institute for Labour and Social Research and the Institute of Health Promotion at Vestfold University College.

Sampling of cancer survivors

The Cancer Registry of Norway identified a sample of 2,848 individuals who had been treated for invasive cancer at four large hospitals in Norway (Ullevaal University Hospital, Oslo; Haukeland University Hospital, Bergen; St. Olav's University Hospital, Trondheim; and Vestfold Hospital, Tønsberg). The eligibility criteria were the following: (1) an age of 25–60 years at the time of diagnosis; (2) diagnosed for the first time between January 1, 2005 and December 31, 2006; and (3) the diagnosis being one of the ten most common invasive types of cancer among men and the ten most common invasive types of cancer among women in Norway. Thus, a total of 15 different cancer types were included: colon, rectal, lung, skin (melanoma), breast, cervical, uterine, ovarian, prostate, testicular, bladder, central nervous system, thyroid, non-Hodgkin lymphoma, and leukemia. The exclusion criteria were as follows: (1) death during the follow-up period; (2) patients who had not been told that they had cancer; and (3) patients considered too ill to receive the questionnaire.

Procedures and response rates

Based on the exclusion criteria, the patient-responsible doctors at the hospitals excluded 326 patients. We mailed questionnaires to the remaining 2,522 eligible CSs. The data were collected in February and March 2008, 15–39 months after the initial cancer diagnosis. The participants responded anonymously, so no reminder was possible. Seventy-two envelopes were returned because of incorrect addresses, death, or denial of having cancer. Among the remaining 2,486 CSs, 1,343 (54%) returned the questionnaire, and we included all CSs who reported that they were employed or self-employed both at diagnosis and at the time of the survey (n=905). The participants were also asked whether they had changed labor force status since their diagnosis, and only survivors responding "no" were included in the final dataset (n=653).

Questionnaire variables

The questions on sociodemographics were mostly adopted from studies done by Statistics Norway [10] and Fafo [11], and the questions on cancer and work were mostly selected from the Nordic Study Group of Cancer and Work Life (NOCWO) [7].

Clinical and sociodemographic factors

The types of cancer were self-reported, as was recurrence and whether the CSs were currently receiving treatment or not. Treatments reported were dichotomized into chemotherapy or other treatments (surgery, radiotherapy, endocrine therapy, and other treatments). The participants were also asked to report other current chronic diseases or injuries diagnosed by a physician from a list of eight alternatives. Comorbidity was registered as at least one of these diseases/injuries.

The questions regarding sociodemographic factors applied to the situation at the time of the survey. The level of basic education was rated at four levels and dichotomized into a lower level (≤12 years) and a higher level (>12 years). Civil status was dichotomized into paired (married, cohabiting) and nonpaired [single, separated, divorced, widow(er)]. Children present in the household were dichotomized into children <18 years (no or yes).

General work factors

All questions on work-related factors concerned the work situation at diagnosis. The work position alternatives were worker, supervisor, or top manager, and these were dichotomized into worker and supervisor/manager. Self-employment was registered with a no or yes. The hours worked per week were dichotomized into part-time work (<37 h) or full-time work (≥37 h).

The physical demands at work were covered by the question "How would you describe the work you had when you were diagnosed with cancer?" Four response alternatives were dichotomized into nonmanual work (mostly sitting, mostly walking) and manual work (walking and heavy lifting and heavy manual work). Six questions on psychosocial work factors [12, 13] were modified to measure the work situation at diagnosis. Psychological demands were measured by two items on work tempo and whether the respondent had enough time to complete the work tasks. Decision latitude was measured by two items on the opportunities to learn new things at work and to decide how to carry out the work tasks. Social support was measured by two items regarding support in general either from supervisors or from colleagues. All questions had a five-point Likert scale ranging from "do not agree at all" (=1) to "completely agree" (=5). The scores were summed for each item and divided by 2 for each measure. Higher scores indicate higher demands, decision latitude, and social support.

Cancer-related support at work

Cancer-related social support at work was measured using the Structural–Functional Social Support Scale [14, 15], which measures the amount of perceived workplace social support given by supervisors and colleagues related to severe diseases. The scores were five-point Likert scales ranging from strongly agree (=1) to strongly disagree (=5). The scores were recoded so that a higher score indicates higher support. The scores for the four supervisor support questions were summed and divided by 4, and the scores for the two colleague support variables were summed and divided by 2. One question asked whether the CSs had been in contact with the occupational health service in relation to the cancer. The response alternatives were no and yes.

Worksite adjustments due to cancer

The worksite adjustment question asked was, "Have changes been made for you at your worksite due to your cancer?" This question was related to the following alternatives: (1) changed the number of work hours per week, (2) other or fewer work tasks than before to reduce physical strain, (3) other or fewer work tasks than before to reduce mental strain, (4) physical change of the workplace and/or access to aids, and (5) other changes. Multiple responses were allowed. There were three response alternatives: no; yes, minor changes; and yes, major changes. We recoded the responses of the five alternatives into no and yes (including minor or major adjustments). We also constructed a variable measuring "no worksite adjustments" and "one or more adjustments."

Work ability

Based on questions from the Work Ability Index [16], we asked the respondents whether their physical and mental work abilities had been reduced due to the cancer and whether they had coped well with the physical and mental work demands. The items were formulated as statements, and the response alternatives ranged from strongly agree (=1) to strongly disagree (=5). The two variables on reduction in work ability were dichotomized into no reduced work ability (strongly disagree/disagree/neither agree nor disagree) and reduced work ability (strongly agree/agree), while the two variables on coping were dichotomized into not coping well (strongly disagree/disagree/neither agree nor disagree) and coping well (agree/strongly agree).

Total work ability was assessed with the following question from the Work Ability Index [3, 19]: "Assume that your work ability at its best has a value of 10 points. How many points would you give to your current work ability? (0 means that you cannot currently work at all)."

Statistical analysis

We performed a descriptive analysis for all the variables for men, women, and the total sample. The differences between men and women on worksite adjustments and work ability were tested by chi-squared tests for dichotomous variables and independent samples t tests for the continuous measure of total work ability. We analyzed the relationships between the independent variables and total work ability as a dependent variable using linear regression analysis. The strengths of the associations are reported as standardized β values. No substitution for missing values was performed when constructing indexes. The significance level was set at $p<0.05$, and all tests were two-sided. PASW Statistics 18 [17] was used for the statistical analyses.

Ethics

The Regional Committee for Medical Research Ethics of South-Eastern Norway and the Norwegian Data Inspectorate approved the study. By returning the questionnaire, the participants gave written informed consent.

Results

Description of the respondents

The most common diagnoses among women were breast cancer [296 (67%)] and gynecological cancer [78 (18%)]; among men, they were prostate cancer [68 (33%)] and testicular cancer [32 (16%)]. Sixty-seven (10%) survivors reported that they were being treated at the time of the survey, and 56 (9%) reported metastases. We do not know whether the employed CSs were free of their cancer or whether they had any tumor activity. Table 1 shows the clinical, sociodemographic, and work-related characteristics of the 653 CSs. The study included more women [441 (68%)] than men [205 (32%)]. The average age was 52 years. A total of 302 CSs (46%) had had chemotherapy, 234 (36%) had other diseases or disorders, and only 40 (6%) had been in contact with the occupational health service. Eighty percent were engaged in nonmanual work, and 74% were employed full-time.

Worksite adjustments

Table 2 shows that 26% of all employed CSs had made one or more adjustments at work. The most common adjustments were to reduce/change the number of work hours per week (16%), but some had also changed work tasks to reduce physical (10%) and mental (8%) strains. There were no differences between the sexes, except that men had made more "other" worksite adjustments than women.

Work ability

Thirty-one percent of the employed CSs reported a reduction in physical work ability due to cancer (Table 2), while 23% reported a reduction in mental work ability. More women than men reported reduced mental work ability ($p=0.01$). Despite these reductions in work ability, only 7% and 6% of the employed CSs reported that they did not cope well with the physical and mental strains at work, respectively. The mean score of the overall work ability was 8.6 (SD=1.8) for both men and women.

In the bivariate analysis (Table 3), both chemotherapy and having comorbidity correlated negatively and significantly with total work ability, while the sociodemographic factors did not. Self-employed and part-time workers reported significantly lower total work ability compared with non-self-employed and full-time workers, respectively. Psychological job demands, decision latitude, and social support correlated significantly with total work ability, while manual work did not. Employed survivors who had received a high level of cancer-related support from their colleagues after developing cancer reported significantly higher work ability than workers who did not characterize their colleagues as supportive. Lastly, survivors with high total work ability had been significantly less in contact with the occupational health service and had made fewer worksite adjustments than others.

In the multivariate regression analysis (Table 3), we included variables showing significant bivariate relationships with total work ability, except for contact with the occupational health service and worksite adjustments, as we regard these factors as dependent variables in their relation to work ability. Significant relationships between the independent variables and total work ability were maintained, except for decision latitude and general social support. In an analysis including all of the independent variables (data not shown), the relationship between cancer-related support from colleagues and work ability was reduced to nonsignificance ($r=0.12$), while female sex correlated significantly and positively with higher work ability.

Discussion

Approximately one fourth (26%) of the employed CSs in our sample had made worksite adjustments. The most common among these adjustments was changing the number of work hours. A total of 31% and 23% claimed that their physical and mental work abilities had been reduced due to cancer, but only 7% and 6% reported that they did not cope well with their physical and mental work demands, respectively. The mean total work ability score was high (8.6) among both men and women. Comorbidity, having had chemotherapy, being self-employed, and having part-time work at the time of diagnosis were related to lower work ability, while a positive psychosocial work environment was related to higher work ability.

In this study, the response rate was 54%, which may limit the external validity. Recall bias may limit the reliability of the data, but because the study was performed shortly after the respondents were diagnosed, we do not consider this a major limitation. It is important to be aware that only CSs working at more or less the same job as at the time of diagnosis were included in this study. Thus, survivors with major problems at work were not included because they either did not work or had made major changes in their labor force status, such as changing job or occupation. This factor reduces the variability in work ability and thus the possibility of revealing significant relationships, but it increases the possibility of showing important work-related predictors of work ability. Work ability is a multifaceted construct that is covered by several questions. We only included one of these questions from the full Work Ability Index [4], but it has been shown that this single question may be a good alternative to the Work Ability Index for assessing work ability [18, 19].

Table 1 Clinical, sociodemographic, and work characteristics of employed CSs

	Total (n=653)		Men (n=205)		Women (n=441)	
	No. (%)	Mean (SD)	No. (%)	Mean (SD)	No. (%)	Mean (SD)
Clinical factors						
Treatment						
Chemotherapy	302 (46)		68 (33)		231 (52)	
Other treatments	351 (54)		137 (67)		210 (48)	
Comorbidity						
No	419 (64)		128 (62)		286 (65)	
Yes	234 (36)		77 (38)		155 (35)	
Sociodemographic factors						
Age (years)		51.9 (7.9)		52.4 (8.9)		51.6 (7.4)
Level of education						
≤12 years	291 (45)		102 (50)		188 (43)	
>12 years	357 (55)		103 (50)		252 (57)	
Civil status						
Nonpaired	136 (21)		28 (14)		107 (24)	
Paired	513 (79)		176 (86)		331 (76)	
Children <18 years						
No	431 (68)		122 (62)		307 (71)	
Yes	203 (32)		74 (38)		124 (29)	
General work factors						
Self-employed						
No	611 (94)		180 (88)		424 (96)	
Yes	42 (6)		25 (12)		17 (4)	
Position						
Worker	432 (68)		109 (55)		320 (75)	
Supervisor/manager	202 (32)		89 (45)		109 (25)	
Hours worked per week						
<37 h	167 (26)		21 (10)		145 (33)	
≥37 h	477 (74)		182 (90)		289 (67)	
Physical work environment						
Nonmanual work	509 (80)		156 (79)		348 (81)	
Manual work	127 (20)		42 (21)		83 (19)	
Psychosocial work environment						
Psychological demands		3.2 (1.0)		3.1 (1.0)		3.2 (1.0)
Decision latitude		4.1 (0.8)		4.2 (0.7)		4.1 (0.8)
Social support		4.7 (0.6)		4.7 (0.6)		4.8 (0.5)
Cancer-related support at work						
Supervisor support		3.8 (1.1)		3.6 (1.1)		3.9 (1.1)
Colleague support		4.5 (0.8)		4.2 (1.0)		4.6 (0.7)
Contact with occupational health service						
No	613 (94)		189 (92)		417 (95)	
Yes	40 (6)		16 (8)		24 (5)	

Twenty-six percent of employed CSs had made at least one worksite adjustment to reduce physical or mental strain at work. Changing work tasks and performing physical adjustments had been done, but the most common adjustment was to reduce work hours. This result has also been documented in other studies among both CSs [20] and workers with other chronic disorders [21]. Taking into account that survivors with the most reduced work ability were excluded in this study, one fourth of the survivors making worksite adjustments may be considered a high proportion, and this result may indicate that workers in need of adjustments actually find room and support for

Table 2 Worksite adjustments and work ability among employed CSs

	Total (n=653)	Men (n=205)	Women (n=441)	Difference between men and women p value
Worksite adjustments, no. (%)				
Change in number of work hours per week	100 (16)	35 (17)	64 (15)	0.44
Other or fewer work tasks to reduce physical strain	65 (10)	22 (11)	43 (10)	0.73
Other or fewer work tasks to reduce mental strain	52 (8)	15 (8)	37 (9)	0.62
Physical adjustment of the work environment and/or access to aids	40 (6)	8 (4)	31 (7)	0.12
Other adjustments	37 (6)	17 (9)	19 (5)	0.04
One or more adjustments at work[a]	153 (26)	45 (24)	105 (26)	0.58
Work ability, no. (%)				
Reduced physical work ability due to cancer	196 (31)	57 (29)	137 (32)	0.35
Reduced mental work ability due to cancer	148 (23)	33 (17)	113 (26)	0.01
Coping well with physical work demands	598 (93)	189 (94)	402 (93)	0.81
Coping well with mental work demands	597 (94)	189 (94)	401 (94)	0.97
Total work ability, mean (SD)	8.6 (±1.8)	8.6 (±1.8)	8.6 (±1.7)	0.89

[a] Based on responses to the alternatives of the worksite adjustments mentioned above

these adjustments at the workplace. This assumption is supported by Torp et al. [9], who showed that CSs' satisfaction with cancer-related support from colleagues and supervisors is high.

Table 3 Linear regressions between clinical, sociodemographic, and work-related factors and total work ability

	Total work ability	
	Bivariate (standardized β)	Multivariate (standardized β)
Clinical factors		
Chemotherapy (no=reference)	−0.25***	−0.24***
Comorbidity (no=reference)	−0.20***	−0.17**
Sociodemographic factors		
Age	0.00	
Sex (male=reference)	−0.01	
Education (≤12 years=reference)	−0.04	
Civil status (nonpaired=reference)	−0.04	
Living with children (no=reference)	0.07	
General work factors		
Self-employed (employee=reference)	−0.08*	−0.09*
Supervisor/management (no=reference)	0.04	
Full-time work (part-time=reference)	0.12**	0.12**
Manual work (no=reference)	−0.02	
Psychological demands	−0.14***	−0.11**
Decision latitude	0.08*	0.01
Social support	0.15***	0.09
Cancer-related support at work		
Supervisor support	0.09	
Colleague support	0.15***	0.15**
Contact with occupational health service (no=reference)	−0.09*	
Worksite adjustments (no=reference)	−0.46***	
R^2		0.15

*p≤0.05, **p≤0.01, ***p≤0.001

Few studies have investigated the effects of work adjustments among CSs [22, 23], but studies have documented that work disability associated with pain-related disorders is efficiently reduced by work-related adjustments [24]. Perhaps this result may also be expected for CSs [25]. We underline the need to tailor worksite adjustments to the particular needs of survivors with specific types of cancer, treatments, and work conditions [25].

Respectively, 93% and 94% of the male and female employed CSs coped well with work demands, and their level of self-assessed total work ability was high. This level of work ability is similar, or slightly higher, than the work ability of other working CSs, as shown in studies documenting no differences in work ability between CSs and comparable noncancer controls [26, 27]. Therefore, our study confirms that CSs who are able to stay at work regain their work ability relatively soon after treatment. At the same time, it is somewhat confusing that 20% to 30% of the survivors reported reduced work ability due to cancer. Similar results were also found by Taskila et al. [27] among Finnish employed CSs, but unlike in our study, men reported more often reduced mental work ability due to cancer compared to women [27]. CSs who stopped working or made important changes in their labor force status reported lower work ability than workers remaining at work [7].

Chemotherapy and comorbidity have been shown to have a negative effect on work ability [6]. These clinical factors were also strongly correlated with work ability in our study. Self-employed CSs reported lower work ability than employees. Other studies have documented a positive effect of being self-employed on return to work [28, 29], while Torp et al. [9] documented that self-employed CSs undertook changes in their labor force status more often than employees. An explanation of the reduced work ability among the part-time working CSs in our study might be that this reduced ability was present before they were diagnosed with cancer. In general, part-time workers in Norway have a higher probability of being disability-pensioned than full-time workers [30, 31].

Employed CSs with heavy physical work demands did not report lower work ability than survivors with light or sedentary work. This result is unexpected because manual work or physical strain has been documented in numerous studies to be an important factor influencing return to work [2, 32], work changes [9, 33], and work ability [34]. The social security system of Norway is well-developed, and many workers with health impairments are granted disability pension or get financial and practical help from the social service to make necessary occupational changes. Further, for the past 10 years, workplace policy in Norway, such as expressed in the tripartite Inclusive Working Life Agreement [35], has particularly focused on helping sick employees to return to work. One reason why manual work did not show any relationship with reduced work ability may be that CSs with high physical workload and low work ability have the highest need of making job changes. Therefore, this group of CSs was not included in the present study because they were granted disability pension or had received support to make major changes in work status after being diagnosed with cancer. We believe that heavy manual work is a risk factor for CSs' work ability in general.

As in other studies among both working CSs [34] and other workers [36], favorable psychosocial work factors seemed to have a positive effect on work ability in our study. High psychological demands showed a negative association with work ability in both the bivariate and multivariate analyses, while general support, decision authority, and cancer-related colleague support showed only significant bivariate correlations. The reduction to nonsignificance was partly because the variables are closely correlated. The positive effects of cancer-related support have been shown in other studies [9, 23, 27], underlining that it is important for enterprises to be aware of CSs' need for support when returning to work during or after treatment.

Conclusion

Approximately one fourth of working CSs who did not make major changes in their work status after being diagnosed with cancer reported reduced physical and mental work abilities. Nevertheless, they reported high total work ability and that they are coping well with work demands. One reason for the high level of work ability and coping may be that it is quite common to make worksite adjustments at work to reduce both physical and mental strains. Thus, the future outlook of work life appears optimistic for Norwegian CSs who return to work relatively soon after primary treatment. However, special attention should be given to CSs having received chemotherapy or having other chronic diseases and those engaged in psychologically demanding work.

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Competing interests The authors declare that they have no competing interests.

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