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Comparative study of work ability between cancer survivors and their referents

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ABSTRACT

Even though cancer survivors are often able to continue working after they have been diagnosed, they may have health impairments resulting in reduced work ability. We studied the current work ability of 591 employed people with an early-stage of breast cancer, lymphoma, testicular or prostate cancer, and 757 referents. We also investigated whether the survivors perceived that cancer had impaired their work ability, and which disease-related, socio-demographic and social factors at work had an impact on their work ability. The work ability of the cancer survivors did not differ from that of their referents. Among the survivors, 26% reported that their physical work ability, and 19% that their mental work ability had deteriorated due to cancer. The survivors who had other diseases or had had chemotherapy, most often reported impaired work ability, whereas survivors with a strong commitment to their work organisation, or a good social climate at work, reported impairment less frequently.

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1. Introduction

More attention has recently been paid to studying the impact of cancer diagnosis on a person's employment and return to work. The results have indicated that cancer does not have a great impact on the survivors' employment, and that cancer survivors are usually able to return to work.^{1–5} Some studies have nevertheless pointed out that cancer survivors may experience impairment in mental and physical health as a result of their illness, and that the impairment sometimes leads to a decrease in their ability to work.^{6–9} This is evidently one of the most burdensome consequences of cancer for working-aged people.

Research on the effects of cancer on work ability is scarce, and the usual methodological limitation of the few published studies is that no proper reference group has been used. Only

one study compared work ability of cancer survivors to that of cancer-free referents, and showed that people with cancer had significantly poorer physical and mental work ability than their controls.⁹ The lack of a reference group in most studies makes it impossible to separate cancer-specific effects from those resulting from other factors. Moreover, little is known about the role of social factors at work for cancer survivors' experiences of decreased work ability.

The primary aim of the present study was to examine whether the self-assessed current work ability of breast, lymphoma, testicular and prostate cancer survivors differs from that of people without cancer. Secondly, we examined whether the survivors experienced that their physical or mental work ability had been impaired due to cancer. We also studied whether some disease-related factors (cancer type, treatment, time since diagnosis, number of other chronic diseases or

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injuries) or socio-demographic factors (age, gender, marital status, education or occupation) or social factors at work (social climate, social support from co-workers and supervisors, commitment to the work organisation) had an impact on these two outcomes. Furthermore, we assessed whether there were any differences between the survivors and their referents with respect to the association between the explanatory variables and current work ability.

The data for this study were collected in connection with a Nordic Study on Cancer and Work Life (NOCWO). The results presented in this article are based on the Finnish data.

2. Materials and methods

2.1. Participants

Altogether, 1000 patients diagnosed with breast cancer, lymphoma, testicular or prostate cancer in 1997–2001 were selected from the Patient Register of the Department of Oncology of the Helsinki University Hospital. The selected patients had to have a good prognosis (no advanced stage of disease or recurrence) and to be 25–57 years of age at the time of the diagnosis. Other inclusion criteria were: no previous cancer, no ongoing treatment with cytostatic drugs, native language Finnish or Swedish, and resident of the Hospital District of Helsinki and Uusimaa, Finland. In addition, a reference group of 1500 persons was selected from the files of the Population Register Centre representing the general population living in the same district and having the same age and gender distribution as the cancer survivors.

Questionnaires were mailed to the study subjects to obtain information on work ability and related factors. A total of 825 cancer survivors (82.5%) and 1026 referents (68%) completed the questionnaire. The referents who reported having had cancer were excluded from the analyses (31 persons). The analyses were restricted to those who were either employed full-time or part-time, worked as freelancers, or were entrepreneurs at the time of the survey. Unemployed persons, homemakers, students, or retired persons were excluded from the analysis, because our aim was to examine the work ability of employed cancer survivors.

Altogether 591 cancer survivors (437 women and 154 men) and 757 referents (552 women and 205 men) were included in the study. Of the women 90% ($n = 394$) had breast cancer, and 10% had lymphoma ($n = 43$). Among the men, 41% had lymphoma ($n = 64$), 30% had prostate cancer ($n = 46$) and 29% had testicular cancer ($n = 44$). Ninety five percent of women with breast cancer and 56% of men with prostate cancer had TNM classification of T1 or T2 with no metastasis or metastasis in regional lymph nodes (N0, N1 or Nx). Moreover, 89% of men with testicular cancer and 77% of people with lymphomas had clinical stage of I or II. None of the participants had distant metastasis. Fifty percent of the women and 43% of the men had had chemotherapy.

2.2. Measuring work ability

We assessed work ability by asking the participants to estimate their current work ability compared with their lifetime best, using the following question: '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).' This question is an item included in the Work Ability Index (WAI), which is a validated tool for measuring self-assessed work ability.¹⁰ The item has been proven to be a good predictor of retirement due to work disability and mortality.¹¹

In addition, we asked the survivors to evaluate whether cancer diagnosis had impaired their physical or mental work ability on a scale of 1 (not at all) to 5 (very much). For the analysis, the participants were divided into the following three groups: people whose work ability was not impaired at all as a result of cancer, those who reported that cancer had only little impact on their work ability, and finally, those who answered that cancer had impaired their work ability to some extent, quite a lot, or very much.

2.3. Disease-related and socio-demographic factors

Information about the disease-related variables (diagnosis, time since diagnosis and treatment) were obtained from the hospital files. Treatment was classified into two categories: chemotherapy, or some other type of treatment (endocrine therapy, radiotherapy and/or surgery). In the questionnaire, the participants were asked to mark on a list their current chronic diseases or injuries that had been diagnosed by a physician. The conditions included injury or accident, musculoskeletal disease, cardiovascular disease, respiratory disease, mental disorder, neurological or sensory diseases, digestive disease, genitourinary disease, skin disease, tumour (asked only from the referents), endocrine and metabolic diseases, blood diseases, or other disorder or disease. Anyone marking 'other' was asked to specify the disorder or disease.¹⁰

Information was inquired concerning marital status (single, married, cohabitating, or other), education, and occupation. The participants were classified into four educational categories as follows: comprehensive school (approximate length 1–9 years), secondary school / vocational school (10–12 years), college degree (13–16 years) and higher university degree (more than 16 years).¹² The occupations were coded according to the International Standard Classification of Occupations ISCO-88.¹³

2.4. Social factors at work

The items measuring support from supervisors and co-workers, social climate at work, and commitment to the work organisation were adopted from the general Nordic Questionnaire (QPSNordic). It is a validated tool for measuring psychological and social factors at work, including job organisation characteristics, as well as individual work-related attitudes.¹² Social climate at work, commitment to the work organisation and support from supervisors were measured by three items, and support from co-workers was determined from two items. The scale ranged from 1 (very seldom/little or not at all/disagree totally) to 5 (very often or always/very much/agree totally) for all the questions. The individual values of the items measuring the same social factor were summed up.

2.5. Statistical analysis

The data on the men and women were analysed separately because they mainly had different types of cancer. The effects of both categorical and continuous explanatory variables on current work ability were assessed using a general linear model. The differences in the mean values of current work ability between the categories of the explanatory variables were tested, and the effect of one unit increase in the continuous variables on the mean of the outcome variable was evaluated. In these analyses, one of the main interests was the interaction between the disease status (cancer survivor/referent) and other explanatory vari-

ables (i.e. we assessed whether the effect of the explanatory variables on current work ability differed between the survivors and their referents).

We determined a multinomial outcome distribution with a cumulative link function to fit a proportional odds model¹⁴ in order to assess the effects of the explanatory variables on the two ordinal categorical outcome variables representing the cancer survivors' impaired physical and mental work ability. The validity of the proportional odds assumption (i.e. the homogeneity of the odds ratios across all possible cut points of the outcome) was confirmed. All of the statistical analyses were performed with the use of SAS 8.2 software.

Table 1 – The mean value of the current work ability according to disease-related and socio-demographic factors

	Men		Women	
	Cancer survivors (N)	Referents (N)	Cancer survivors (N)	Referents (N)
<i>Cancer type</i>				
Lymphoma	8.23 (64)		8.49 (43)	
Prostate	8.00 (46)			
Testicular	8.95 (44)			
Breast			8.23 (394)	
<i>Treatment</i>				
No chemotherapy	8.38 (87)		8.25 (217)	
Chemotherapy	8.36 (67)		8.25 (220)	
<i>Year of diagnosis</i>				
1997	8.72 (18)		8.28 (81)	
1998	8.39 (33)		8.40 (84)	
1999	8.28 (36)		8.29 (87)	
2000	8.24 (41)		8.07 (88)	
2001	8.42 (26)		8.23 (97)	
<i>Diseases or injuries</i>				
None	8.72 (96)	8.58 (113)	8.66 (235)	8.74 (278)
One	8.15 (40)	7.97 (70)	8.03 (140)	8.15 (199)
Two or more	6.57 (14)	7.24 (21)	7.15 (55)	7.44 (66)
<i>Age, years</i>				
25–34	8.79 (24)	8.89 (19)	8.85 (13)	8.80 (46)
35–44	9.03 (34)	8.46 (39)	8.54 (59)	8.58 (93)
45–54	7.85 (41)	8.10 (80)	8.35 (187)	8.44 (213)
55–64	8.16 (55)	8.06 (67)	8.01 (178)	8.11 (200)
<i>Education</i>				
Comprehensive school (1–9 years)	7.70 (23)	7.82 (49)	8.12 (94)	8.09 (125)
Secondary/vocational school (10–12 years)	7.78 (40)	7.96 (54)	8.19 (90)	8.20 (116)
College degree (13–16 years)	8.74 (46)	8.38 (45)	8.27 (139)	8.50 (177)
Higher university degree (over 16 years)	8.87 (45)	8.82 (55)	8.39 (113)	8.61 (133)
<i>Occupation</i>				
Legislators, professionals, senior officials and managers	8.82 (82)	8.56 (87)	8.36 (122)	8.58 (183)
Technicians and associate professionals	8.00 (18)	7.97 (30)	8.07 (98)	8.37 (115)
Clerks	9.00 (6)	7.33 (9)	8.24 (125)	8.52 (102)
Service and care workers and sales personnel	8.00 (10)	8.47 (15)	8.43 (49)	8.05 (107)
Craft workers, plant and machine operators, assemblers and elementary occupations	7.62 (34)	7.97 (63)	8.31 (36)	8.00 (44)
<i>Marital status</i>				
Married, co-habiting	8.32 (128)	8.26 (162)	8.34 (313)	8.37 (345)
Other	8.62 (26)	8.12 (42)	8.02 (123)	8.38 (207)
Total	8.37 (154)	8.23 (205)	8.25 (437)	8.37 (552)

Table 2 – Effects (with 95% confidence intervals) of the explanatory variables on the mean of the current work ability among men and women as estimated by the multivariate general linear model

	Men	Women
<i>Status groups</i>		
Referents	0.00	0.00
Cancer survivors	0.00 (–0.30, 0.31)	–0.05 (–0.22, 0.11)
<i>Diseases or injuries</i>		
None	0.00	0.00
One	–0.44 (–0.78, –0.11)	–0.57 (–0.74, 0.39)
Two or more	–1.24 (–1.79, –0.69)	–1.09 (–1.36, 0.83)
<i>Age, years</i>		
25–34	0.00	0.00
35–44	0.20 (–0.34, 0.74)	–0.20 (–0.57, 0.18)
45–54	–0.31 (–0.81, 0.18)	–0.30 (–0.65, 0.04)
55–64	–0.34 (–0.85, 0.17)	–0.52 (–0.87, –0.16)
<i>Education</i>		
Comprehensive school (1–9 years)	0.00	0.00
Secondary/vocational school (10–12 years)	–0.10 (–0.56, 0.36)	0.17 (–0.08, 0.42)
College degree (13–16 years)	0.53 (0.08, 0.99)	0.20 (–0.03, 0.42)
Higher university degree (over 16 years)	0.67 (0.22, 1.12)	0.27 (0.03, 0.51)
<i>Good social climate at work</i>	0.09 (0.01, 0.16)	0.04 (0.00, 0.09)
<i>Commitment to the work organisation</i>	0.10 (0.03, 0.17)	0.10 (0.06, 0.14)
<i>Social support from a supervisor</i>	0.10 (0.03, 0.17)	0.06 (0.02, 0.09)

3. Results

3.1. Current work ability of the cancer survivors and their referents

The mean values for the perceived current work ability of the employed cancer survivors with good prognosis and their referents were nearly the same. In both groups, people with a higher level of education had better work ability than those with less education. Older age, or several diseases or injuries lowered the work ability. The men with testicular cancer had the highest mean value for work ability, and the men with prostate cancer had the lowest (Table 1).

Multivariate analysis showed also no difference in the mean of work ability between the cancer survivors and their referents for both genders (Table 2). Age and education were associated with current work ability. Better educated men had a higher mean of work ability than the less educated ones ($p < 0.001$), whereas among the women, the differences were not as significant ($p = 0.17$). The more diseases people had, the poorer their work ability was. A better social climate at work and greater commitment to the work organisation was related to better work ability among both genders. Other disease-related, socio-demographic, or social factors at work were not significantly associated with work ability.

We also studied whether there were differences in the association of the explanatory variables with work ability between the cancer survivors and their referents. Among the men, an interaction was noted between the disease status (cancer survivor / referent) and social support from one's supervisor ($p = 0.003$). The male referents who got more support had better work ability than the other referents, whereas such an association was not found among the male survivors. Among the women, getting support from a supervisor in-

creased the level of work ability equally in both status groups. Other interactions were not found.

3.2. Impairments in physical and mental work ability among the cancer survivors

We also studied whether the survivors perceived that cancer had impaired their work ability. A total of 20% ($n = 31$) of the men and 28% ($n = 121$) of the women reported that cancer had impaired their physical work ability to some extent, quite a lot, or very much. Impaired mental work ability was reported by 23% ($n = 35$) of the men and 18% ($n = 79$) of the women. Men with testicular cancer reported less impairment than people with other cancer types. Only 4% ($n = 2$) and 13% ($n = 6$) of this group reported impaired physical and mental work ability, respectively.

We investigated which factors were associated with impairments in physical and mental work ability among the cancer survivors, using a multivariate model (Table 3). Among the women, age was associated with impaired physical work ability, the oldest age group (55–64 years) having a nearly five-fold risk of impairment compared with the youngest group (25–34 years), as a result of cancer. Among the men, age did not increase the risk of impaired work ability. The men with a higher university degree were ten times less likely to report impairment than those who had the lowest level of education. Those men who had two or more other diseases or injuries, had a five-fold risk of impairment compared with those who did not have any other disease than cancer. For the women, the corresponding risk was almost four-fold. Moreover, both the men and the women who had had chemotherapy had more than twice the risk of impaired physical work ability than those who had received other treatments. Impaired work ability was also dependent on some psychosocial

Table 3 – Odds ratios (with 95% confidence intervals) for impaired physical work ability among the cancer survivors estimated by the multivariate proportional odds model

	Men	Women
<i>Treatment</i>		
No chemotherapy	1.00	1.00
Chemotherapy	2.79 (1.24–6.32)	2.16 (1.45–3.21)
<i>Other diseases or injuries</i>		
None	1.00	1.00
One	0.87 (0.35–2.16)	2.02 (1.33–3.08)
Two or more	5.08 (1.49–17.29)	3.82 (2.11–6.92)
<i>Age, years</i>		
25–34	–	1.00
35–44	–	2.90 (0.83–10.20)
45–54	–	2.77 (0.83–9.21)
55–64	–	4.56 (1.36–15.34)
<i>Education</i>		
Comprehensive school (1–9 years)	1.00	–
Secondary/vocational school (10–12 years)	0.46 (0.14–1.53)	–
College degree (13–16 years)	0.61 (0.20–1.89)	–
Higher university degree (over 16 years)	0.10 (0.03–0.38)	–
<i>Commitment to the work organisation</i>	0.79 (0.69–0.91)	0.90 (0.83–0.97)
<i>Social support from co-workers</i>	–	0.83 (0.73–0.94)

factors at work. The higher the commitment to the work organisation, the less the risk of impaired work ability among both genders. Among the women, co-workers' support was also related to reduced risk of impaired work ability.

The factors that were significantly associated with impaired mental work ability are presented in Table 4. The men and women who had at least two other diseases had an increased risk of impaired mental work ability. A better social climate at work was related to a reduced risk of impairment among both genders. In addition, commitment to the work organisation and co-workers' support were associated with a reduced risk of impaired mental work ability among the women.

4. Discussion

The self-assessed current work ability of employed people with breast cancer, lymphoma, and prostate cancer, and their

referents, did not differ essentially. In both groups, those with more education considered themselves to have better work ability than did the less educated responders. In addition, older age and the presence of several diseases or injuries were related to lower work ability. Other studies in the general population have shown similar results; they have indicated that people with lower socioeconomic status and older age have lower work ability.^{15,16}

It has been reported in previous studies that prognosis and time since diagnosis have big impact on employment of cancer survivors.^{17,18} Our study population consisted of long-term cancer survivors with a good prognosis; survivors had been diagnosed with cancer 2–6 years before the time of the questionnaire. This fact may have played a role for finding no differences in work ability between the survivors and their referents. In addition, previous studies have indicated that cancer has little impact on those who remain in work life.^{2,3} According to a study among employed breast

Table 4 – Odds ratios (with 95% confidence intervals) for impaired mental work ability among the cancer survivors estimated by the multivariate proportional odds model

	Men	Women
<i>Other diseases or injuries</i>		
None	1.00	1.00
One	1.85 (0.84–4.09)	1.38 (0.88–2.18)
Two or more	8.34 (2.41–28.83)	2.86 (1.54–5.30)
<i>Age, years</i>		
25–34	–	1.00
35–44	–	1.12 (0.34–3.69)
45–54	–	0.50 (0.16–1.53)
55–64	–	0.84 (0.27–2.57)
<i>Good social climate at work</i>	0.80 (0.70–0.91)	0.84 (0.76–0.94)
<i>Commitment to the work organisation</i>	–	0.87 (0.79–0.96)
<i>Social support from co-workers</i>	–	0.84 (0.73–0.96)

cancer survivors, hours of work and wages were even higher than among the women in the control group although, in general, cancer had a negative impact on employment.¹⁹ Our finding of no difference in the work ability between the survivors and the referents is consistent with these results. Conversely, Gudbergsson and colleagues⁹ noted that cancer survivors reported poorer work capacity than their referents. The response rate in this study was low, however, and thus selective participation may have affected the findings.

The strength of our study was the inclusion of a reference group, unlike in most other studies. The response rate was also high. Nevertheless, the cross-sectional design was a limiting factor in the study. In addition, potential selective participation may have played a role in the fact that no difference was found between the survivors and their referents. The rate was higher among the survivors (82.5%) than among the referents (68%). Moreover, the oldest age group of referents (55–64) included more active responders (74%) than the younger age groups (65%), whereas the survivors' response rate did not vary by age. It is possible that those referents who had more problems in work life may have participated more actively than those with no complaints, and this may have diluted the difference in work ability between the two groups. Therefore, the possibility of information bias cannot be excluded.

Of the cancer survivors, 26% reported that their physical work ability, and 19% that their mental work ability was impaired as a result of cancer. These percentages are in line with the results from the other studies. For example, in four studies^{6–9} the percentages of those reporting work-related impairment due to cancer varied from 19%⁶ to 31%.⁸

There was a clear difference between those cancer survivors who reported impaired work ability due to cancer and those who did not. Cancer survivors who had received chemotherapy and had other diseases or injuries were most likely to report impaired work ability, whereas the survivors with a strong commitment to their work organisation or a good social climate at work, reported impairment less frequently.

Earlier studies have suggested that cancer survivors' return to work is strongly dependent on both the type of cancer and related factors such as prognosis and the side effects of treatment.^{2,4,8,17} It has been reported, for example, that chemotherapy, along with its side effects (especially fatigue), has a long-term negative effect on return to work and the capability to work.^{6,20,21} Our results are in agreement with this; both the men and the women treated with chemotherapy had a greater likelihood to report impaired work ability than did those with other treatments. In addition, the treatment with cytostatic drugs varies by cancer type. People with lymphoma may have had more intensive treatment than people with breast cancer. It has been noted, for example, that lymphoma survivors treated with chemotherapy have poorer quality of life than chemotherapy-treated breast cancer patients.²²

The presence of other diseases impaired physical work ability. It has also been reported earlier that cancer survivors who have other chronic diseases are more likely to report

being in poor health^{18,23} and are more likely to quit work as a result of cancer.⁸

Our results on social factors at work are in line with the results of other studies conducted in the general population. For example, commitment to the work organisation has been observed to correlate negatively with burnout²⁴ and stress.²⁵ Furthermore, a poor social climate at work has been found to be associated with increased absenteeism, especially in female-dominant sectors.²⁶

Mobilising social support in the work environment has been reported to be positively associated with return to work among cancer survivors.¹⁷ In our study, support from co-workers was related to a reduced risk of impaired work ability among the women, but the association was not found among the men. According to previous research, women often seek support more actively and have a wider social network than men, whereas men usually lean on one person, a spouse in most cases.²⁷ In addition, female cancer survivors seem to benefit from social support more than men. Hann and colleagues observed that a wide social network was related to less depressive symptoms among women with cancer, whereas the effect was not found for men.²⁸ Similarly, Bildt and Michelsen noted that deficient support at work was related to mental health problems among women, but a similar connection was not found for men.²⁹

Age was associated with impaired physical and mental work ability among the women, whereas among the men, age did not increase the risk of impairment. The risk of reporting impaired mental work ability was more common in younger than older women. The result is in line with a previous study that indicates a greater risk for psychological distress among younger than older women with breast cancer.³⁰ This finding may not be related to gender only; the differences between the cancer types examined may also have played a role.

There seemed to be no essential difference in current work ability between the cancer survivors who had a good prognosis and remained in work life, and their cancer-free referents. However, many survivors did experience impaired work ability due to their illness. Having other diseases or chemotherapy had the strongest association with impaired physical as well as mental work ability. In the future, more attention should be paid to treatment-related factors, as well social factors at work, as these seem to play an important role in the work ability of cancer survivors and their continuance in work life.

Conflict of interest statement

None declared.

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