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The impact of education and occupation on the employment status of cancer survivors☆

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Abstract

We explored the effect of a diagnosis of cancer on employment according to cancer type, education, occupation, age, gender, mother tongue (Swedish or Finnish), calendar time and hospital district. All 12,542 new cancer cases diagnosed in 1987–1988 and 1992–1993, aged 15–60 years at the time of the diagnosis were identified from the Finnish Cancer Registry. The employment rate of the cancer survivors 2–3 years after the diagnosis was only 9% lower than their gender- and age-matched referents. However, we found that education and occupation modified the effect of cancer on the employment; the difference between cancer survivors and their referents in the probability of being employed was greater in the lower than in the higher educational groups. A modifying effect of education on the probability of employment was found among people with cancer of the lung, stomach, rectum and cervix uteri and those with cancers of the nervous system.

Keywords: Employment; Education; Occupation; Cancer type

1. Introduction

Due to the improved prognosis of many forms of cancer, an increasing number of cancer survivors return to work after their treatment, or continue working during their treatment. Previous studies have indicated that a change of job or employer, shifting to part-time work, unemployment and early retirement are common among cancer survivors [1–5]. By contrast, some recent studies of breast cancer survivors have concluded that a diagnosis of cancer does not have a big impact on people's employment possibilities or earnings [6,7]. Moreover, according to a review study of young adult survivors of childhood cancer, survivors and controls did not differ with respect to employment [8].

A review of Spelten and colleagues in 2003 [9] brought several problems to light concerning the methods and data used in the earlier studies on cancer and returning to work. Most of the studies were based on small numbers of cancer survivors, and many of them did not include any reference group. Overall, too little information is available for estimating the magnitude of the problem, and thus it is difficult to identify the need for further studies or to propose guidelines to improve the situation.

The aim of this study was to investigate in a whole population setting whether diagnosis of cancer has an impact on employment by comparing the employment

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of cancer survivors with that of the cancer-free population. Moreover, we examined whether this impact varies by education, occupation, cancer type, calendar time, hospital district (21 regions), age, gender or mother tongue (Swedish or Finnish). Mother tongue was included because it has been reported previously that the Swedish-speaking minority has a longer life-expectancy than the Finnish-speaking population [10].

2. Patients and methods

2.1. Subjects

All new cancer cases diagnosed in 1987–1988 or 1992–1993 and aged 15–60 years at the time of the diagnosis were identified from the Finnish Cancer Registry and linked by a personal identifier to the census data of the years 1985, 1990 and 1995 of Statistics Finland. Because of the legal confidentiality restrictions, a 90% random sample of people with cancer was generated. Everyone residing in Finland since 1967 has been assigned a unique 11-digit personal identifier (PID), which was used in the linkage. Only cancer patients who were alive at either December 31, 1990 (people diagnosed in 1987–1988) or 1995 (people diagnosed in 1992–1993) were linked to the census data. Moreover, people who had a previous cancer diagnosis or who had more than one type of malignant tumour during the study period were excluded from the data analysis.

There were 12,542 people with cancer in the final data-set. An equal number of referents, individually matched for gender and age (birth year), were selected for all of the cancer survivors from the subjects in the Finnish population that were free of cancer and alive on December 31, 1990 or 1995. After the linkage, the personal identifiers were deleted, but a code was included to match each cancer patient to his/her referent. The linkage failed in 0.5% of the cases.

2.2. Employment status and construction of the data-file

The employment status in 1990 of people diagnosed with cancer in 1987–1988 and the employment status in 1995 of people diagnosed in 1992–1993 were obtained from the files of Statistics Finland. Employment status refers to the main activity of the individual in 1990 or 1995. We divided the employment status into "employed" and "not employed". The latter group includes unemployed persons, homemakers, students, military conscripts, and those on disability pension, retired or unknown. Data on occupation and education were based on the census data of the year before the diagnosis, i.e., the 1985 or 1990 censuses.

The occupational and educational categories used are based on the official classifications of Statistics Finland. Occupational categorisation is based on the classification in census files 1970–1985 [11]. The educational categorisation is based on Educational classification 1981 [12].

2.3. Statistical analyses

Our outcome variable, employment status, was dichotomous ("employed" or "not employed") and we used a generalised linear model with binomial distribution and log link to estimate the survivors' probability of being employed compared with their referents who were free of cancer up to December 31, 1990 or 1995. Interactions between cancer status and the other variables were tested. Relative Risks (RR) were estimated because our outcome (employment) was not rare and thus Odds Ratios (OR) would have overestimated the risk of employment among cancer survivors. Interactions between cancer status and the other variables were tested. Because people with cancer and their referents had the same age and gender distributions, further adjustments were not needed. Calendar time was included in all models. SAS 8.12 software (SAS Institute Inc. SAS/STAT®, User's Guide, Version 8. Cary, NC: SAS Institute Inc., 1999) was used for the statistical analyses.

3. Results

We explored the effect of cancer diagnosis on employment according to education, occupation, cancer type, age, gender, hospital district, mother tongue (Swedish or Finnish) and calendar time. We found that education and occupation modified the effect of cancer on employment. Other variables did not have such modifying effects.

3.1. Employment by occupation and education

The employment rate before diagnosis (either 1985 or 1990) was 78%, and it was the same as the rate of the cancer-free population. Two to three years after the diagnosis, the employment rate of cancer survivors was slightly lower (64%) than the employment rate of their age- and gender-matched referents (73%).

The difference in the employment rate between the cancer survivors and their referents varied by occupation. In agricultural, forestry, and fishery work and in transport and communication, manufacturing and services, cancer survivors had a 18–20% lower statistically significant probability of being employed (RR) than their referents (Table 1). In technical, physical, social sciences, humanistic and artistic work, as well as administrative, managerial, and clerical work, the probability of employment was only 7% smaller among the cancer survivors than among their referents.

Table 1
Employment rates and RR of being employed among people with cancer, and their referents

Occupation before the diagnosis	Employed % and (*N*)		RR (95% CI)
	Cancer survivors	Referents	
0 Technical, physical science, social science, humanistic, and artistic work	76 (2475)	81 (2327)	0.93 (0.90–0.96)
1 Administrative, managerial, and clerical work	74 (1773)	79 (1620)	0.93 (0.90–0.97)
2 Sales work	60 (848)	68 (851)	0.86 (0.80–0.93)
3 Agricultural work, forestry, and fishery	57 (902)	72 (1064)	0.81 (0.75–0.86)
4 Mining	25 (8)	47 (15)	0.54 (0.15–2.02)
5 Transport and communication	58 (532)	72 (517)	0.80 (0.73–0.88)
6/7 Manufacturing and related work	52 (1845)	63 (1848)	0.82 (0.78–0.87)
8 Services	59 (1440)	71 (1591)	0.82 (0.78–0.87)
9 Defense forces	76 (17)	77 (31)	0.97 (0.71–1.32)
Employed (total)	64 (9840)	73 (9864)	0.88 (0.86–0.90)
Not employed [a]	23 (2702)	21 (2678)	0.83 (0.74–0.92)
All	12,542	12,542	

RR, Relative Risk; 95% CI, 95% Confidence Interval.
[a] Includes unemployed, homemakers, students, military conscripts, those on disability pension, retired, and unknown.

Table 2
Employment rates and RR of being employed by educational class among cancer survivors and their referents

Education	Employed % (*N*)		RR (95% CI)
	Cancer survivors	Referents	
Primary school (1–9 years)	42 (6199)	52 (6404)	0.81 (0.78–0.84)
Vocational and professional (10–12 years)	60 (3687)	68 (3722)	0.88 (0.85–0.91)
Polytechnic (13–16 years)	73 (1518)	78 (1375)	0.94 (0.90–0.98)
University (over 16 years)	80 (1133)	83 (1041)	0.96 (0.93–1.00)

The probability of being employed was lowest among those cancer survivors who had only primary education (Table 2). These survivors were 19% less likely to be employed than their referents. Among people who had completed vocational or professional school, the probability of being employed was 12% lower in the group of cancer survivors than in the reference group. Finally, there was no statistically significant difference in the employment among people who had university education.

3.2. Cancer effect on employment by cancer type

The employment rate of the cancer survivors by selected cancer type 2–3 years after diagnosis compared with their age- and gender-matched referents is presented in Table 3. We chose the presented cancer types, because they are rather common in the age group of 15–60 years. The cancer sites of young persons at diagnosis (e.g., testis) showed a high employment rate, while the sites prevalent at high age (e.g., prostate) showed a low rate. People with lung cancer were least likely to be employed (RR 0.45, 95% Confidence Interval (CI) 0.34–0.59). The probability of employment was also low among people with leukaemia, stomach, and cancer of the nervous system. There was no significant difference in the employment between referents and people diagnosed with melanoma, non-melanoma of the skin, Hodgkin's disease, prostate, kidney, testis, or thyroid gland cancers.

3.3. Modifying effect of education

We tested whether the effect of cancer on employment depended on any of the modifying factors among those cancer diagnoses presented in Table 3. We found that education modified the effect in people with cancer of the nervous system ($P = 0.0014$), lung, stomach, rectum or cervix uteri ($P < 0.0001$ in all). In the other types of cancers, there was no interaction between cancer diagnosis and education.

People with only primary school education had a lower probability of being employed compared with their referents, whereas in the higher educational groups, there was no statistically significant difference in employment between the cancer survivors and their referents, except for cancers of the nervous system (Table 4).

4. Discussion

In this study, we examined the effect of cancer on employment. The existence of a comprehensive cancer

Table 3
Employment rate and RR of being employed by cancer type 2–3 years after diagnosis compared with their referents

	N	Employed %		RR (95% CI)
		Cancer survivors	Referents	
Stomach	284	38	54	0.71 (0.59–0.85)
Colon	538	53	59	0.90 (0.81–0.99)
Rectum	331	43	54	0.79 (0.68–0.93)
Cervix uteri	183	58	75	0.77 (0.67–0.90)
Corpus uteri	548	42	51	0.84 (0.74–0.95)
Ovary	534	54	65	0.83 (0.75–0.92)
Prostate	240	30	34	0.87 (0.67–1.13)
Testis	206	72	69	1.02 (0.93–1.19)
Kidney	404	50	55	0.91 (0.80–1.04)
Bladder	364	47	57	0.82 (0.72–0.95)
Melanoma of the skin	853	68	66	1.03 (0.97–1.11)
Non-melanoma of the skin	203	56	53	1.06 (0.88–1.26)
Leukaemia	222	45	64	0.70 (0.59–0.84)
Non-Hodgkin's lymphoma	411	49	66	0.75 (0.66–0.84)
Hodgkin's disease	269	64	65	0.98 (0.87–1.11)
Lung	279	19	43	0.45 (0.34–0.59)
Breast	4098	61	65	0.95 (0.92–0.98)
Nervous system	878	45	69	0.66 (0.61–0.71)
Thyroid gland	629	70	70	1.01 (0.94–1.08)

Table 4
Number of cancer survivors and RR of being employed by educational class among people with cancer of the nervous system, lung, stomach, rectum cancer and cervix uteri in comparison with their referents

Education	Cancer of the nervous system		Lung cancer		Stomach		Rectum		Cervix uteri	
	N	RR (95% CI)	*N*	RR (95% CI)	*N*	RR (95% CI)	*N*	RR (95% CI)	*N*	RR (95% CI)
Primary school (1–9 years)	398	0.55 (0.47–0.65)	210	0.48 (0.34–0.68)	177	0.56 (0.42–0.75)	182	0.64 (0.48–0.84)	87	0.64 (0.48–0.86)
Vocational and professional (10–12 years)	296	0.66 (0.58–0.76)	46	0.59 (0.36–0.98)	75	0.87 (0.65–1.17)	88	0.78 (0.59–1.03)	68	0.82 (0.66–1.02)
Polytechnic (13–16 years)	108	0.79 (0.68–0.92)	13	0.64 (0.26–1.57)	15	0.99 (0.66–1.50)	33	1.17 (0.82–1.68)	19	1.09 (0.86–1.39)
University (over 16 years)	76	0.84 (0.71–0.99)	10	0.88 (0.57–1.36)	17	1.11 (0.78–1.59)	28	1.02 (0.78–1.35)	9	1.04 (0.76–1.42)

registry in Finland made it possible for us to investigate the employment status of all cancer survivors diagnosed in 1987–1988 and 1992–1993. The large data-set allowed us to examine the impact of cancer diagnosis on employment by several modifying factors (education, occupation, cancer type, calendar time, hospital district, age, gender or mother tongue). We found that education and occupation modified the effect of cancer on employment.

On average, cancer survivors are in employment almost as much as the general population. All cancer survivors had only a 9% lower employment rate than the cancer-free population. However, there were differences in the employment rates between educational and occupational classes and between cancer types.

Results of earlier studies examining the employment rate of cancer survivors have varied considerably. For example, in three recent studies on long-term cancer survivors, the employment rate varied from 35% [4] to 67% [6,13]. The variation could mostly be explained by the different pattern of the cancer types examined. In our study, 64% of the 9852 working-aged and economically-active people with cancer were still employed 2–3 years after their diagnosis, in comparison with 73% of their age- and gender-matched referents. Before the cancer diagnosis (in 1985 or 1990), the employment rate in both groups was the same (78%). Employment decreased in both groups, which is partly due to the aging of the population. Many people who are close to 60 years of age have most likely already retired during the previous five years. According to our previous analysis, the retirement rate was 7% higher among cancer survivors than their referents among the working population (data not shown).

It has been shown previously that a lower socioeconomic status is associated with a higher mortality risk among cancer patients [14,15]. Our results indicate that people with a higher education status are more likely to be employed after their cancer diagnosis than people with a less education. Similarly, in two previous studies it was noted that cancer survivors with a better education are less likely to retire early or become unemployed than people with less education [2,16].

Results of previous studies have indicated that manual labour is negatively associated with a return to work [9]. In our study, the biggest difference in the employment rate between the cancer survivors and their referents was found among people working in mining and agriculture, forestry, fishery, and transport and communication. This is likely to be due to the physical load of work in these occupations. In some occupations, such as construction work, employment is sensitive to economic fluctuations. In such occupations, cancer diagnosis might have a stronger effect on one's employment possibilities: when there is an oversupply of workforce it is less likely that people with a history of cancer will be employed.

In addition, not only the physical load of work, but also the individual prognosis of cancer, has an impact on people's capability to return to work. In our data, the employment rate clearly varied by cancer type. The difference between the cancer survivors and their referents in the employment rate was largest in lung cancer, leukaemia, stomach cancer and cancers of the nervous system. Earlier studies have also suggested that the return to work of cancer survivors is strongly dependent on cancer type as well as related factors, such as prognosis, and side-effects of the treatment [1,4,9,13]. Fatigue is one of the most common side-effects of cancer treatment, and the fatigue level independently predicts how soon a person with cancer is able to return to work [2,17].

We found that the effect of cancer on employment varied by education, notably among people with cancers of the nervous system, lung cancer, stomach, rectum and cervix uteri. Earlier studies have indicated that some cancer sites are associated with a lower socio-economic status, which is closely related to educational attainment [15,18]. Association between cancer incidence and low social class has been reported earlier in cervix uteri [19], stomach [20], rectum [14], and lung cancer [14,21–23], mainly because of the differences in dietary habits, smoking and alcohol consumption.

In our data, 70% of the people with lung cancer, and 62%, 55%, 48% and 45% of the stomach, rectum, cervix uteri and cancers of the nervous system, respectively, had only primary education. It is more likely that less educated people work in physically demanding jobs, such as manufacturing or agriculture. Because cancer reduces a person's physical capacity [18], it was expected that cancer patients with less education might be more likely to terminate their work career than people with a higher education. However, there was no difference in employment between the cancer survivors and their referents in the highly educated group, expect for cancers of the nervous system. The recurrence rate of cancers of the nervous system is high [24] and the side-effects of the treatment and complications may be the major reason for the low probability of being employed also in the highest educational category. There may also be more flexibility for people in higher positions to stay on long sick-leaves or to work part-time.

Even though a cancer diagnosis does not automatically lead to unemployment or early retirement, it often has an impact on the cancer survivors' possibilities to continue working. Previous studies have suggested several psychosocial problems related to a lack of knowledge, fears and attitudes among the work-mates of cancer survivors, and this hinders their personal work career [25,26]. However, there is not, much research on the return to work process of cancer survivors. More research is needed to clarify both environmental and personal factors that predict the successful return to work of cancer survivors.

Conflict of interest statement

None.

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