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Health behaviours in older cancer survivors in the English Longitudinal Study of Ageing

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ABSTRACT

Objectives: To assess health behaviours in cancer survivors in a population-based sample of older adults in the United Kingdom (UK).

Methods: Data were from wave 1 of the English Longitudinal Study of Ageing. Prevalence of smoking, alcohol consumption and physical activity was compared in cancer survivors and those with no cancer diagnosis. Associations between health behaviours and quality of life (QoL) and depressive symptoms were compared in both groups.

Results: There were 716 (6.2%) cancer survivors in the sample. Cancer survivors were more likely to be former smokers (p < 0.001) and less likely to do moderate or vigorous physical activity (p < 0.05) than those with no cancer diagnosis. Physical activity was associated with better QoL and lower depressive symptoms, and smoking with poorer QoL and higher depressive symptoms, in both groups.

Discussion: Levels of health behaviours among cancer survivors in the UK are suboptimal. Effective strategies to promote healthy lifestyles are needed in this vulnerable population.

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1. Introduction

The number of cancer survivors worldwide was estimated to be over 25 million in 2002¹ and a recent study using United Kingdom (UK) cancer registry data put the number of survivors in the UK at 2 million.² Although these trends are immensely encouraging for anyone facing a diagnosis of cancer, they also introduce a new health challenge because cancer survivors have a significant risk of second primary cancers and other chronic conditions including coronary heart disease, diabetes and osteoporosis.³ Improvements in survivorship therefore raise the issue of tertiary prevention.

The adverse sequelae of a cancer diagnosis have multiple causes including iatrogenic effects and pre-existing behavioural and genetic risk, but whatever the cause, it is likely that behaviours which minimise risk of cancer and heart disease have the potential to improve survival and quality of life (QoL).4 The most convincing evidence on the role of health behaviours in survivorship has come from the studies of weight control and physical activity. A recent analysis concluded there was strong evidence that overweight and obesity are significant risk factors for specific second cancers and other comorbidities (i.e. CVD and diabetes).5 There is also evidence for a protective association between post-diagnosis physical activity and recurrence, cancer-related mortality and overall mortality, in breast and colorectal cancer survivors. 6,7 In addition, Hamer et al. showed that physical activity was inversely associated with total mortality following a diagnosis of cancer in a population-based Scottish sample.8 Evidence regarding continued smoking in cancer survivors shows reduced overall survival,9 increased risk of second primary malignancy¹⁰ and reduced QoL¹¹; however, research is

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mostly limited to head, neck and lung cancer survivors. Alcohol's role in survivorship is complex because it is associated with raised risk for certain cancers, but at the same time is cardio-protective in modest quantities 12; nonetheless alcohol intake should clearly be modest at most. In addition to effects on morbidity and mortality, there is evidence that healthful behaviours in cancer survivors are related to better QoL 13 and lower depression, 14 giving an additional reason for promoting healthy lifestyles in this vulnerable group.

The recent review by the World Cancer Research Fund concluded that cancer prevention recommendations for the general population should also be applied to cancer survivors, including advice to maintain a healthy body weight, engage in regular moderate physical activity, eat at least five portions of fruit and vegetables a day, limit alcohol consumption and not to smoke. The survivorship literature indicates that these recommendations may be even more important because of the raised risk of other adverse health outcomes in cancer survivors. Research to assess health behaviours in cancer survivors is therefore vital to identify the scale of the problem.

Large-scale, population-based studies have been conducted in the United States (US)^{15,16} and Australia. ¹⁷ Generally they have found similar levels of physical activity, alcohol consumption and smoking in survivors as in the general population. To date, no studies of health behaviours in cancer survivors in England have been reported. The aim of the present analyses was to assess the prevalence of smoking, alcohol consumption and physical activity in older adults with a history of cancer compared with those with no cancer history using data from a population-based sample. We also assessed whether smoking and inactivity were related to poor QoL and greater depressed mood in the same way in cancer survivors as in people with no history of cancer.

Methods

2.1. Participants

Data for these analyses were from wave 1 of the English Longitudinal Study of Ageing (ELSA) carried out in 2002. This nationally representative, population-based sample was drawn from people aged 50 or over who had taken part in the Health Survey for England in 1998, 1999 or 2001. Data from 11,515 adults aged 50–99 are used for these analyses. Details of the ELSA methodology have been published previously, 18 but briefly involve a nurse assessment, an interview during a home visit, and a self-completion questionnaire to return by post which includes simple items on smoking, alcohol and physical activity, as well as established measures of depression and quality of life.

2.2. Measures

2.2.1. Demographic

Participants reported their gender, age, race/ethnicity (coded as white versus non-white) for these analyses and marital status (coded as married or cohabiting versus single, divorced, separated or widowed). Education was used as an indicator of socioeconomic status (SES). Participants were di-

vided into three groups: higher education, intermediate qualification and no educational qualification.

2.2.2. Health behaviours

Smoking was assessed by asking participants if they smoked currently, were former smokers or had never smoked. Alcohol consumption was assessed by asking if they had consumed any alcohol in the last 12 months. Among those who reported having alcohol, respondents were divided into those who had two or more versus less than two drinks per day. Physical activity status was categorised as taking part in vigorous or moderate activity more than once a week versus once or less a week.

2.2.3. Cancer history and arthritis

Participants were asked if they had ever been told by a doctor or other health professional that they had 'cancer or any other kind of malignancy'. All those who answered yes were categorised as cancer survivors. This is in accordance with the National Cancer Institute's definition of a cancer survivor which states that from the time of diagnosis and for the balance of life, a person diagnosed with cancer is a survivor. Those reporting a history of cancer were also asked to specify the kind(s) of cancer with which they were diagnosed and if they received treatment for their disease in the last 2 years. Arthritis was assessed as a confounder of opportunities for physical activity, and participants reported if they had ever been told by a doctor of other health professional if they had arthritis (including osteoarthritis and rheumatism).

2.2.4. Quality of life and depression

Quality of life was assessed using the CASP-19. This is a 19-item Likert-scaled index containing sub-domains from which the acronym is derived; control, autonomy, self-realisation and pleasure. The CASP-19 was developed specifically to assess the quality of life in early old age, and is based on a needs satisfaction perspective. Scores range from 0 to 57 with a higher score indicating higher QoL. The four sub-domains have shown good internal reliability (Cronbach's alphas between 0.6 and 0.8) in a non-institutionalised population of older adults. The scale correlates well with the Life-Satisfaction Index (r = 0.63, p = 0.01) demonstrating concurrent validity.²⁰

Depressive symptoms were assessed using the Centre for Epidemiologic Studies Depression Scale (CES-D). A shortened 8-item version with binary response options which was developed for the Health and Retirement Study (HRS) was used, as in several previous publications from ELSA and HRS. Cronbachs α is 0.82, and the scale shows good sensitivity and specificity in comparison with the Short Form Composite International Diagnostic Interview clinical screener for depression. Scores could range from 0 to 8, with higher scores indicating a greater number of depressive symptoms.

2.3. Statistical analysis

Demographic characteristics of cancer survivors and those with no cancer history were compared using t-tests for continuous variables and non-parametric methods for categorical variables. Results are also presented adjusting for age

and sex. Multiple logistic regression was used to assess whether health behaviours differed between cancer survivors and those with no cancer history. The three behaviours (smoking, alcohol consumption and physical activity) were modelled separately. For each behaviour, we first calculated the odds of engaging in the behaviour in cancer survivors versus those with no cancer history adjusting for age and sex, and then adjusted for additional variables that might affect health behaviour. For smoking and alcohol consumption, these models included age, sex and education. Since the number of ethnic minority cancer survivors was very small, ethnicity was not included as a covariate. Because physical activity may be impaired in people with mobility restrictions such as rheumatic conditions, the presence of arthritis was included as a covariate in the analyses of physical activity, along with age, sex and education. Adjusted odds ratios with 95% confidence intervals (CIs) are presented.

Relationships between physical activity or smoking and quality of life and depression were analysed using linear regression with the health behaviour as the independent variable, and including age, sex, education and arthritis (for the analyses of physical activity). Checks were made to ensure that no multicollinearity was present. \mathbb{R}^2 for the regression analysis are presented, along with standardised regression coefficients (β) and standard error.

3. Results

3.1. Sample characteristics

There were 716 cancer survivors in the sample (6.2%) and 10,799 men and women who did not report a diagnosis of cancer. The most commonly reported cancer was breast (31.3%); 12.6% reported a diagnosis of colorectal cancer, 10.1% had skin cancer or melanoma, 3.6% had leukaemia/lymphoma, 2.2% had lung cancer and 40.2% had 'other' cancers. These results are comparable to prevalence rates reported in the cancer registry dataset for England.² Forty-three percent of cancer survivors had received treatment for cancer within 2 years of survey completion.

Cancer survivors were older (p < .001) and more of them were female (p < .001) than those without a history of cancer (Table 1). They did not differ from the rest of the sample with respect to marital status, ethnicity, education or the occurrence of arthritis, but they did have lower QoL (p < .05) after controlling for age and sex. Cancer survivors also had significantly more depressive symptoms (p < .001); however, both these differences were small.

3.2. Health behaviours in cancer survivors

Table 2 presents the prevalence of each health behaviour in cancer survivors and those with no history of cancer. Adjusted odds ratios for the association between cancer survivor status and health behaviours are also presented.

Overall, 15% of cancer survivors were current smokers compared with 18% of those with no history of cancer. This difference was not significant. However, cancer survivors were more likely to be former smokers (52% versus 46%),

and this was significant after adjusting for age, sex and education (OR 1.20, CI 1.03–1.14, p < .05).

There was no difference in alcohol consumption; 66% of cancer survivors and 69% of those with no history of cancer reported drinking alcohol. Of those who drank, 8% of cancer survivors and 6% of those without a history of cancer reported $\geqslant 2$ drinks per day. This difference was not significant after adjustment for covariates.

Fewer cancer survivors reported being moderately or vigorously active on more than one day per week compared to those with no history of cancer (51% versus 59%). The difference was significant after adjusting for age and sex (p < .05), and remained after additional adjustment for education and arthritis status (OR 0.82, CI 0.70–0.96, p < .05).

3.3. Health behaviours, quality of life and depression

The associations between health behaviours and QoL and depressive symptoms are summarised in Table 3. Physical activity was associated with better QoL in both cancer survivors and those with no history of cancer (p < .001). Mean scores on the CASP-19 (adjusted for covariates) were 43.11 (95% CI 42.15-44.07) versus 37.99 (95% CI 36.89-39.08) for active and inactive cancer survivors, and 43.49 (95% CI 43.25-43.73) versus 39.55 (95% CI 39.25-39.24) for those with no history of cancer. There was no interaction with cancer status. Physical activity was also negatively associated with depressive symptoms in both groups (both p's < .001). Adjusted depressive symptoms scores averaged 1.36 (95% CI 1.13-1.58) and 2.37 (95% CI 2.14-2.61) in active and inactive cancer survivors, and 1.37 (95% CI 1.32-1.43) and 2.05 (95% CI 1.99-2.16) for active and inactive individuals with no history of cancer. Among cancer survivors, QoL was better in women and those with more education, and worse in those with arthritis; the reverse associations for education and arthritis were observed for depressive symptoms. The same relationships were found for those with no cancer history with the addition of a negative association of age with QoL and greater depressive symptoms in women.

Quality of life was worse in current smokers, mean CASP-19 scores (adjusted for covariates) were 39.31 (95% CI 37.47–41.14) versus 41.70 (95% CI 41.04–42.36) for cancer survivors who smoke and non-smokers, respectively (p < .05), and 40.73 (95% CI 40.29–41.16) for smokers and 43.23 (95% CI 43.03–43.42) for non-smokers in those with no cancer history (p < .001). Smoking had an unfavourable relationship with depressive symptoms, with significantly higher CES-D depression scores (after adjustment for covariates) in smokers 2.18 (95% CI 1.77–2.59) than non-smokers 1.64 (95% CI 1.47–1.82) in survivors (p < .001), and 1.90 (95% CI 1.80–1.99) for smokers and 1.39 (95% CI 1.35–1.44) for non-smokers in those with no history of cancer.

4. Discussion

This study provides evidence concerning three health-related behaviours in a cohort of older cancer survivors in England identified from a population-based national survey. The results highlight the prevalence of suboptimal health behav-

Characteristics	Cancer survivors	No cancer	P	P (adjusted for age and sex)
N	716	10,799		
Breast cancer	31.3% (224)			
Colorectal cancer	12.6% (90)			
Lung cancer	2.2% (16)			
Lymphoma/leukaemia	3.6% (26)			
Skin cancer/melanoma	10.1% (72)			
Other cancer	40.2% (288)			
Age (years)	68.27 (10.55)	64.92 (10.44)	0.000	
Male	38.1% (273)	45.9% (4956)		
Female	61.9% (443)	54.1% (5843)	0.000	
Ethnicity (% minority)	1.4% (10)	2.9% (316)	0.018	0.059
Educational qualifications				
Higher education	24.3% (174)	22.0% (2372)		
Intermediate	32.1% (230)	35.5% (3823)	0.140	
No qualifications	43.6% (312)	42.5% (4573)		
Married (%)	62.0% (444)	66.9% (7220)	0.008	0.914
Arthritis (%)	32.5% (233)	28.5% (3079)	0.021	0.507
CES-D depression score (0–8)	1.87 (2.13)	1.57 (1.98)	0.000	0.009
CASP-19 quality of life (QoL) score (0–57)	41.36 (8.95)	42.57 (8.67)	0.001	0.011

Percentage (n) and O	R with 95% confidence intervals (CIs).		
		OR (95% CI) ^a	OR (95% CI) ^b
	Former smoker (versus rest)		
No cancer	46.1% (4902)	1.00	1.00
Cancer Survivor	52.5% (368)	1.26 (1.08–1.47)**	1.24 (1.06–1.45)**
	Current smoker (versus rest)		
No cancer	18.0% (1919)	1.00	1.00
Cancer survivor	15.3% (107)	0.93 (0.75–1.15)	0.97 (0.78–1.20)
	Complete sample: any alcohol		
No cancer	68.8% (7318)	1.00	1.00
Cancer survivor	66.0% (463)	1.06 (0.90–1.25)	1.00 (0.85–1.19)

Drinkers only: Two or more drinks per day

Table 2 – Prevalence and adjusted odds ratios (ORs) for health behaviours by cancer survivors/no history of cancer.

No cancer is reference category.

No cancer

No cancer

Cancer survivor

Cancer survivor

iours (that is, low levels of physical activity and a significant minority continuing to smoke) in this vulnerable population. Cancer survivors were more likely to be former smokers, but they had similar levels of alcohol consumption and current smoking, and they were less likely to be physically active than those with no history of cancer.

6.2% (457)

8.0% (37)

Physical activity

58.8% (6355)

51.4% (368)

The greater proportion of former smokers in the cancer survivors group (52%) than among the rest of the sample

(46%) is encouraging in terms of secondary or tertiary prevention. Similar results were reported in an Australian population-based sample¹⁷ where cancer survivors were 30% more likely to be ex-smokers compared with non-cancer controls. It is also consistent with the studies of patients with cancer, who report relatively high levels of quitting – at least in the short term.²⁶ However, a worrying finding is that 15% continued to smoke despite their estimated twofold risk of develop-

1.22 (0.86-1.73)

0.81 (0.73-0.99)*

1.00

1.21 (0.85-1.75)

0.81 (0.69-0.95) c,*

1.00^c

a Adjusted for age and sex.

b Adjusted for age, sex and education.

c Adjusted for age, sex, education and arthritis.

^{*} p < 0.05.

^{**} p < 0.001.

Table 3 – Association	Table 3 – Association between physical activity and smokii	rity and smok	ing and quality of life (QoL) and depression.	λoL) and depre	ssion.			
Physical activity	Quality of life (CASP-19)	.19)			Depression (CES-D)			
	Cancer survivors		No cancer		Cancer survivors		No cancer	
	Regression coefficient β (SE)	d	Regression coefficient β (SE)	d	Regression coefficient β (SE)	р	Regression coefficient β (SE)	р
Physical activity	.283 (0.04)	<0.001	.220 (0.01)	<0.001	236 (0.04)	<0.001	169 (0.01)	<0.001
Age	.026 (0.04)	0.522	023 (0.01)	0.031	049 (0.04)	0.317	.007 (0.01)	0.714
Sex	(0.03)	0.048	.081 (0.01)	<0.001	.053 (0.04)	0.147	.072 (0.01)	<0.001
Education	.198 (0.04)	0.001	.134 (0.01)	<0.001	160 (0.04)	<0.001	124 (0.01)	<0.001
Arthritis	167 (0.03)	<0.001	166 (0.01)	<0.001	.091 (0.04)	0.015	.156 (0.01)	<0.001
	Adjusted $r^2 = .183$		Adjusted $r^2 = .121$		Adjusted $r^2 = .108$		Adjusted $r^2 = .097$	
Smoking								
Current smoker	113 (0.04)	900.0	110 (0.01)	<0.001	.091 (0.04)	0.018	.098 (0.01)	<0.001
Age	067 (0.04)	0.112	092 (0.01)	<0.001	.030 (0.04)	0.451	.057 (0.01)	<0.001
Sex	.050 (0.03)	0.214	.055 (0.01)	<0.001	.069 (0.04)	0.068	.096 (0.01)	<0.001
Education	.239 (0.04)	<0.001	.061 (0.01)	<0.001	193 (0.04)	<0.001	144 (0.01)	<0.001
	Adjusted $r^2 = .083$		Adjusted $r^2 = .054$		Adjusted $r^2 = .053$		Adjusted $r^2 = .052$	

ing a second primary cancer compared to the general population²⁷ and the likelihood that smoking could increase this risk still further²⁸ as well as increasing the risk of other adverse health outcomes.²⁶ These observations suggest that smoking cessation interventions need to be more effectively targeted.

Public recognition of the smoking-cancer link is high in the UK.²⁹ However, in a recent study of cancer survivors, more than 75% believed smoking would cause the same type of cancer in other people, yet only 16% of former smokers and 29% of current smokers believed that smoking caused their own cancer.³⁰ Such a belief system may help to explain why some cancer survivors continue to smoke. Data on the efficacy of smoking cessation interventions in cancer survivors are limited (see de Moor et al., for a recent review),³¹ therefore further research is needed to understand the determinants of continued smoking or relapse to smoking in cancer survivors, to help to design effective interventions.

There was no significant difference in alcohol consumption between cancer survivors and those with no history of cancer, confirming findings from similar studies in US population samples 15,16 although direct comparison between studies is difficult because of differences in definitions. The studies from the US used total number of drinks consumed in a day, 15,16 but in ELSA, alcohol consumption was only divided into drinking $\geqslant 2$ drinks per day versus less, which does not distinguish very heavy from moderately heavy drinkers. This issue deserves further investigation, and cancer survivors may look for guidance on the recommended level of alcohol intake to promote long-term health.

We found cancer survivors to be significantly less active than those without a history of cancer independent of confounding factors including arthritis. Three population-based studies from other countries 17,15,32 have reported no difference in physical activity participation between cancer survivors and those with no cancer history, and one similar study¹⁵ found cancer survivors to be 9% more likely to meet physical activity recommendations. Different definitions could be part of the explanation for this variation; previous studies used the relevant general population guidelines as a cut-off, whereas in the present analyses, we estimated the proportion engaging in moderate or vigorous activity more than once a week, a much lower threshold. However, a lower threshold may have some value given that the proportion of older adults in the England meeting the recommended guidelines is so low; 31% of 55-64-year olds, 19% of 65-74-year olds and 6% of those aged 75 and over.33

It would have been interesting to explore the differences in the levels of physical activity between those diagnosed with cancer in the last 2 years versus longer survivors. Recent evidence suggests that physical activity is reduced soon after diagnosis but begins to recover (if not entirely) after treatment completion.³⁴ Unfortunately, the sample was not large enough to permit these analyses.

Impaired QoL at the time of diagnosis and treatment is well established, and recent evidence suggests that this can persist for several years.³⁵ Our results support the finding that cancer survivors have a lower QoL than those without a history of cancer. Physical activity is known to be associated with higher QoL in the general population, and our data suggest that this is also true for cancer survivors. This is in accor-

dance with the growing body of literature documenting the positive effects of physical activity on QoL in cancer survivors¹³ and consistent with the idea that low physical activity could be contributing to poor QoL in cancer survivors. We also found a negative association between smoking and QoL, a relationship which has previously been reported in a small number of studies in head and neck cancer survivors. ¹⁴

Physical activity was also associated with lower depressive symptoms. Given that we also found that smokers had higher depressive symptom scores than non-smokers, these observations provide additional support for the idea that health behaviours can improve psychosocial outcomes in cancer survivors. Alongside the evidence that physical activity after a cancer diagnosis has a protective effect on recurrence and mortality, 6-8 a strong case is emerging for supporting cancer survivors in engaging with healthy behaviours to improve both physical and psychosocial outcomes.

In conclusion, our results suggest that the prevalence of health risk behaviours is far from optimal in cancer survivors. With a current consensus that cancer survivors should follow recommendations for cancer and heart disease prevention in the general population, research into effective means of promoting healthy lifestyle in cancer survivors is required. A start has been made in the physical activity field (see Stevinson et al., for review)³⁶ but more work is needed to integrate effective behavioural interventions into the routine care of UK cancer survivors.

This study has a number of limitations. Cancer survivorship was determined from the self-report of a diagnosis and this may not be completely reliable although a recent study found reasonably good agreement with record data.³⁷ Health behaviours were also self-reported, and this may have led to response biases such as over-estimation of physical activity and under-estimation of alcohol consumption. The cross-sectional nature of the data means we are unable to determine if the patterns of health behaviours were a result of change since diagnosis or maintained since before the diagnosis. These data were collected in 2002 and it is possible that awareness of the importance of health behaviours among cancer survivors has changed since that time. Nonetheless, this study is a first step towards addressing the issue of health behaviours in cancer survivors in England. The prevalence of suboptimal health behaviours found in all the recent studies highlights the need for collaboration between researchers and health care providers to find effective strategies to improve psychological and physical wellbeing among the growing numbers of people who will survive a diagnosis of cancer.

Conflict of interest statement

None declared.

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