Psychiatric admission in female survivors of childhood and young adult cancer

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Population-based linkage study

WHB Wallace, TW Kelsey, DS Morrison, KFM Marwick, RA Anderson

BMJ Mental Health 2026;29:1–7

Part of a series of Scottish population studies linking female survivors of cancer to maternity and other outcomes.

All Scottish Cancer Registry entries, each with three controls matched for age, parity and SIMD

Pregnancy after cancer in girls and women in Scotland: a population-based analysis

R A Anderson, DH Brewster, R Wood, S Nowell, C Fischbacher, T W Kelsey, W H B Wallace

Human Reproduction 33(7): 1281-1290
doi:10.1093/humrep/dey216

Initial study – useful, but on reflection could be improved.

Family size and fertile lifespan in female cancer survivors: a population based analysis

R A Anderson, T W Kelsey, D Morrison, W H B Wallace

Fertility and Sterility 117(2): 387-395
doi:10.1016/j.fertnstert.2021.11.011

The initial study done properly. What is the gap between cancer survivors and everyone else? Aimed at fertility experts.

Survival after breast cancer in women with a subsequent live birth: influence of age at diagnosis and interval to subsequent pregnancy

R A Anderson, M Lambertini, P Hall, W H B Wallace, D S Morrison, T W Kelsey

European Journal of Cancer 173:113-122
doi:10.1016/j.ejca.2022.06.048

Restriction to breast cancer – aimed at oncologists

Age at diagnosis, previous pregnancy and interval to pregnancy influence survival after breast cancer in women with a subsequent live birth

R A Anderson, M Lambertini, P Hall, W H B Wallace, D S Morrison, T W Kelsey

Human Reproduction 37: doi:deac105.110

Restriction to breast cancer – aimed at fertility experts

Live birth and maternity outcome in childhood and adolescent cancer survivors under 18 years at diagnosis: a 40-year population-based cohort study.

W H B Wallace, T W Kelsey, D Morrison, R A Anderson

British Journal of Cancer 131: doi:10.1038/s41416-024-02818-0

The original study done properly – aimed at oncologists

Background and rationale

Survival after childhood and young adult cancer has improved substantially over the past four decades, with around 80% of those diagnosed at 0–24 years in the UK now surviving beyond 10 years.

Survivors carry a high burden of chronic health conditions: the US Childhood Cancer Survivor Study reported a cumulative incidence of any chronic condition of 73.4% and of severe or life-threatening conditions of 42.4% at 30 years after diagnosis.

Background and rationale

Evidence on severe psychiatric morbidity is mixed. Scandinavian register data suggest a 34% higher rate of incident psychiatric disorders in childhood cancer survivors compared with matched population controls, while systematic reviews highlight uncertainty around prevalence and risk factors.

Against this backdrop, we asked whether female survivors diagnosed before age 25 have different risks of psychiatric hospital admission than their matched controls.

Study objectives

Estimate the cumulative incidence of first psychiatric hospital admission among female cancer survivors diagnosed at < 25 years, compared with matched controls.

Quantify relative risks of first psychiatric admission at 15 and 25 years after cancer diagnosis, accounting for death as a competing risk.

Study objectives

Describe incidence rates for first and all psychiatric admissions across major ICD-10 diagnostic categories (F0–F9), including mood, anxiety, psychotic, personality and substance use disorders.

Explore subgroup patterns by cancer type (central nervous system tumours, lymphomas/leukaemias, other cancers) and by childbirth after diagnosis.

Full disclosure we only had female data – originally a fertility study cohort – so we force a fertility aspect into the objectives

Data sources & cohort definition

- Scottish Cancer Registry (diagnoses 1981–2012).
- Scottish Morbidity Record 04 (psychiatric hospital admissions.
- SMR02 (maternity and live births).
- National death records (follow-up to September 2018).
- Linkage via unique Community Health Index (CHI) number.

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Study population

Exposed: 3677 females diagnosed with cancer at ages 0–24 years, with no prior pregnancy or psychiatric admission.

Controls: 3 matched women per survivor, drawn from CHI database, without cancer and with matched age, year, deprivation, pregnancy and mental health history.

Study population

Entry: date of cancer diagnosis for survivors and corresponding date for matched controls.

Exit: date of death or end of follow-up; psychiatric admissions in controls after the survivor's death were censored.

Outcomes and psychiatric categories

First admission to a psychiatric hospital (SMR 04) after cancer diagnosis, with any ICD-10 F-code (F0–F9) psychiatric diagnosis.

Time-to-event framework with death as a competing risk; cumulative incidence functions estimated for survivors and controls.

Outcomes and psychiatric categories

All mental disorders (Fxxx)

Organic mental disorders (F0xx)

Substance use disorders (F1xx)

Schizophrenia and related disorders (F2xx)

Mood (affective) disorders (F3xx)

Anxiety and stress-related disorders (F4xx)

Outcomes and psychiatric categories

Behavioural syndromes (F5xx)

Personality disorders (F6xx)

Intellectual disability, neurodevelopmental and other childhood-onset disorders (F7xx–F9xx)

Notes:

ICD9 codes in the data were converted to ICD10

Any admission can have multiple codes

Statistical methods

Cumulative incidence of first psychiatric admission was estimated for survivors and controls using competing-risks methods, with death treated as a competing event and the Kalbfleisch–Prentice approach used for confidence intervals.

Differences between cumulative incidence functions were assessed with Gray's test, providing overall p values for equality of survivor versus control curves.

Relative risks of first psychiatric admission at 15 and 25 years from cancer diagnosis were calculated, with values below one indicating lower risk in the survivor group.

Statistical methods

Incidence rates per 1000 person-years for first and all psychiatric admissions were computed for each diagnostic category; comparisons used two-sided Poisson tests and incidence rate ratios (survivor/control).

Times from diagnosis to first psychiatric admission were compared using Wilcoxon rank-sum tests with continuity correction, and subgroup analyses considered cancer site (CNS, lymphoma/leukaemia, other) and childbirth after diagnosis.

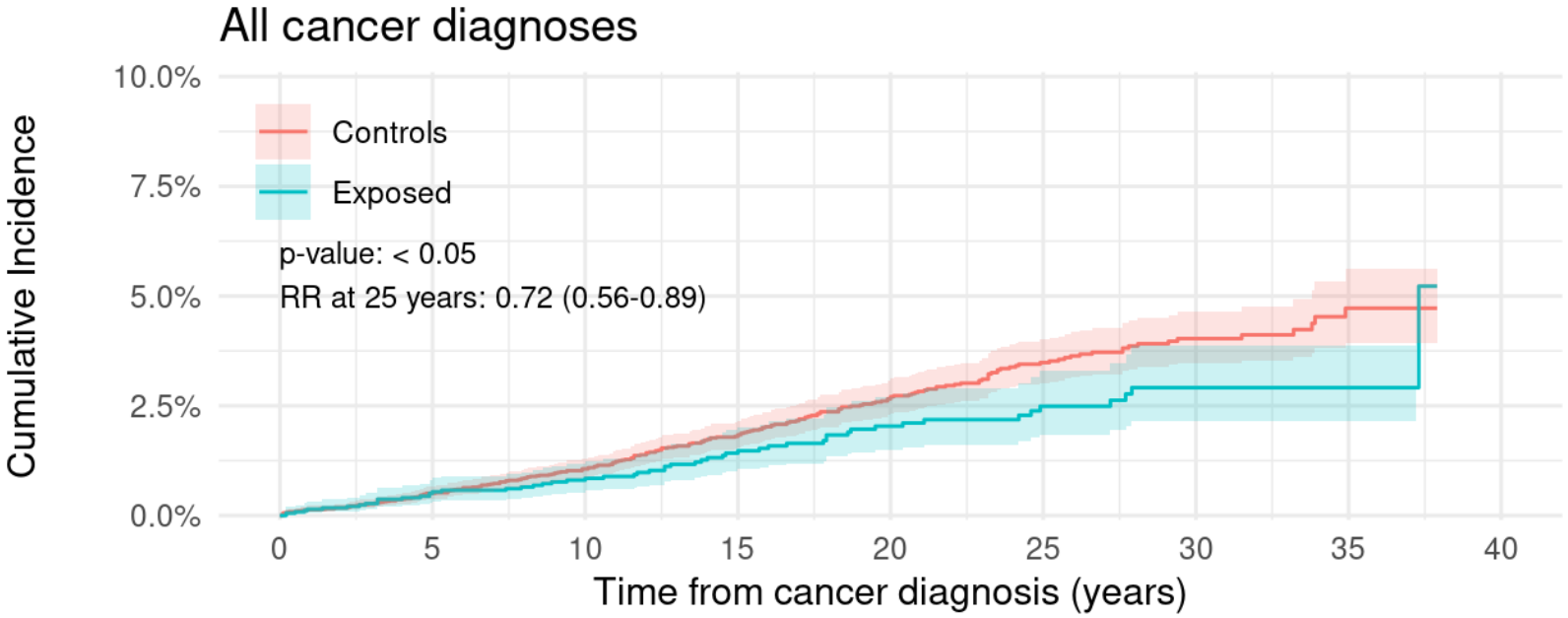
Cumulative incidence of first psychiatric admission

Across up to 38 years of follow-up, female cancer survivors had a significantly lower cumulative incidence of first psychiatric hospital admission than matched controls

By 25 years from diagnosis, the relative risk of first psychiatric admission for survivors versus controls was 0.72 (95% CI 0.56–0.89.

Cumulative incidence curves showed divergence over time, with a higher proportion of controls experiencing psychiatric admission despite longer total person-time in the control group.

Cumulative incidence of first psychiatric admission



Controls

At Risk	11003	8733	7196	5506	4063	2690	1476	485	0
Censored	270	2237	3758	5374	6766	8126	9335	10301	10774
Events	0	48	93	143	185	212	224	229	229

Cancer survivors ('exposed')

At Risk	3667	2913	2411	1851	1370	915	507	166	0
Censored	89	743	1246	1785	2253	2709	3116	3450	3611
Events	0	17	25	38	47	52	55	55	56

Incidence rates by diagnostic category

For most psychiatric diagnostic categories, incidence rates per 1000 person-years and incidence rate ratios suggested lower risk among survivors compared with controls.

First-admission incidence rates were significantly lower for mood disorders, anxiety and stress-related disorders, personality disorders and substance use disorders among survivors.

Analyses considering **all** psychiatric admissions showed similar patterns of reduced rate ratios for these categories, implying fewer repeat admissions as well as fewer initial admissions in survivors.

Subgroups by cancer type

The analysis stratified survivors into central nervous system tumours, lymphomas/leukaemias and other cancers, recognising that CNS disease and its treatment may carry distinctive risks for neurocognitive and psychiatric sequelae.

Results suggested that reduced psychiatric admission risk was particularly evident among survivors without CNS tumours, consistent with broader literature on neurocognitive deficits after brain-directed therapy and on psychiatric outcomes in specific diagnostic groups.

Subgroups by cancer type

However, detailed estimates by subgroup were not the primary focus of the paper; rather, the key message is that, overall, young female survivors—especially those without CNS disease—were less likely to experience psychiatric hospitalisation than matched controls.

Childbirth and psychiatric admission

Given established links between childbirth and severe psychiatric illness, including puerperal psychoses and early and late postpartum admissions, the authors conducted post hoc analyses stratified by live birth after cancer diagnosis.

Among cancer survivors, those who had a live birth after diagnosis were less likely to have a psychiatric admission than survivors who did not give birth, whereas in the control group, childbirth was associated with an increased risk of psychiatric admission.

Interpretation and possible mechanisms

Reasons for the lower risk of psychiatric hospital admission among young female cancer survivors are unclear and require further investigation.

We hypothesise that survivors may have better access to follow-up care, psychosocial support and early interventions that avert the need for psychiatric hospitalisation, particularly within structured survivorship programmes.

The experience of diagnosis and treatment may be associated with greater resilience to severe psychiatric disorders compared with non-exposed peers, though this remains speculative.

Study Strengths

Whole-population design using linked national registries in Scotland over nearly four decades.

Careful matching of controls on age, calendar period, deprivation, prior pregnancy and psychiatric history.

Competing-risk methods accounting for mortality and robust specification of psychiatric diagnostic categories by ICD-10 exposed peers, though this remains speculative.

The Scottish SMR and CHI systems are very useful for this type of research.

Study Limitations

Psychiatric outcome restricted to hospital admissions; community-managed disorders and sub-threshold symptoms are not captured.

Residual confounding cannot be excluded despite matching, and mechanisms underlying lower admission risk are not directly assessed.

Findings pertain to Scottish healthcare and may not generalise to settings with different survivorship care or mental health service structures.

Clinical and research implications

Clinically, the findings suggest that young female cancer survivors, particularly those without CNS disease, are less likely to be admitted than their peers, even after childbirth.

This underlines the importance of continued investment in survivorship programmes that integrate psychosocial and perinatal mental health support.

For research, the study highlights the need to explore mechanisms behind apparent resilience, including service use, social support and neurobiological factors, and to examine outcomes beyond hospital admission, such as outpatient psychiatric care and quality of life.

Summary

In this Scottish whole-population study, young female cancer survivors had lower cumulative incidence and incidence rates of psychiatric hospital admission than matched controls, including for mood, anxiety, personality and substance use disorders.

Childbirth appeared to increase psychiatric admission risk in controls but not in survivors, among whom women who had live births were less likely to be admitted than those who did not.

Summary

The findings point to potential resilience and protective effects within survivorship care.

The Scandinavian study showed earlier and more numerous low-level interactions with mental health practitioners.

Our results suggest that these early interactions could lead to fewer and later psychiatric admissions for survivors.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