

BACKGROUND

- In the general population, physical activity is associated with a decreased risk of developing chronic conditions, such as endocrine dysfunction, osteoporosis, obesity and cardiovascular disease.
- Physical activity may be of particular importance to cancer survivors who are at increased risk of developing chronic conditions.
- Little longitudinal data exists examining how physical activity levels change over time among childhood cancer survivors.

AIM

To identify demographic and health-related predictors of declining physical activity among participants in the Childhood Cancer Survivor Study (CCSS).

METHODS

Participants

- 6617 ≥5 year childhood cancer survivors diagnosed between 1970-86 who completed both the CCSS 2003 and 2007 questionnaires.
- A comparison group of 1992 siblings were also included.

Data collection

- Data on demographic characteristics, health information, and physical activity were collected from the CCSS questionnaires.
- Participants were classified as active if they reported engaging in any physical activity other than their regular job duties in the month prior to completing the questionnaire.
- Chronic disease variables based on the CTCAE scoring rubric (version 4) were used to grade the severity of chronic conditions.
- Prior anti-cancer treatments were abstracted from medical records.

Statistical models

- Generalized linear models were used to compare **characteristics** of participants whose activity levels fell from active to inactive over the study interval to those who remained active or whose activity levels improved.

RESULTS

Demographic characteristics

- The median age at last follow-up among survivors and siblings was 36 (range: 21-58) and 38 (range: 21-62) years, respectively.
- A higher proportion of survivors were never smokers (70.8% vs. 60.9%), unable to work or unemployed (10.6% vs. 3.2%), or resided in a household with income <\$20,000 per annum when compared to their siblings (p<0.001).

Comparisons of physical activity levels between survivors and their siblings

- Approximately 14% of survivors and 9% of siblings reported declining activity levels at the end of the study interval.

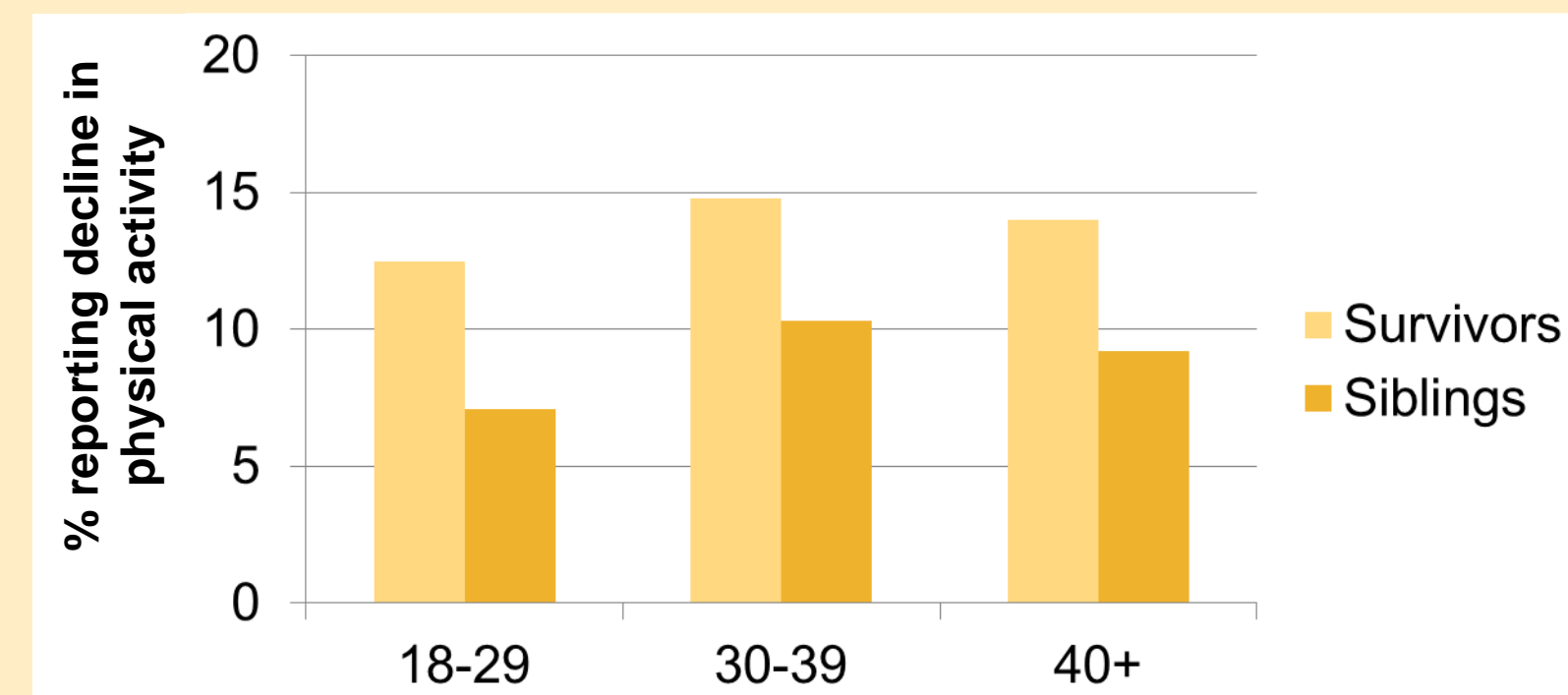


Figure 1: Proportion of survivors and siblings who reported declines in physical activity as a function of age.

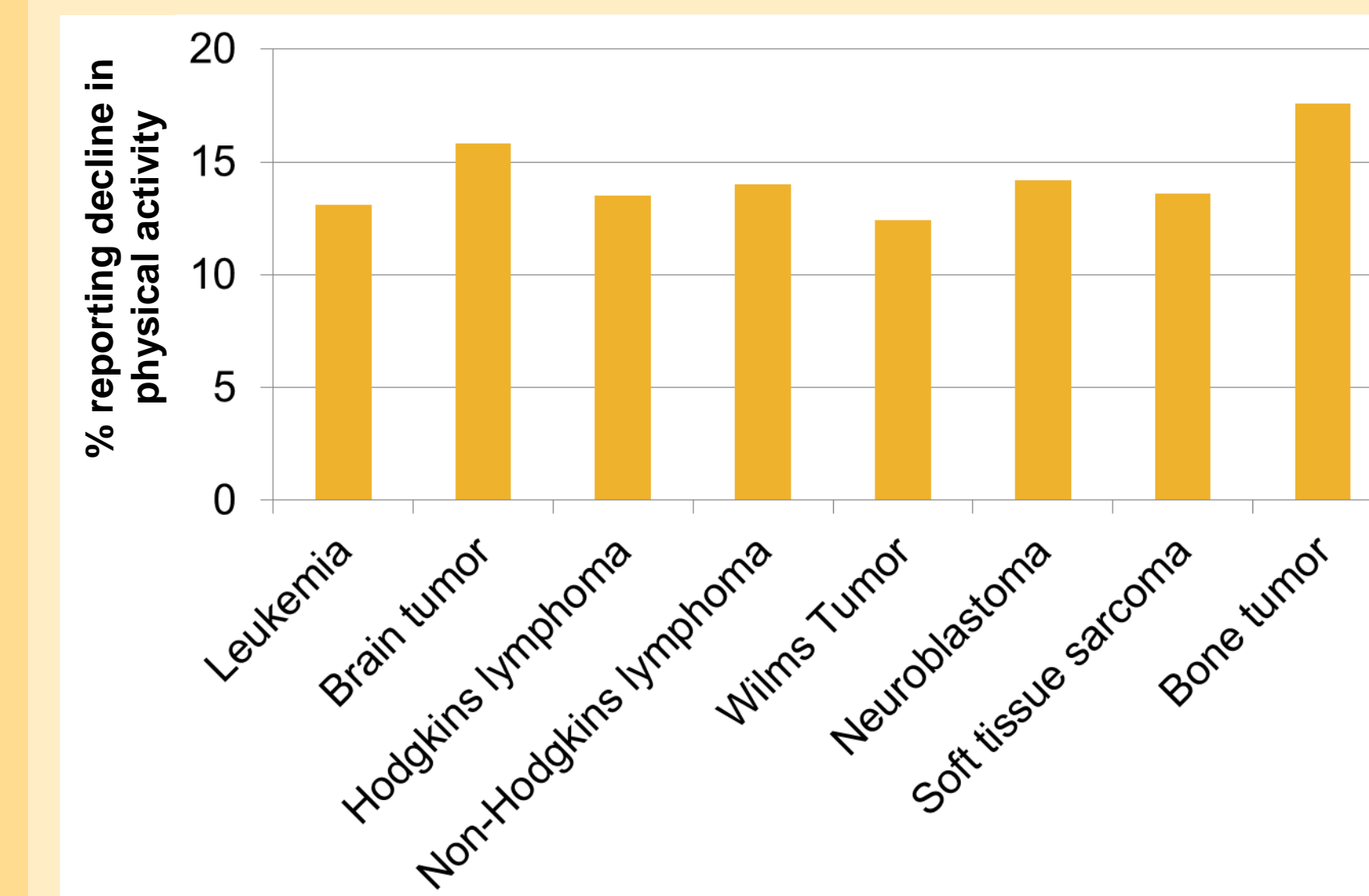


Figure 2: Proportion of survivors reporting declines in physical activity by diagnosis.

RESULTS

- In multivariable analyses, survivors were 1.48-times more likely to report declining physical activity levels when compared to siblings (95% CI=1.26-1.72).
- Factors that were found to increase the risk of low physical activity levels at the end of the follow-up interval are presented in Table 1.

Table 1: Relative risk of declining physical activity levels in survivors compared to siblings

	RR	95%CI	P-value
Siblings			
Survivors	1.48	1.26-1.72	<0.001
Age at follow-up (years)			
18-29	1.0		
30-39	1.14	1.00-1.29	0.05
>40	1.11	0.94-1.32	0.21
Sex			
Male	1.0		
Female	1.07	0.95-1.20	0.27
Race			
Black	1.62	1.23-2.14	<0.001
Hispanic	0.86	0.62-1.19	0.37
White	1.0		
Other	1.15	0.80-1.64	0.45
Educational attainment			
< High school	1.66	1.24-2.21	<0.001
High school graduate	1.42	1.25-1.61	<0.001
College graduate	1.0		
Body Mass Index			
Underweight	1.37	1.03-1.81	0.030
Normal weight	1.0		
Overweight	1.15	1.01-1.33	0.042
Obese	1.44	1.25-1.67	<0.001
Smoking Status			
Current	1.17	1.00-1.36	0.052
Former	1.00	0.85-1.18	0.96
Never	1.0		

RESULTS

Associations between treatment and the risk of declining physical activity levels in cancer survivors only

- After adjusting for sex, ethnicity, age at diagnosis and age at the 2003 questionnaire, cancer survivors who had undergone a lower limb amputation (RR=1.61, 95% CI=1.21-2.14) had an increased risk of declining activity levels when compared to survivors who had not received this treatment.
- Exposure to anthracyclines, platinum-based chemotherapy or cranial radiation was not associated with an increased risk of declining activity levels (p>0.05).

Associations between chronic disease status and the risk of declining physical activity levels in cancer survivors only

- The risk of being inactive at the end of the study interval was higher among survivors who reported the presence of moderate/severe neurological or cardiac conditions (p<0.01; Table 2).

Table 2: Relative risk describing associations between chronic disease status and declining physical activity levels in cancer survivors

Chronic disease category	RR*	95%CI	P-value
Cardiac	1.54	1.25-1.91	<0.001
Musculoskeletal	1.14	0.89-1.46	0.29
Neurological	1.46	1.19-1.79	<0.002
Respiratory	1.00	0.59-1.70	0.99

*Participants reporting Grade 3 (severe) or Grade 4 (disabling or life-threatening) conditions were compared to survivors reporting Grade 1 (mild), Grade 2 (moderate), or no conditions. All models are adjusted for sex, age at diagnosis, age at follow-up and race.

CONCLUSIONS

- Findings from this study suggest that female survivors, survivors who are obese or underweight, or less educated, are at increased risk of becoming inactive as they age.
- The success of future interventions to promote physical activity among cancer survivors will be dependent on the ability of each intervention to address specific barriers to physical activity that may exist for certain sub-populations of survivors.

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