Engagement in High-Risk Behaviors Among Young Adult Survivors of Childhood Cancer Compared to Healthy Same-Age Peers Surveyed in the National Longitudinal Study of Adolescent Health

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Purpose: This secondary data analysis compared smoking rates, alcohol consumption, and binge drinking, and examined risk factors for engaging in these behaviors among 90 young adult-aged childhood cancer survivors (CCS) with 15,490 young adults in the general population.

Methods: The sample was drawn from the National Longitudinal Study of Adolescent Health. The sampling distribution of these healthy matched young adults was estimated through the use of bootstrapping, which involved randomly repeated for 10,000 samples of healthy controls.

Results: The findings of repeated sampling analysis revealed that CCS were more likely to smoke daily (34.5% vs. 20.6 healthy matched controls; $p=0.03$). The proportion of respondents who had any signs of alcohol abuse symptoms was 72.2% of CCS compared with 81.1% of matched controls ($p=0.16$), while CCS with severe alcohol abuse was 51.1% compared with 59.1% of matched controls ($p=0.28$). Whether they engaged in binge drinking in the past 12 months was 43.3% for CCS and 46.4% for healthy respondents. Logistic regression analyses were performed to examine predictors of smoking, alcohol use, and binge drinking among CCS. Smoking was very strongly associated with optimism. An optimism score of one unit higher was associated with a 39% reduction in odds of smoking (odd ratio [OR]=0.61, $p<0.0001$). Black CCS were less likely to smoke (OR=0.15, $p<0.05$). CCS in good health were more likely to binge drink (OR=3.67, $p<0.05$).

Conclusions: Data generated from this secondary data analyses add to the evidence base about the engagement in high risk behaviors among young adult-aged CCS. These findings further emphasize the need for widespread, available effective theory-based screening guidelines and interventions.

Keywords: risk behavior, survivorship, pediatric

Introduction

ESTABLISHING THE PREVALENCE and risk factors for unhealthy behavior, such as smoking and drinking, continues to be a research priority to improve the well-being of young adult-aged childhood cancer survivors (CCS).¹ CCS who engage in high-risk behaviors experience life-threatening health outcomes at increased rates compared with healthy individuals.^{2–6} In turn, life-style factors are known to influence survivors' risk of disease and thus may further increase the risk of adverse late effects among these individuals.^{3,7} Specifically, smoking potentiates the organ damage resulting from exposure to radiation and chemotherapy during treatment, and excessive alcohol consumption may pose an increased risk for breast cancer and cancers of the gastrointestinal tract.^{4–8}

Several investigations have reported smoking rates for CCS to be lower than the rates reported for siblings and sex- and age-matched controls.^{7,9–12} Others have found no dif-

ferences,^{1,13,14} while yet others have reported increased rates among CCS.^{15–17} Despite the variation in findings, the percentage of CCS who reported being daily (current) smokers is substantial, with previous investigations reporting daily smoking rates ranging from 17% to 25%.^{7,12,18–20}

As with cigarette smoking research, reported alcohol consumption rates among CCS compared to comparison control groups vary. The findings of several studies suggest that CCS have lower rates of alcohol consumption compared with siblings or age- and sex-matched controls.^{7,11,21} In contrast, the findings of other studies suggest that CCS have slightly higher alcohol consumption rates compared with control groups.^{4,8} Alcohol consumption rate among CCS range from 72.5% to 77.2%.^{4,7,11,19,22} Investigations on binge drinking and risky drinking behaviors involving CCS and siblings in the Childhood Cancer Survivor Study reported CCS less likely to engage in binge drinking¹ and have less risky drinking behaviors.²³ Likewise, in a Canadian study that

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compared binge drinking among CCS with sex-matched peers, CCS were less likely to be binge drinkers.²⁴ Although Carswell et al. reported that survivors were less likely than their peers to be binge drinkers, they reported that a substantial percentage (25%) of cancer survivors reported binge drinking behavior.²⁴ In contrast, Rebholz et al. reported that these survivors engaged in binge drinking more often than the general population do.²⁵ While findings vary across studies, investigators caution that engagement in any of these high-risk behaviors among CCS is of great concern and has negative consequences on their health status.^{7,10–12,19,20,22}

In addition to research on drinking patterns and smoking rates among CCS, there is a growing body of literature that has focused on examining risk factors that influence these survivors' engagement in high-risk behaviors. Klosky et al. point out that the identification of the determinants of risky behavior in older adolescents and CCS is a critical focus of research, since health attitudes and behaviors developed early in life predict future behavior into adulthood.¹ The findings from previous studies have identified the following risk factors that influence the engagement of CCS in alcohol and smoking: male sex,^{3,4,24} low educational attainment,^{4,24} high stress, life dissatisfaction,²⁴ drinking initiation before the age of 14, depression, anxiety or somatization, fair or poor self-assessed health, activity limitations, anxiety about their cancer,⁴ lower resiliency, negative risk behavior modeling, feelings of being more susceptible to adverse health outcomes, and worry about cancer and treatment effects.²⁶

The purpose of this secondary data analysis was to examine risk factors for engaging in high-risk behaviors among CCS, ranging in age from 25 to 35 years, and to compare rates of drinking, including binge drinking, and cigarette smoking with peers of the same age, race/ethnicity, and sex in the general population who have not experienced childhood cancer. The data for this secondary data analysis were drawn from The National Longitudinal Study of Adolescent Health (Add Health), which uses a nationally representative sample to follow a large cohort of individuals from adolescence through young adulthood.²⁷

The use of a national, probability-based sample offers the opportunity to address some of the known methodological limitations of past studies in this area of research. Kloskey et al. noted that past studies have yielded inconsistent results due to control group selection, such as siblings, setting of data collection, specifically data collection at CCS medical center and by a member of the CCS follow-up team, and age/developmental level of the participants.¹ The control group selected for this study were age-, race/ethnicity-, and sex-matched young adults in the general population. All Add Health study participants were interviewed in their homes by trained data collectors who were not affiliated with or known to the CCS follow-up survivorship team.

Using the findings from these previous investigations and the variables available in the Add Health study, three research questions about high-risk behaviors, which included smoking, alcohol use/abuse, and binge drinking, were developed for this secondary data analysis.

RQ1: *What are the prevalence rates of these high-risk behaviors among young adult-aged survivors of childhood cancer?*

RQ2: *Are there differences in the rates of engaging in these high-risk behaviors between young adults who are CCS and young adults with no history of childhood cancer?*

RQ3: *What are the relationships between the risk factors of general orientation toward life (optimism), depression, stress, anxiety, health status, sex, age, socioeconomic status, educational attainment, race/ethnicity, and the risk of engaging in these high-risk behaviors among young adult CCS?*

Method

Sampling design

The Add Health study used a nationally representative, probability-based, stratified, random sample of all high schools (public, private, and parochial) in the United States and contained more than 90,000 adolescents. High schools were stratified into clusters based on region of the country, urbanicity, size, type, and race/ethnicity.²⁷ Eighty high schools were randomly selected from a sampling frame of 26,666 schools. A school was eligible for the sample if it included an 11th grade and had a minimum enrollment of 30 students. The multistage cluster sampling procedure of the Add Health study has been fully described by Chantala and Tabor and Resnick et al.^{28,29} The Add Health study is comprised of four waves or four data collection points: Wave I (1994–1995), Wave II (1996), Wave III (2001–2002), and Wave IV (2007–2008). Health behaviors among a cohort of individuals were followed from adolescence through young adulthood. In-home 90-minute computer-assisted personal interviews were conducted to collect the survey data. The data analyzed for this secondary analysis were collected at the fourth data collection point when study participants were between the ages of 24 and 34 years.

Within this large cohort is a subpopulation of individuals who had a childhood cancer diagnosis. Childhood cancer survivor was defined as being diagnosed with cancer before the age of 21 years. Among the 15,701 young adults surveyed during the Wave IV data collection time, 90 survey respondents identified themselves as being diagnosed with childhood cancer. One hundred and twenty respondents were diagnosed with cancer later in life, and one person did not answer as to whether she/he had been diagnosed. These 121 individuals were excluded from the analyses, leaving a comparison group of 15,490 young adults who never had a diagnosis of childhood cancer. A matched cohort analysis was done, identifying a healthy adolescent of the same age, race/ethnicity, and sex for each of the 90 CCS. For this analysis, race/ethnicity was defined as white, black, or other. The latter category included respondents who were Asian, Pacific Islander, Alaskan Native, American Indian, Other, or race/ethnicity was not reported. Institutional Review Board approval for this secondary data analysis was obtained from the investigators' institution.

Measures

Risk behaviors. To assess the rate of engaging in the high-risk behavior of smoking, survey participants were asked whether they were currently a daily smoker. Overall drinking and alcohol abuse symptoms were assessed based on criteria of the *Diagnostic and Statistical Manual of Mental Disorders, 4th Edition*, using five questions: how often their drinking interfered with their responsibilities at work or school; how often it caused them harm or engagement in high-risk behaviors; how often it created trouble with law enforcement; how often it caused problems with family, friends, or people at work or school; and whether they continued to drink after

TABLE 1. DEMOGRAPHICS BY SEX, AGE, AND RACE/ETHNICITY

	<i>Cancer survivors</i> (N = 90)	<i>Healthy cohorts</i> (N = 15,490)	<i>Eligible Add Health respondents</i> (N = 15,580)
Age in years (mean and SD)	28.8 (1.8)	29.0 (1.8)	29.0 (1.8)
Sex			
Male	24 (27%)	7304 (47%)	7328 (47%)
Female	66 (73%)	8186 (53%)	8252 (53%)
Race/ethnicity			
White	72 (80%)	10,769 (70%)	10,841 (70%)
Black	16 (18%)	3590 (23%)	3606 (23%)
Other	2 (2%)	1131 (7%)	1133 (7%)

SD, standard deviation.

realizing it caused problems with family, friends, or people at work or school. Four questions were scored 0 (never), 1 (1 time), and 2 (more than 1 time), and the fifth question was scored as 0 (no) or 1 (yes). Alcohol abuse was examined in two ways: whether respondents exhibited any symptoms of alcohol abuse, and whether respondents had severe alcohol abuse by exhibiting seven or more symptoms. The examination of alcohol abuse was done in an effort to validate the findings of each analysis and to take advantage of the existing data available reported within the Add Health data set. Binge drinking was measured by asking respondents how many days they had drunk five or more drinks in a row (male sex) or four drinks in a row (female sex) during the past 12 months.²⁷ Respondents were identified as binge drinkers if they responded 1 or 2 days in the past 12 months, once a month or less (3–12 times in the past 12 months), 2 or 3 days a month, 1 or 2 days a week, 3–5 days a week or every day, or almost every day.²⁷

Risk/protective factors. The Add Health researchers constructed a depression variable from 5/20 items from the Center for Epidemiologic Studies Depression Scale (CES-D).³⁰ Responses to each question were scored on a Likert-type scale with response options of never/rarely to most of the time or all of the time, ranging in value from 0 to 3, accordingly. The theoretical range for depression scores was 0 to 15, with higher scores indicating more depressive symptoms. Exploratory factor analyses determined a single-factor measure for the constructed variable of depression, and the Cronbach's alpha estimated reliability was 0.78 (J. Tabor, pers. commun., November 20, 2009). The internal reliability for the depression scale for this secondary data analysis was 0.79.

The constructed variable of anxiety was based on the Mini International Personality Item Pool (Mini-IPIP)³¹ in which

the Add Health collaborators used four items from this pool to construct the anxiety variable. Responses to each question were on a Likert-type scale, with response options of strongly agree to strongly disagree, ranging in value from 1 to 5, accordingly. The theoretical range for anxiety scores was 4 to 20, with lower scores indicating more anxiety. Exploratory factor analyses determined a single-factor measure for the constructed variable of anxiety, and the Cronbach's alpha estimated reliability was 0.78 (J. Tabor, pers. commun., November 20, 2009). The internal reliability for the anxiety scale for this secondary data analysis was 0.68.

The Add Health study collaborators evaluated respondents' general health status with a one-item question. Respondents were asked to rate their general health status as excellent, very good, good, fair, or poor. Several researchers have posited that a single-item rating of individuals' general health could serve as a reasonable substitute for multi-item measures of self-rated general health status.^{32–34}

To measure one's general orientation toward life, the Add Health researchers asked respondents to reply to four items from the Life Orientation Test (LOT). The LOT is a 10-item scale developed to assess individual differences in generalized optimism versus pessimism.³⁵ The calculated Cronbach's alpha for the LOT in this secondary analysis was 0.78.

The degree of perceived stress among respondents in the Add Health study was determined using four items of the 10-item Cohen Perceived Stress Scale, which measures the degree to which situations in one's life are appraised as stressful.³⁶ The scale was designed to determine how unpredictable, uncontrollable, and overloaded respondents find their lives.³⁶ Exploratory factor analyses determined a single-factor measure for the constructed variables of stress; the internal reliability for the scale for this secondary data analysis was 0.73.

TABLE 2. SMOKING, ALCOHOL ABUSE, AND BINGE DRINKING BY CANCER SURVIVORSHIP

	<i>Add Health data</i>			<i>Repeated matched samples</i>		
	<i>Cancer survivors</i> (n = 90)	<i>Healthy respondents</i> (n = 15,490)	<i>p-Value</i>	<i>Cancer survivors</i> (n = 90)	<i>Healthy respondents</i> (n = 90 each)	<i>p-Value</i>
Smoking	34.5%	21.3%	0.003	34.5%	20.6%	0.03
Any alcohol symptoms	72.2%	81.6%	0.02	72.2%	81.1%	0.16
Severe alcohol abuse symptoms	51.1%	59.5%	0.11	51.1%	59.1%	0.28
Binge drinking	43.3%	46.5%	0.55	43.3%	46.4%	0.68

p-Values were calculated using two-sample *z*-tests for proportions. Proportions for repeated matched samples of healthy respondents are averages of 10,000 samples.

Results

Demographic data for all eligible respondents in the Add Health study are presented in Table 1. To control for sex and age, a matched analysis was done in which 90 healthy young adults were selected with the same race/ethnicity, age (years), and sex characteristics as the CCS. However, due to the small sample size of survivors, the results were unstable, in some instances resulting in strongly significant differences, while in other instances resulting in strongly non-significant differences, depending on which matched sample was randomly chosen. This variability of these data is consistent with the varying results seen in previous research. To address this, repeated matched sampling, based on the bootstrap method,^{37,38} was used. In this method, 10,000 samples of the matched healthy comparison group were obtained. For each sample, the proportion of respondents who engaged in binge drinking, smoking, and alcohol abuse were calculated. These individual values were combined for the 10,000 samples to obtain a mean estimate for each high-risk behavior.

The healthy controls and the CCS were compared via an independent two-sample *z*-test for testing equality of proportions. Four response variables of interest were examined: smoking, alcohol abuse (any), severe alcohol abuse (seven symptoms or more), and binge drinking. These results can be found in Table 2. The repeated sampling analysis revealed that CCS were significantly more likely to smoke daily, with 34.5% of CCS indicating they were daily smokers compared with 20.6% of the healthy matched controls who smoked daily ($p=0.03$). The proportion of respondents who had any signs of alcohol abuse symptoms was 72.2% of CCS compared with 81.1% of matched controls ($p=0.16$), while CCS with severe alcohol abuse was 51.1% compared with 59.1% of matched controls ($p=0.28$). These survivors' engagement in binge drinking in the past 12 months was 43.3% for CCS and 46.4% for healthy respondents, which was not a statistically significant difference ($p=0.68$).

Logistic regression analyses were performed to examine predictors of smoking, alcohol use, and binge drinking among CCS. The findings of the analyses are reported in Table 3. Alcohol use was not predicted by any factors, although age was nearly statistically significantly related to any alcohol use (odds ratio [OR]=1.33, 95% confidence interval [CI]: 0.97–1.81). Smoking was very strongly associated with optimism, demonstrating that an optimism score of one unit higher was associated with a 39% reduction in odds of smoking (OR=0.61, 95% CI: 0.44–0.84). Blacks were also less likely to smoke (OR=0.15, 95% CI: 0.02–0.91). Respondents in good health were more likely to binge drink (OR=3.67, 95% CI: 1.05–12.90).

Discussion

The daily smoking rate for these young adult-aged CCS is much higher than those reported in several previous studies.^{7,9,12} However, it is similar to the rate reported by Phillips-Salmi et al.,³⁹ who also used a national, probability sample. The rates of engagement in any alcohol abuse symptoms, severe alcohol abuse symptoms, and binge drinking (43.3%) are of concern even if they are not statistically different from the healthy controls. These rates continue to highlight previous concerns expressed that any engagement in these high-risk behaviors poses serious adverse health risks for these survivors.^{7,10–12,19,20,23} The unexpected finding

TABLE 3. ODDS RATIO ESTIMATES FOR ALCOHOL ABUSE, SMOKING, AND BINGE DRINKING WITH CONFIDENCE INTERVALS WITH AND WITHOUT DEMOGRAPHICS AMONG CHILDHOOD CANCER SURVIVORS

	Any alcohol abuse symptoms		Severe alcohol abuse symptoms		Smoking		Binge drinking	
	No demographics	With demographics	No demographics	With demographics	No demographics	With demographics	No demographics	With demographics
Depression	1.08 (0.85–1.37)	1.00 (0.77–1.30)	0.96 (0.78–1.17)	0.90 (0.73–1.12)	1.01 (0.80–1.28)	1.11 (0.85–1.44)	1.03 (0.84–1.26)	1.05 (0.85–1.30)
Stress	1.06 (0.84–1.34)	1.08 (0.84–1.39)	1.06 (0.86–1.30)	1.06 (0.85–1.32)	0.96 (0.75–1.23)	0.97 (0.75–1.27)	1.06 (0.85–1.31)	1.03 (0.83–1.29)
Anxiety	1.02 (0.85–1.22)	1.02 (0.84–1.23)	1.00 (0.86–1.18)	1.01 (0.85–1.19)	1.05 (0.86–1.28)	0.97 (0.76–1.23)	1.00 (0.85–1.18)	0.98 (0.82–1.16)
Optimism	1.09 (0.87–1.37)	1.06 (0.84–1.34)	1.02 (0.84–1.25)	1.00 (0.81–1.22)	0.61 (0.46–0.81)****	0.61 (0.44–0.84)****	1.04 (0.84–1.27)	1.04 (0.84–1.28)
Good health	0.41 (0.10–1.75)	0.48 (0.11–2.11)	0.79 (0.26–2.38)	0.94 (0.30–2.99)	1.46 (0.40–5.29)	1.08 (0.26–4.56)	3.32 (0.97–11.32)*	3.67 (1.05–12.90)**
Age (years)		1.33 (0.97–1.81)*		1.15 (0.89–1.48)		0.85 (0.62–1.18)		0.85 (0.66–1.10) ^a
Race/ethnicity (black)		1.77 (0.32–9.78)		2.45 (0.69–8.66)		0.15 (0.02–0.91)**		
Race/ethnicity (other)		0.50 (0.03–10.03)		0.99 (0.05–18.52)		3.43 (0.16–75.37)		^a
Sex (male)		0.49 (0.16–1.55)		0.63 (0.22–1.81)		0.67 (0.16–2.71)		0.58 (0.20–1.72)
c-statistic	0.63	0.69	0.54	0.63	0.80	0.84	0.61	0.67

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$; **** $p < 0.001$.

^aRace/ethnicity excluded from this model due to quasi-separation.

that those CCS who were in good health were more likely to drink may reflect a repressive coping style and denial that has been found in other studies of CCS.⁴⁰ This is a new finding in the literature and one that requires further investigation. While enjoying good health is a positive outcome for CCS, they also need to be aware of the risk that binge drinking has on their health status, as well as potentiating engagement in other high-risk behaviors. The National Institute on Alcohol Abuse and Alcoholism reports that these other high-risk behaviors include injuries, unsafe sex, and driving under the influence of alcohol, as well as vandalism, property damage, and involvement with the police.⁴¹

The state of being optimistic as a significant predictor of not smoking was an interesting finding that also requires further investigation. Bitsko tested the mediation effects of positive emotions (satisfaction with life, subjective happiness, and optimism) and time perspective on the outcome variables quality of life and benefit finding with demographic/medical variables (sex, number of treatments received for cancer, and previous psychotherapy) among 50 adolescent cancer survivors.⁴² Bitsko reported that positive emotions (satisfaction with life, subjective happiness, and optimism) fully mediated negative aspects of the cancer experience, such as the extent and degree of treatment and health-related quality of life.⁴² Having positive emotions, such as optimism, may also be a determinant of survivors' smoking status.

Data generated from this secondary data analyses continue to emphasize the need for widespread, available effective theory-based screening guidelines such as those of the Children's Oncology Group (COG) and targeted interventions for at-risk groups.⁴³ COG guidelines suggest that a survivor's plan for lifelong screening and prevention should incorporate risks based on lifestyle behaviors, with an emphasis on education regarding risk reduction.⁴³ These guidelines state that it is essential that survivors receive appropriate education and screening so that late effects can be recognized at their earliest, most treatable stage. The COG guidelines support that long-term follow-up programs, whether large or small, can be instrumental in providing these much needed follow-up services to CCS.⁴³ As emphasized by the Institute of Medicine report, *Childhood Cancer Survivorship: Improving Care and Quality of Life*,⁴⁴ the consequences of engagement in any high-risk behaviors are likely to have significant negative effects on these survivors' health status.

There are several strengths and limitations of this study. The finding of higher reported rates for smoking among CCS may reflect the data collection methods of the study, which may have permitted CCS to be more honest about their smoking behaviors. Klosky¹ and Vartiainen⁴⁵ noted when behavioral health questionnaires are administered to CCS in a medical setting in the presence of the medical team and/or parents, these situational characteristics may cause CCS to under-report high-risk behaviors and threaten the validity of the self-report responses. Other strengths of the study were the use of the technique of repeated sampling and the use of this large data set, which are unique and illustrate how healthcare professionals can use these resources to answer important clinical questions. Analyzing data from a large data set, such as Add Health, may address some of the limitations of small and biased samples noted in past investigations in this area of research.¹

A limitation of the study was the use of life dissatisfaction, depression, stress, and anxiety scales constructed from known

scales measuring these constructs. Although the internal consistency reliability coefficients estimated for each constructed scale were acceptable, one has to consider if a more reliable assessment of these constructs would have been obtained if the complete scale for each construct were used. The limited information about the reliabilities and the abbreviated measure of these constructed variables is a limitation of the study.

Conclusion

Data generated from this secondary data analyses add to the evidence base about engagement in high-risk behaviors among CCS. These findings further emphasize the need for widespread, available, effective theory-based screening guidelines and interventions. Adequate screening of risky behaviors is an essential need in the follow-up care for CCS, and further research examining predictors of engagement in high-risk behaviors is warranted.

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References

1. Klosky JL, Howell CR, Li Z, et al. Risky health behaviors among adolescents in the Childhood Cancer Survivor Study cohort. *J Pediatr Psychol*. 2012;37(6):634–46.
2. Bhatia S, Sklar, C. Second cancers in survivors of childhood cancer. *Nat Rev Cancer*. 2002;2(20):124–32.
3. Hollen PJ, Tyc VL, Shannon SV et al. Factors related to decision making and substance use in adolescent survivors of childhood cancer: a presenting clinical profile. *J Cancer Surviv*. 2013;7(3):500–10.
4. Lown AE, Goldsby R, Mertens, AC, et al. Alcohol consumption patterns and risk factors among childhood cancer survivors compared to siblings and general population peers. *Addiction*. 2008;103:1139–48.
5. Nathan PC, Ford JS, Henderson TO. Health behaviors, medical care, and interventions to promote healthy living in the Childhood Cancer Survivors Study Cohort. *J Clin Oncol*. 2009;27(14):2363–73.
6. Oeffinger KC, Hudson M. Long-term complications following childhood and adolescent cancer: foundations for providing risk-based health care for survivors. *CA Cancer J Clin*. 2004;54:208–36.
7. Hollen PJ, Hobbie WL, Donnangelo SF, et al. Substance abuse risk behaviors and decision-making skills among cancer-surviving adolescents. *J Pediatr Oncol Nurs*. 2007;24(5):264–73.
8. Klesges RC, Krukowski RA, Klosky JL, et al. Efficacy of a tobacco quitline among adult cancer survivors. *Prev Med*. 2015;73:22–7.
9. Thaaker KD. An overview of health risks and benefits of alcohol consumption. *Alcohol Clin Exp Res*. 1998;22:S285–98.
10. Krull KR, Huang S, Gurney JG, et al. Adolescent behavior and adult health status in childhood cancer survivors. *J Cancer Surviv*. 2010;4(3):210–17.

11. Larcombe I, Mott M, Hunt L. Lifestyle behaviors of young adult survivors of childhood cancer. *Br J Cancer*. 2002;87:1204–9.
12. Tao ML, Guo MD, Weiss R, et al. Smoking in adult survivors of childhood acute lymphoblastic leukemia. *J Natl Cancer Inst*. 1998;90:219–25.
13. Park JJ, Park HA. Prevalence of cigarette smoking among adult cancer survivors in Korea. *Yonsei Med J*. 2015;56(2):556–562.
14. Verrill JR, Schafer J, Vannatta K, Noll RB. Aggression, antisocial behavior, and substance abuse in survivors of pediatric cancer: possible protective effects of cancer and its treatment. *J Pediatr Psychol*. 2005;25:493–502.
15. Tai W, Buchanan N, Townsend J. Health status of adolescent and young adult cancer survivors. *Cancer* 2012;118:4884–91.
16. Emmons KM, Puleo E, Sprunck-Harrid K, et al. 2015 Partnership for Health-2, a web-based versus print smoking cessation intervention for childhood and young adult cancer survivors: randomized comparative effectiveness study. *J Med Internet Res*. 2013;15(11):e218.
17. Asafr T, Dietz NA, Arheart KL et al. Smoking behavior among adult childhood cancer survivors: what are we missing? *J Cancer Surviv*. 2016;10(1):131–41.
18. Emmons KM, Butterfield RM, Puleo E, et al. Smoking among participants in the Childhood Cancer Survivors Cohort: the Partnership for Health Study. *J Clin Oncol*. 2003;21(2):189–96.
19. Emmons K, Li FP, Whitton J, et al. (2002). Predictors of smoking initiation and cessation among childhood cancer survivors: a report from the childhood cancer survivors study. *J. Clin Oncol*. 2002;20:1608–16.
20. Mulhern RK, Tyc VL, Phipps S, et al. Health-related behaviors of survivors of childhood cancer. *Med Pediatr Oncol*. 1995;25:159–65.
21. Schultz KA, Chen L, Chen Z, et al. (2010). Health and risk behaviors in survivors of childhood acute myeloid leukemia: a report from the Children's Oncology group. *Pediatr Blood Cancer*. 2010;55:157–64.
22. Frosbier C, Lancashire ER, Reulen RC, et al. Extent of alcohol consumption among adult survivors of childhood cancer: the British Childhood Cancer Survivor Study. *Cancer Epidemiol Biomarkers Prev*. 2010;19(5):1174–84.
23. Lown EA, Mertens AC, Korch RA, et al. Prevalence and predictors of risky and heavy alcohol consumption among adult siblings of childhood cancer survivors. *Psychooncology*. 2013;22(5):1134–43.
24. Carswell K, Nair RC, Shaw AK, et al. Smoking and binge drinking among Canadian survivors of childhood and adolescent cancers: a comparative, population-based study. *Pediatr Blood Cancer*. 2008;51(2):280–7.
25. Rebholz CE, Kuehni CE, Strippoli MPF, et al. Alcohol consumption and binge drinking in young adult childhood cancer survivors. *Pediatr Blood Cancer*. 2012;58(2):256–64.
26. Cox CL, McLaughlin RA, Steen BD, Hudson, MM. Predicting and modifying substance use in childhood cancer survivors: application of a conceptual model. *Oncol Nurs Forum*. 2006;33(1):51–60.
27. *The National Longitudinal Study of Adolescent Health* (Add Health). Accessed April 2, 2015 from: www.cpc.unc.edu/projects/addhealth
28. Chantala K, Tabor J. Strategies to perform a design-based analysis using the Add Health Data. Carolina Population Center. Accessed May 4, 2013 from: www.cpc.unc.edu/projects/addhealth/files/weight1.pdf
29. Resnick MD, Bearman PS, Blum RW, et al. Protecting adolescents from harm: findings from the National Longitudinal Study of Adolescent Health. *JAMA*. 1997;278:823–32.
30. Radloff LS. The CES-D scale: a self-report depression scale for research in the general population. *Appl Psychol Meas*. 1997;1:384–401.
31. Donnellan MB, Oswald FL, Baird BM, Lucas RE. The mini-IPIP scales: tiny-yet-effective measures of the Big Five factors of personality. *Psychol Assess*. 2006;18(2):192–203.
32. Barofsky I, Erickson P, Eberhardt M. Comparison of a single global item and an index of a multi-item health status measure among persons with and without diabetes. *Qual Life Res*. 2004;13:1671–81.
33. DeSalvo KB, Fisher WP, Tran K, et al. Assessing measurement properties of two single-item general health measure. *Qual Life Res*. 2006;15:191–205.
34. Sloan J, Aaronson N, Cappelleri J, Fairclough D, Varricchio C. Assessing the clinical significance of single items relative to summated scores. *Mayo Clin Proc*. 2002;77:479–87.
35. Scheier MF, Carver CC, Bridges MW. Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): a reevaluation of the Life Orientation Test (LOT). *J Pers Soc Psychol*. 1994;67:1063–78.
36. Cohen S, Kamarck T, Mermelstein RA. A global measure of perceived stress. *J Health Soc Behav*. 1983;24(4):385–96.
37. Efron B. Bootstrap methods: another look at the jackknife. *Ann Stat*. 1979;7(1):1–26.
38. Gajewski B, Hall M, Dunton N. Summarizing benchmarks in the national database of nursing quality indicators using bootstrap confidence intervals. *Res Nurs Health*. 2007;30:112–19.
39. Phillips-Salimi CR, Lommel K, Andrykowski MA. Physical and mental health status and health behaviors of childhood cancer survivors: findings from the 2009 BRFSS survey. *Pediatr Blood Cancer*. 2012;58(6):964–70.
40. Harila MJ, Niinivirta TIT, Winqvist S, Harila-Saari AJ. Low depression symptom and mental distress scores in adult long-term survivors of childhood acute lymphoblastic leukemia. *J Pediatr Hematol Oncol*. 2011;33(3):194–8.
41. The National Institute on Alcohol Abuse and Alcoholism. Alcohol & Your Health. (n.d.) Accessed October 15, 2015 from: <http://www.niaaa.nih.gov/alcohol-health/overview-alcohol-consumption>.
42. Bitsko MJ. Psychosocial adjustment of adolescent cancer survivors: Time perspective and positive emotions as mediators to quality of life and benefit finding. 2005. Available from ProQuest Dissertations and Theses database. (UMI No. 3180693).
43. Children's Oncology Group (COG) Long-Term Follow-Up Guidelines for Survivors of Childhood, Adolescent, and Young Adult Cancers. Accessed October 15, 2015 <http://www.survivorshipguidelines.org/>
44. Hewitt ME, Weiner SL, Simone JV (Eds). *Childhood cancer survivorship: improving care and quality of life*. Washington, DC: National Academies Press; 2003.
45. Vartiainen E, Seppala T, Lillsunde P, Puska P. Validation of self-reported smoking by serum cotinine in a community-based study. *J Epidemiol Commun Health*. 2002;56:167–70.

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