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ARTICLE

Covariates of risky health behaviors in pediatric cancer survivors during adolescence

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ABSTRACT

Purpose: Adolescent survivors of pediatric cancers may use alcohol and tobacco (73–90% and 10–29%, respectively) at similar rates as their healthy peers despite known adverse health effects of these substances. This is concerning given that these behaviors can increase the risk for adverse late effects among this population. This study explores the beliefs and behaviors associated with alcohol and tobacco use among adolescent survivors of pediatric cancer.

Design: Cross-sectional study using assessment questionnaires by telephone.

Participants: Adolescent cancer survivors who had been seen at Memorial Sloan Kettering Cancer Center ($n = 128$)

Methods: Questionnaires concerned participants' medical history, current health behaviors, attitudes about health behaviors, fear of cancer recurrence, cancer worry, knowledge of risk, and perceived risk of future health problems. Univariate and multiple logistic regression analyses determined the association between psychological covariates with having ever used alcohol and cigarettes.

Results: In multiple logistic regression, higher positive attitude (OR = 3.65; $p < 0.001$) toward alcohol use and lower knowledge of the risk of binge drinking (OR = 0.38; $p < 0.05$) were significantly related to alcohol use. Older age (OR = 1.55; $p < 0.01$), lower knowledge of the risks of smoking (0.41; $p < 0.05$), and the subjective norm that smoking is desirable to others (OR = 1.90; $p < 0.05$) were significantly related to cigarette use.

Conclusion and implications for psychosocial providers: Understanding the uptake of risky health behaviors and factors related to tobacco and alcohol use for adolescent survivors is imperative to promoting lifelong healthy behaviors and potentially reducing future adverse health effects. Despite broadly disseminated public service campaigns and anticipatory guidance of our cancer specialists to inform youth about the adverse effects of alcohol and tobacco use, there remains a gap in adolescent cancer survivors' knowledge of these risks. More effective interventions to increase knowledge of the risks of drinking and smoking are needed to bridge this gap.

KEYWORDS

Adolescent/young adult; behavioral health; pediatric; quantitative; survivorship

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Introduction

The number of pediatric cancer survivors has increased, with current five-year survival rates now at 83.4% for children and 84.6% for adolescents.[1] Despite these high survival rates, young survivors are at risk for lifelong late effects. Physical late effects, or treatment-related chronic health problems, are a result of intense treatments and increased life expectancies that augment the risk of these health problems in childhood cancer survivors.[2,3] Tobacco and alcohol use are known to influence an individual's risk of disease and may further increase the risk of adverse health problems among cancer survivors.[3–6] Therefore, avoiding these substances is imperative for pediatric and adolescent cancer survivors.

Negative health behaviors, like smoking and drinking alcohol, are typically initiated during adolescence and may contribute to "normal" development.[7,8] Conversely, adolescent survivors of childhood cancer have reported feeling isolated, socially and developmentally delayed, and not having the "true experience" of adolescence.[9] This delay, especially in decision-making skills, could contribute to increased engagement in risky behaviors compared to their healthy peers.[10] Perception of susceptibility to cancer treatment's late effects, worry, older age, and higher school grade have been found to strongly predict substance use among pediatric cancer survivors.[11,12]

There have been varying estimates of tobacco and alcohol use among pediatric cancer survivors compared to their "healthy peers" with some findings indicating that survivors smoke cigarettes, drink alcohol, and binge drink with the same frequency as their "healthy" peers[13–15] although at least one study found that survivors were less likely than siblings to smoke or binge drink.[16] Prevalence of tobacco use ranges from 10% to 29%,[13] for any alcohol use 73% to 90%,[17,18] and for binge drinking (5 or more alcoholic drinks on one occasion or 4 or more for women and 5 or more for men) 14–53%.[15,18,19] The literature has also been inconsistent in the definition of "use" of these substances and the age ranges of survivors surveyed, leading to the variety of prevalence rates reported. Of note, much of the comprehensive data published on tobacco use among childhood cancer survivors is from the Childhood Cancer Survivor Study. Since the time this data was collected, rates of adolescent cigarette smoking have substantially declined, and thus, this cigarette smoking behavior may not be representative of the population currently.

Several covariates of tobacco and alcohol use have been investigated in the literature. Social support, personal agency, optimism, and self-efficacy all are inversely correlated with tobacco and alcohol use among young adult survivors of childhood cancers.[20,21] Additionally, lack of concern about recurrence among young adult survivors was associated with

increased odds of being nicotine dependent[22] and worry about cancer and its treatment predicted substance use.[11] Low perceived risk of future health issues and of tobacco-related health issues were associated with increased amounts of tobacco-related quit attempts.[22]

The current health behavior literature focuses heavily on young adult survivors of pediatric cancers. However, by focusing on young adults, existing literature has not adequately captured adolescence, which is an important developmental period that sets the stage for acquiring lifelong health behaviors.[23] Understanding the uptake of risky health behaviors and factors related to tobacco and alcohol use for adolescent survivors is imperative to promoting lifelong healthy behaviors and potentially reducing late effects that may be exacerbated by alcohol and tobacco use.

The present study sought to understand the prevalence and covariates of alcohol and tobacco use among adolescent cancer survivors. Covariates were informed by the widely used theory of planned behavior (TPB)[24,25] as it predicts substance use among the general adolescent population[26,27] but there is a paucity of similar studies done within the pediatric survivorship population. Additional survivorship- related variables previously studied in the literature[11,22] were selected on the basis of empirical support. We hypothesize that more favorable attitudes toward substance use, lower perceived behavioral control of avoiding use, decreased fear of cancer recurrence, increased cancer worry, lower knowledge of risk, and lower perceived risk of developing other health problems will be associated with increased tobacco and alcohol use.

Methods

Data and participant selection

Participants were adolescent cancer survivors who were seen at Memorial Sloan Kettering Cancer Center's (MSKCC) Department of Pediatrics for their primary cancer treatment and/or follow-up care. Eligible participants were between the ages of 14 and 20, had been diagnosed with cancer between the ages of 8 and 14, were at least 12 months post-treatment, had no evidence of active disease, could be reached by mail or telephone, and were fluent in English. We chose participants diagnosed after age 8 so that they had memory and greater awareness and understanding of their cancer diagnosis and treatment. We obtained informed consent directly from participants age 18 and older and parental consent and participant assent for those under age 18. All study procedures and data collection were approved and overseen by MSKCC's IRB.

Based on a chart review performed, 406 individuals met all eligibility criteria for study entry. In order to reach the desired final sample size, we

estimated the need to reach out to 250 eligible adolescent cancer survivors. We approached 250 eligible adolescent cancer survivors by sending an introductory letter describing the study, written consent form, and then study staff followed-up within a couple of weeks with a telephone call to each potential participant (or participant's parent, for minors) in order to further describe the study, answer any questions, review and obtain verbal consent, and invite the survivor to participate in the study. Of those, 54 did not respond, 27 refused, and 41 had inaccurate contact information and were not able to be reached (resulting in a 10.8% active refusal rate and an overall 51.2% participation rate). Participants ($n = 128$) completed the self-reported assessment questionnaires by telephone regarding their medical history, health behaviors, attitudes toward their health behaviors, fear of cancer recurrence, cancer worry, perceived risk, and knowledge of risk. Participants were offered the option of completing the questionnaire on their own rather than by telephone, if they desired. To minimize reporting bias, interviewers had no clinical relationship with participants. Further, participants were assured that their responses would be kept confidential, would not be shared with parents or providers and would be reported in aggregate with other participants.

Outcomes

Current tobacco and alcohol use were assessed through previously validated questions adopted from the Youth Risk Behavior Surveillance System-High School Questionnaire.[28] Two questions asked whether survivors had ever tried alcohol and/or cigarette smoking (yes/no). We will refer to this variable when referring to alcohol or tobacco use throughout this paper. For those that indicated yes to tobacco use, an additional 18 questions were administered assessing the age at first cigarette, whether they smoked at least 100 cigarettes in their lifetime, frequency of use in the last 30 days, questions about dependency, attempts at quitting, and whether their family and/or friends smoke and their frequency of use. For those that indicated they used alcohol, an additional 12 questions were administered assessing the frequency of use, binge drinking in the last 30 days, attempts at cutting down, and whether family and friends use alcohol and/or binge drink. Binge drinking was defined as drinking greater than 5 drinks on at least one occasion in the past 30 days.[28]

Covariates

Attitudes toward tobacco and alcohol use used bipolar adjectives[29] when assessing the overall evaluation of performing the behavior (i.e. "For me to

drink alcohol in the next 6 months is:") using a 7-point Likert scale with example scale items ranging from harmful to beneficial; unenjoyable to enjoyable, etc. Five items were averaged with higher scores reflecting more positive attitudes toward the behavior.

Subjective norms included what others (family and peers) think you should do about the behavior and whether others themselves perform the behavior. Example: "Most people who are important to me do not smoke cigarettes" with a 7-point Likert scale ranging from "completely false" to "completely true" as well as "Most people who are important to me think that … smoke cigarettes within the next 6 months" with a 7 point Likert scale ranging from "I should" to "I should not." Once these items were recoded, these two items were averaged with higher scores reflecting a perception that the behavior was more desirable to others.

Perceived behavioral control or self-efficacy evaluated the adolescent's confidence that he/she is capable of performing the health behavior (i.e. "If I wanted to, I could avoid smoking cigarettes for the next six months") and the belief of the level of control that he/she has over the behavior with a 7-point Likert scale from "Definitely True" to "Definitely False" and "Strongly Agree" to "Strongly Disagree". Two items were reverse scored and then averaged with higher scores reflecting a higher perceived control over avoiding the behavior.

Physician recommendations to avoid each behavior was assessed with two items (one for alcohol and one for smoking) asking participants whether their physician had recommended avoiding alcohol/smoking (yes/no).

Fear of cancer recurrence was measured utilizing the fear of recurrence questionnaire (FRQ).[30] The FRQ has 22 items and specifically assesses fear of cancer recurrence (Cronbach's alpha = 0.92).[31] It includes a 5-point Likert scale from "Strongly Agree" to "Strongly Disagree" with items averaged to one score. Higher scores reflect a greater fear of cancer recurrence. Example item: "I am bothered by the uncertainty of my health status."

Cancer worry was assessed by the impact of events scale-revised (IES-R),[32,33] a 15-item questionnaire to assess intrusive and avoidant thoughts about the threat of a cancer recurrence (Cronbach's alpha = 0.80–0.91).[33] It has a one to four response scale spanning "Not at all" to "Often." Items were averaged to one score with higher scores reflecting greater cancer worry.

Knowledge of risk examined how risky participants perceived smoking/binge drinking with one item on a three-point scale of *not at all risky* to *extremely risky*. Higher scores reflect a greater knowledge of risk.

Perceived risk examined participants' perceived risk of developing other serious health problems compared to others their age and sex with one item using a five-point Likert scale.[34,35] Higher scores reflect a greater perceived risk.

Table 1. Sociodemographics and medical history.

	M (SD)	*N* (%)		*N* (%)
Age	16.4 (1.8)		**Diagnosis**	
Gender			Sarcoma	41 (32.0)
Female		67 (52.3)	Lymphoma	19 (14.8)
Race:			Leukemia	16 (12.5)
White		104 (81.3)	Brain	12 (9.4)
Black		7 (5.5)	Germ cell	9 (7.0)
Asian		6 (4.7)	Thyroid (Papillary)	8 (6.3)
Other		10 (7.8)	Carcinoid	5 (3.9)
Hispanic/Latino		17 (13.3)	Neuroblastoma	4 (3.1)
Students		121 (94.5)	Nasopharyngeal Carcinoma	4 (3.1)
Grade:			Other	10 (7.8)
8th grade		11 (8.6)	**Treatment**[b]	
9th grade		25 (19.5)	Solely chemotherapy	9(7.0)
10th grade		19 (14.8)	Solely radiation	1 (0.8)
11th grade		19 (14.8)	Solely surgery	28 (21.9)
12th grade		20 (15.6)	Multimodal	87 (68.0)
2-year college		5 (3.9)	**Recurrence**	
4-year college		22 (17.2)	Yes	9 (7.0)
Work			2 Recurrences	2 (1.6)
Full time		5 (3.9)		
Part time		35 (27.3)		
Unemployed		88 (68.8)		
Years since diagnosis[a]	5.0 (2.3)			
1–3 years		30 (23.4)		
4–6 years		61 (47.7)		
7+ years		33 (25.8)		

[a]Four participants missing due to being treated off site.
[b]Three participants missing due to being treated off site.

Sociodemographic variables and medical history

Participants reported standard sociodemographic variables and medical characteristics and their medical charts were reviewed (Table 1).

Analysis plan

We conducted descriptive analyses for each variable. We first explored correlations among sociodemographic variables, covariates, and dependent variables. We then created a model using logistic regression analyses, selecting covariates that were significantly correlated ($p < 0.05$) with each dependent variable.

Results

Descriptive analyses

Participants

Approximately half of the participants were female ($n = 67$, 52.3%), were on average 16.4 years old (SD = 1.7), with a majority ($n = 97$, 75%)

Table 2. Description of outcomes.

	Number (%)
Alcohol use (had ever drank more than a few sips):	71 (55.5%)
Best friend drinks	38 (53.5%)[a]
In past 30 days:	
Had at least one alcoholic drink	40 (56.3%)[a]
Binge drinking participation	17 (23.9%)[a]
Consumed alcohol at school	3 (4.2%)[a]
Tried to cut down on alcohol use in past 12 months	9 (12.6%)[a]
Tobacco use (ever tried a cigarette)	31 (24.2%)
Smoked at least 100 cigarettes in their life	8 (25.8%)
Smoked cigarettes daily	8 (100%)[a]
Dependent on cigarette smoking	2 (25%)[a]
Tried quitting for at least one day in past 12 months	4 (50%)[a]
Best friend smokes	4 (50%)[a]

[a]Percentages represent from category above.

identifying as white, non-Hispanic. Additional sociodemographic information is available in Table 1.

Seventy-one participants had ever used alcohol (55.5%). Mean age at first drink was 14.8 (SD 2.08) years old. In the past 30 days, of the 71 participants, 56.3% had at least one alcoholic drink and 23.9% participated in binge drinking. Thirty-one participants had ever tried cigarette smoking (24.2%). Of those, 25.8% had smoked at least 100 cigarettes in their life. 55.5% of participants had either previous exposure to alcohol or cigarette smoking. Every participant who smoked also drank alcohol but only 31 of those who drank alcohol (43.7%) had tried smoking a cigarette. Descriptive analyses of alcohol and tobacco use are available in Table 2.

Independent variables

Descriptive statistics of our independent variables are detailed in Table 3. We ran correlations analyses examining sociodemographic and medical history variables (as outlined in Table 1) and the covariate variables (Table 3) with ever use of alcohol and ever use of cigarettes. Age, years since diagnosis, and grade in school as well as most covariate variables listed in Table 3 (cancer worry, perceived behavioral control, and physician recommendations did not correlate with dependent variables) had low to moderate significant correlations with alcohol use and cigarette use with significant Pearson's r ranging from 0.188 to 0.654 for alcohol use and ranging from −0.185 to 0.599 for cigarette use. Correlations table is available upon request of the corresponding author.

Regressions predicting alcohol and cigarette use

Univariate logistic regressions were conducted for each of the significant variables correlated with alcohol and/or tobacco use. Significant covariates of alcohol use *(all $p < 0.05$)* included older age *($OR = 1.87$; 95% CI,*

Table 3. Description of predictors.

	Range	Mean (SD)	Number (%)
Physician recommendations for:	Reporting "yes"		
Decrease/avoid alcohol			35 (27.3)
Avoid smoking			68 (53.1)
Fear of cancer recurrence[a]	1.00–4.74	3.27 (0.62)	
Cancer worry[a]	0–54	18.94 (13.62)	
Attitudes toward[a]			
Alcohol	1–6.2	2.64 (1.49)	
Binge drinking	1–6	1.74 (1.17)	
Smoking	1–4.4	1.35 (0.76)	
Perceived behavioral control[a]			
Alcohol	1–7	6.67 (0.89)	
Smoking	1–7	6.73 (0.89)	
Subjective norms[a]			
Binge drinking	1–6	2.05 (1.24)	
Smoking	1–5	1.98 (1.14)	
Perceived risk of experiencing any serious health problem in the future			
No chance to unlikely			31 (24.2)
Moderate chance			64 (50.0)
Likely to certain to happen			26 (20.3)
Knowledge of risk			
Binge drinking			
Not at all risky			11 (8.6)
Moderately risky			47 (36.7)
Extremely risky			67 (52.3)
Smoking			
Not at all risky			11 (8.6)
Moderately risky			30 (23.4)
Extremely risky			85 (66.4)

[a]These variables included multiple items that were averaged.

1.45–2.42), greater time since diagnosis *(OR = 1.37; 95% CI, 1.14–1.63)*, greater fear of cancer recurrence *(OR = 1.88, 95% CI, 1.02–3.44)*, more positive attitudes toward alcohol use *(OR = 3.96, 95% CI, 2.56–6.14)*, more positive attitudes toward binge drinking *(OR = 4.81, 95% CI, 2.30–10.09)*, lower knowledge of the risks of binge drinking *(OR = 7.57, 95% CI, 3.13–18.27)*, and higher subjective norms or feeling that binge drinking is desirable to others *(OR = 2.28, 95% CI, 1.57–3.31)*. Using multiple logistic regression, higher positive attitudes toward alcohol use and lower knowledge of the risk of binge drinking were significantly associated with alcohol use (Table 4).

We ran exploratory logistic regression analyses as a preliminary explanation of covariates of binge drinking. Significant covariates of binge drinking included more positive attitude toward binge drinking *(OR = 4.52, 95% CI, 1.89–10.81)* and greater subjective norm that binge drinking is desirable to others *(OR = 2.31, 95% CI, 1.28–4.16)*. In multiple logistic regression, none of the variables remained significant with binge drinking.

Significant covariates of cigarette use included older age *(OR= 1.44; 95% CI, 1.13–1.84)*, lower knowledge of the risk of smoking *(OR = 4.85, 95% CI, 1.91–12.27)*, and greater subjective norm that smoking is desirable to others *(OR = 1.98, 95% CI, 1.38–2.83)*. In multiple logistic regression, all

Table 4. Multiple logistic regression-predictors of alcohol use.

	B	S.E.	Wald	*df*	*p*	OR	95% C.I. for OR	
							Lower	Upper
Age	0.22	0.22	0.95	1	0.33	1.24	0.80	1.93
Years since diagnosis	0.23	0.18	1.60	1	0.21	1.26	0.88	1.79
Fear of cancer recurrence	0.83	0.53	2.48	1	0.12	2.29	0.82	6.43
Attitude toward alcohol use	1.30	0.34	14.8	1	0.00	3.65	1.89	7.07
Attitude toward binge drinking	0.20	0.52	0.15	1	0.70	1.22	0.44	3.41
Knowledge of the risk of binge drinking	−0.97	0.48	4.16	1	0.04	0.38	0.15	0.96
Subjective norm that binge drinking is desirable to others	0.55	0.31	3.15	1	0.08	1.72	0.95	3.15

were significantly associated with cigarette use (Table 5). There was a significant relationship between cigarette and alcohol use such that those who had tried cigarettes had also tried alcohol ($X^2 = 32.841$; $p < 0.001$).

Discussion and research implications for psychosocial oncology practice

This study examined the prevalence and covariates of alcohol and tobacco use among adolescent cancer survivors. In our cohort, prevalence of ever use of alcohol was 55% (lower than previous studies finding of 73–90%).[17,18] Younger age of the cohort may account for this finding. In contrast with ever having tried cigarette smoking, our finding of 24.2% is similar to previous studies of 10–29%.[13]

Our findings indicated that higher positive attitudes toward alcohol use were significantly associated with reported alcohol use, which has been previously reported in the literature focused on healthy adolescents[26,27,36] but has not previously been described in the adolescent survivorship literature. Peers' and family's perceptions about drinking were significantly associated with alcohol use when placed as its own variable in the univariate regression; however, when placed in the multiple regression, were not significant, demonstrating that when among other covariates, is not reliably associated with alcohol use. This is surprising given the predominance of peers' influences in an adolescent's decision making to perform a behavior.[37] Less knowledge about the risks of binge drinking was significantly associated with alcohol use, consistent with findings from a study of healthy adolescents[38] reporting that higher perceived risk of binge drinking was associated with lower episodic alcohol use. Greater fear of cancer recurrence was significantly associated with alcohol use in the univariate logistic regression but not the multiple regression analyses. Perhaps adolescents either drank alcohol to cope with this fear of cancer recurrence or take a fatalistic attitude toward a future cancer diagnosis and thus engage in this risky behavior. These relationships have been previously theorized in relation to smoking cessation.[22]

Table 5. Multiple logistic regression-predictors of cigarette use.

	B	S.E.	Wald	*df*	*p*	OR	95% C.I. for OR	
							Lower	Upper
Age	0.44	0.15	8.74	1	0.00	1.55	1.16	2.10
Knowledge of the risk of smoking	−0.90	0.35	6.54	1	0.01	0.41	0.20	0.81
Subjective norm that cigarette smoking is desirable to others	0.64	0.20	9.95	1	0.00	1.90	1.27	2.82

In multiple logistic regression analysis, older age was associated with increased tobacco use, perhaps due to greater access to cigarettes, less parental supervision, and legality of age of initiation of cigarette purchasing in the United States. Lower knowledge of the risk of smoking was significantly associated with cigarette use, contributing to the literature's conflicting findings of this relationship among adolescents.[39] Subjective norms were significantly related to tobacco use but not to alcohol use. Perhaps adolescents' peers who look favorably on smoking have more influence than those who look favorably on drinking. Since every participant who smoked also drank alcohol but not vice versa, perhaps those adolescents who are already involved in a peer group that experiments with alcohol and cigarettes may relate more to their peers and be more susceptible to the influence of peers' perceptions on smoking. These complex dynamics with one's peers contributing to our findings may be due to our sample comprised of cancer survivors. Adolescent cancer survivors may be influenced differently (than the general adolescent population) by their peers who have never been diagnosed.

Every participant who smoked also drank alcohol but not vice versa. Perhaps this is due to cigarette smoking seen as a more "risky" behavior than drinking alcohol based on increased media attention and more widespread lung cancer prevention education. Counter-marketing campaigns targeted at youth meant to reduce substance use are effective with anti-tobacco initiatives but less so for anti-alcohol campaigns.[40]

Positive attitudes toward alcohol were associated with any lifetime alcohol use but not binge drinking, indicating that the relationship between attitude and behavior may vary depending on the extent to which the behavior is performed (i.e. one drink to experiment versus a five-drinks-or-more binge episode). Further research is needed to identify additional factors that predict a riskier behavior such as binge drinking compared to any experimentation with alcohol.

As e-cigarette use gains in popularity among the general adolescent population while cigarette smoking declines,[41] further research is needed to assess predictors associated with e-cigarette use among the adolescent cancer survivor population in order to provide targeted interventions on reducing e-cigarette use among this vulnerable cohort as well.

Limitations

Possible limitations of this study include participants' potential biases to under-report their tobacco and alcohol use. The participants in follow-up care had access to health education resources as part of being seen at MSKCC and may be more highly educated about their risks and importance of health behaviors than those participants who did not have follow-up care. Therefore, our study may underestimate the prevalence of tobacco and alcohol use. Adolescents with fewer resources may have different behaviors. Overall participation rate was 61.2%, potentially limiting the generalizability of our results. The outcomes of our study referred to ever using alcohol/cigarettes and therefore, their current attitudes and knowledge as documented on their surveys may have changed since the first experience with substance use. The YRBSS questionnaire informed our definition of binge drinking and at the time of study conduction, this definition did not differentiate based on gender. In addition, although we minimized reporting bias by assuring confidentiality with participants as documented above, there is minimal risk that a parent could have overheard their child's responses. We tried to minimize this, by encouraging teens to complete the data collection in a private space, wherever possible. This could have been addressed if data were able to be obtained in person at a location where the parent was not present, however this was deemed impractical due to geographic dispersion of survivors as well as potential scheduling difficulties with teens, possibly decreasing our participation rate even further.

Conclusions

Based on our study, higher positive attitude toward alcohol use and lower knowledge of the risk of binge drinking were significantly associated with alcohol use. Older age, lower knowledge of the risk of smoking, and greater perception that smoking is desirable to others were associated with cigarette use. Our findings invite further studies into moderating variables such as adolescent egocentrism and personal fable when examining risky behaviors within this population as these constructs have been correlated with risk taking behaviors among the general adolescent population.[42] Based on our results, effective interventions, programs, and follow-up care should help survivors adopt health promoting behaviors and eliminate these health risk behaviors in order to mitigate the risk for secondary health problems associated with cancer and its treatment. Interventions could focus on increasing adolescents' knowledge of the risk of smoking and alcohol use since it was significantly associated with both of these behaviors and there remains a gap in adolescent cancer survivors' knowledge of these risks. As

physician recommendations were not significantly correlated with decreased alcohol and smoking use, proposed interventions could train physicians and psychosocial providers in motivational interviewing techniques to effectively deliver messages.

Acknowledgments

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Disclaimer

The tobacco use findings have been previously presented through a poster presentation at the 2018 American Academy of Pediatrics National Conference & Exhibition. Title of the poster was *Predictors of Tobacco Use Among Pediatric Cancer Survivors During Adolescence.*

Disclosure statement

No competing financial interests exist.

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