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Tobacco Use and Exposure among Youth undergoing Cancer Treatment

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Abstract

Introduction—Adolescents with cancer are susceptible to the health consequences associated with secondhand smoke exposure (SHSe) and tobacco use. The present study compared tobacco use, exposure, and risk factors between patients and population peers.

Method—Self-reported data on tobacco use, SHSe, and tobacco-related risk factors were drawn from a pediatric oncology hospital and the National Youth Tobacco Survey. Conditional logistic regression was used to estimate odds ratios for patients and controls.

Results—Patients were as likely to have tried tobacco and report home SHSe than controls. Patients were more likely to report car SHSe, less likely to report SHSe is harmful, and less likely to report home smoking bans.

Discussion—Patients experienced SHSe, tobacco use, and tobacco-related risk factors at rates greater than or equal to controls. These results provide support for consideration of intervention targets, health status, and delivery mechanisms, particularly healthcare providers, when developing comprehensive tobacco control strategies.

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Author Disclosure Statement

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Keywords

Adolescent health care; oncology; smoking; tobacco use

Secondhand smoke exposure (SHSe) and tobacco use represent significant health concerns for adolescents on-treatment for cancer due to their increased health vulnerabilities secondary to cancer treatment and genetic predisposition (Bhatia et al., 2003; Geenen et al., 2007; Huang et al., 2011; Hudson et al., 2003; Miller et al., 2010; Oeffinger et al., 2006). Pediatric cancer survivors are at increased risk for experiencing adverse health outcomes such as cardiovascular disease, stroke, kidney failure, pulmonary fibrosis, and second malignancies (Bhatia et al., 2003; Geenen et al., 2007; Huang et al., 2011; Hudson et al., 2003; Miller et al., 2010; Oeffinger et al., 2006), conditions that may also be the result of, or exacerbated by, tobacco use or exposure (Kahalley et al., 2012; U.S. Department of Health and Human Services, 2004). Despite increased risk for secondary health consequences, pediatric cancer patients exhibit rates of SHSe similar to the general population (Centers for Disease Control and Prevention, 2010; Kahalley et al., 2012; Tyc et al., 2004; Tyc, Klosky, Throckmorton-Belzer, Lensing, & Rai, 2004; Tyc, Lensing, Vukadinovich, & Hovell, 2009). While rates of current smoking among adolescents on-treatment for cancer have been reported to be lower than their healthy peers (Centers for Disease Control and Prevention, 2013; Tyc, Hovell & Winickoff, 2008), rates of tobacco use among adolescent survivors (15%-38%) are generally equivalent (Centers for Disease Control and Prevention, 2010; Kahalley et al., 2012; Klosky et al., 2012; Tyc, 2008). These findings are concerning as lower rates of exposure and smoking are desired among these youth due to their increased risk for tobacco-related morbidities and increased opportunities for tobacco interventions from healthcare providers (HCPs).

Consequently, preadolescence and adolescence represent critical periods for engagement in behavioral health decision-making for protective health behaviors, such as SHSe avoidance (Ding et al., 2010), and risky health behaviors, including smoking initiation and progression (Turner, Mermelstein, & Flay, 2004). In fact, SHSe and smoking initiation in adolescence are closely related, as exposure is a frequent consequence of parental smoking, and parental smoking has been associated with greater adolescent intentions to smoke, early onset, rapid escalation, and long-term persistence of smoking (Best, Committee on Environmental Health, Committee on Native American Child Health, & Committee on Adolescence, 2009; Centers for Disease Control and Prevention, 2007; Chassin, Presson, Pitts, & Sherman, 2000; Ding et al., 2010). Parental smoking has also been identified as a risk factor for tobacco use among adolescent cancer survivors (Kahalley et al., 2012). Furthermore, parental smoking, the most common source of SHSe (Ding et al., 2010) also serves as a risk factor for adolescent smoking through mechanisms such as modeling, increased access to tobacco (Best et al., 2009; Chassin et al., 2000; Chassin, Presson, Rose, Sherman, & Prost, 2002; Flay, Hu, Siddiqui, Day, & Hedeker, 1994) or genetic predisposition for addiction to nicotine that leads children to adopt the habit themselves (Boomsma, Koopsman, Van Doornen, & Orlebeke, 1994). Beyond parental smoking, research has also established both fixed and modifiable risk factors associated with adolescent tobacco use. Risk factors include socio-demographic factors (e.g., age, socioeconomic status (SES), gender;

Backinger, Fagan, Matthews, & Grana, 2003; CDC, 2008; DiFranza et al., 2007; Gilpin, Choi, Berry, & Pierce, 1999; Johnston, O'Malley, Bachman, & Schulenberg, 2012), psychosocial factors (e.g., intentions to smoke, perceptions of mortality risk, perceived social value of smoking; Ellickson, McGuigan, & Klein, 2001; Lundborg & Andersson, 2008; Tyc, Klosky, Lensing, Throckmorton-Belzer, & Rai, 2009) and social factors (e.g., smoking friends; Chassin, Presson, Rose, Sherman, Montello, & McGrew, 1986). All of these aforementioned factors are important and can inform tobacco assessment and intervention planning. Thus, these developmental periods represent key surveillance and intervention targets for health behaviors, especially among youth at risk for adverse health outcomes.

Three previous studies have compared the rates of tobacco use and related risk factors for youth with and without cancer by separately examining preadolescents (8-11 years; Tyc et al., 2009) and adolescents (12-18 years; Kahalley et al., 2012; Tyc, Lensing, Klosky, Rai, & Robinson, 2005). Tyc and colleagues (Tyc et al., 2009) focused on youth's intention to smoke and found that nonsmoking healthy preadolescents reported more intentions to smoke and perceived social value of smoking compared to children with cancer. Alternatively, preadolescents with cancer reported more tobacco-related knowledge, perceptions about their vulnerability to tobacco health risks, optimism, and value of overall health. In a similar study, adolescents with cancer reported less current smoking (2% vs. 22%) and fewer intentions to smoke than a matched comparison of healthy peers from the local community, but reported similar rates of past smoking behavior (20% vs. 18%; Tyc et al., 2005). A recent study compared smoking between adolescent survivors of cancer and their siblings and found no significant differences in either having a history of smoking or active smoking (Kahalley et al., 2012). Further, risk factors for smoking among adolescent survivors included having smoking friends and living in household with smokers (Kahalley et al., 2012). Taken together, these results suggest that youth with cancer report similar rates of a history of smoking, lower or comparable rates of current smoking, established risk tobacco factors of peer smoking and household exposure to smokers, and fewer individual-level tobacco-related risk factors compared to their healthy peers.

No previous studies have concurrently examined SHSe, tobacco use, and risk factors among both preadolescents and adolescents on treatment for cancer and compared these rates to national data. Previous research has (1) explored these constructs separately and among either preadolescents or adolescents or (2) utilized local comparison groups (e.g., local schools) or sibling comparison groups rather than national data. The current study extended previous research by comparing rates of SHSe, tobacco use, and other potential tobacco-related risk factors in pediatric cancer patients (patients in the current study are being treated at an institution with a large representation of referral areas; Tripp Umbach, 2013) to a larger, nationally representative sample of youth (10-18 years) using a matched-controlled design. Further, the present study simultaneously examined SHSe and tobacco use (Klosky et al., 2012; Tyc, 2008; Tyc et al., 2009; Tyc et al., 2004), using statistical methods recommended for matched-controlled designs, with the aim of exploring a more comprehensive surveillance of health behaviors (Niven, Berthiame, Fick, & Laupland, 2012). Additionally, prevalence rates were examined by preadolescent and adolescent age groups in order to explore any developmental differences that may exist in these tobacco

outcomes. Examination of these deleterious health behaviors and plausible differences between medically compromised and healthy groups will help inform both researchers and clinicians on effective tobacco control approaches when working with pediatric cancer patients and their families.

Methods

Youth-reports on the prevalence of exposure, tobacco use, and associated risk factors were collected from two datasets: the National Youth Tobacco Survey (NYTS; Centers for Disease Control and Prevention, 2006) and baseline data from a study examining SHSe among children on treatment for cancer (Tyc et al., 2013). These two surveys were conducted within the same time frame (2002-2006), thus reducing the risk for cohort effects, and included comparable behavior-based tobacco items. To differentiate, the two samples will be referred to as the *NYTS* and *pediatric cancer patients*. Though prevalence rates will specifically be examined between preadolescents (10-12.9 years) and adolescents (13-18 years), more general terms will be used when describing comparisons made which collapse the age groups, such as youth.

Participants

Pediatric Cancer Patients—Patient self-reports were drawn from the baseline assessment of a randomized controlled intervention trial designed to reduce SHSe among children receiving active treatment for cancer. Details of the clinical trial are presented elsewhere (Tyc et al., 2013). Families were recruited from the outpatient clinics of a large pediatric oncology hospital. Eligible participants had at least one adult smoker residing in the home and were required to be on active treatment for cancer, at least 30 days post-diagnosis, and abstinent from tobacco use during the prior month. Comparable criterion (except the cancer-related criteria) were applied to the national sample such that only NYTS youth who lived with a smoker, but did not currently smoke themselves, were included.

Pediatric patients were on average 13.9 years of age ($SD=2.3$; range 9.7-17.7). Preadolescents ($n=21$; range 9.7-12.9 years) and adolescents ($n=44$; range 13.2-17.7 years) were given parallel versions of the study survey with minimal adjustments for reading level. The majority of participants were Caucasian (72.4%) and 62.1% were male. See Table 1. Children came from low (43.1%), middle (27.6%), and high SES families (29.3%) as measured by the Hollingshead index (Hollingshead, 1975). Patients were on-treatment for central nervous system disease ($n = 4$; 6.9%), leukemia/lymphoma ($n = 45$; 77.6%), and solid tumors ($n = 9$; 15.5%). Questionnaire completion occurred an average 5.0 months from the time of diagnosis.

National Youth Tobacco Survey—NYTS is a national survey ($N=27,038$) administered to middle school and high school students (grades 6-12; Centers for Disease Control and Prevention, 2006). The survey covers topics such as tobacco-related beliefs, attitudes, behaviors, and SHSe. The sample pool was reduced to 8,610 youth using the same inclusion criterion as the cancer sample: (1) 9.7-17.7 years of age at the time of survey completion; (2) no cigarette or smokeless tobacco (ST) use in the previous month as an indication of active smoking; and (3) living with at least one smoking adult (Tyc et al., 2013). To create a

comparison sample, pediatric cancer patients were randomly matched to NYTS youth in a one to three ratio based on age, gender, and ethnicity. Table 1 provides information on the two comparison groups and demonstrates the integrity of the matching based on age, ethnicity, and gender.

Measures

Demographic and Diagnostic Variables—For youths with cancer, child age, gender, race, diagnosis, parents' SES and marital status were collected from parent-reports and hospital records. Youth from NYTS self-reported age, gender, and race.

Youth Tobacco Exposure

SHSe: Questions detailing home and car exposure were consistent across the two studies and based on previous national tobacco surveys (Farrelly, Chen, Thomas, & Heulton, 2001), but response options were limited for preadolescent patients. NYTS youth and adolescent patients were asked how many days they were in the same room (or car) as someone who was smoking in the past 7 days (range: 0-7). For analytic purposes, this variable was dichotomized (yes/no) into whether exposure occurred in the past 7 days, as preadolescent patients were only asked whether they were exposed in the past 7 days.

Smoking History: Youth were queried separately about their tobacco use history for both cigarettes and ST. Pediatric cancer youth were asked to choose between the following choices: 1) "I have never smoked cigarettes (or used ST)"; 2) "I have smoked a cigarette or a few cigarettes (tried ST) but have not smoked in the past month"; 3) "I have smoked one or more cigarettes (used ST) in the past month"; 4) "I have smoked one or more cigarettes (used ST) in the past week". These questions were dichotomized (never used vs. used) to match the questioning of the NYTS ("Have you ever tried cigarette smoking (chewing tobacco, snuff, or dip), even one or two puffs?").

Tobacco Use and Exposure Risk Factors—Youth reported on three risk factors for tobacco use and exposure: number of friends who smoke, whether their home is smoke-free, and perceptions of SHSe harm. NYTS youth were asked, "How many of your four closest friends smoke cigarettes?" and pediatric cancer youth were queried, "How many of your best friends smoke?". Both were categorized into the following response options: 0 friends, 1 friend, or more than 1 friend. To assess the presence of a smoking ban, or a smoke-free home environment, youth from both studies were asked what rules about smoking existed inside their home. While response options differed slightly, both were dichotomized to differentiate between homes where smoking is/is not allowed. In regard to perceptions of harmfulness, youth from both studies were asked, "Do you think the smoke from other people's cigarettes is harmful to you?" While the question was identical for both studies, response options differed (NYTS: definitely yes, probably yes, probably no, definitely not; pediatric cancer: not at all harmful, a little harmful, somewhat harmful, extremely harmful). Response options were recoded to the following options to represent youth's perception of the harmfulness of SHSe: harmful, maybe harmful, and not harmful.

Data Analysis

A three to one match of the national sample to the pediatric cancer sample resulted in a total sample of 232 youth (NYTS: $n=174$; pediatric cancer: $n=58$). First, the prevalence of exposure (home and car), tobacco use, and potential tobacco risk factors (number of smoking friends who smoke, household smoking rules, and perceptions of SHSe harmfulness) are presented for both samples. Prevalence rates were also provided for preadolescent and adolescent groups separately, though sample sizes were too small to examine statistical group differences, in order to examine developmental trends. Given the gender differences for smokeless tobacco use (Johnston et al., 2012), the gender of youth that reported tobacco use history is provided. Finally, conditional logistic regression was used to compute odds ratios and 95% confidence intervals of tobacco use, exposure, and risk factors between youth on treatment for cancer and the national comparison sample (Niven et al., 2012). The final model included all five tobacco use, exposure, and tobacco risk variables simultaneously. Significance levels for all statistical tests were set at a p value less than .05.

Results

Prevalence rates of SHSe, tobacco use, and risk factors

Pediatric cancer patients—For the full pediatric cancer sample, 66.7% of youth reported being exposed in the home, 75.9% in the car, and 55.2% ($n=32$) reported exposure from both sources during the previous week. See Table 2 for further descriptive statistics. Approximately 28% of the sample (14 males, 2 females) endorsed a history of smoking. Males were significantly more likely to report a history of tobacco use: cigarettes: $\chi^2(1, n=57) = 6.4, p = .01$; smokeless: $\chi^2(1, n=57) = 4.2, p = .05$. Regarding tobacco-related risk factors, approximately 28% of youth reported having at least one smoking friend; 66.7% reported that smoking was allowed in the home; and 19.3% reported that SHSe was not harmful. See Table 3. Regarding developmental differences, adolescents reported more SHSe, tobacco use, smoking friends, knowledge of SHSe harm; however, adolescents reported a similar rate of smoking being allowed in the home when compared to preadolescent patients.

National Youth Tobacco Survey—For the national sample, 64.9% reported home SHSe during the past week, 51.7% reported exposure in the car, and 46.6% reported SHSe in both locations ($n=81$). Approximately one quarter of the sample (29 males, 15 females) had a history of smoking and 4.6% (7 males, 1 female) had used ST. See Table 2. No gender differences were detected. For tobacco-related risk factors, 27.6% of the national sample reported having smoking friends; 58% reported that smoking was allowed in their home; 68.4% reported that SHSe was harmful; and 2.9% reported that SHSe was not harmful. See Table 3. Regarding developmental differences, similar to the pediatric sample, adolescents reported more home SHSe, tobacco use, smoking friends, and knowledge of SHSe harm. However, among the national sample, adolescents reported similar rates of car SHSe and increased rates of smoking being allowed in the home when compared to preadolescents.

Comparisons between Pediatric and National Samples

The difference in likelihood of trying tobacco products between the cancer patients and the healthy teens was non-significant ($OR=0.51$; 95% CI [0.20, 1.33]), suggesting that the pediatric cancer patients were no more or less likely to try tobacco products than the youth without cancer. The pediatric cancer patients were less likely to report that SHSe was harmful when compared to their healthy peers ($OR=0.30$; 95% CI [0.16, 0.54]). The pediatric cancer patients and matched comparison group reported no difference in risk of being exposed to SHS in the home ($OR=0.39$, 95% CI [0.14, 1.06]) or having a friend that smokes ($OR=1.06$, 95% CI [0.75, 1.48]). However, youth with cancer were found to be approximately four times more likely to be exposed to tobacco smoke in the car ($OR=4.15$, 95% CI [1.51, 11.39]) and were less likely to report having smoking bans in their household ($OR=0.41$, 95% CI [0.18, 0.93]) when compared to teens without cancer.

Discussion

Youth on-treatment for cancer reported equivalent or increased rates of SHSe and tobacco use compared to youth in the general population, despite their compounded risk for adverse health outcomes (Bhatia et al., 2003; Geenen et al., 2007; Huang et al., 2011; Hudson et al., 2003; Kahalley et al., 2012; Miller et al., 2010; Oeffinger et al., 2006; U.S. Department of Health and Human Services, 2004). Rates of home SHSe and tobacco use among patients were comparable to their healthy peers, while youth on-treatment for cancer reported more SHSe in the car. Regarding risk factors for tobacco use, fewer pediatric patients reported living in smoke-free homes and more ambivalence about SHSe harm, suggesting potentially more tobacco-related risk factors compared to healthy peers. Further, subjective examination of prevalence rates among pediatric patients indicated that adolescents demonstrated increased tobacco use, SHSe, smoking friends, and perceived harmfulness of SHSe as compared to preadolescents. These results warrant a more comprehensive and aggressive tobacco control approach for youth on treatment for cancer.

The Behavioral Ecological Model (BEM) may provide an appropriate framework for conceptualizing how unique factors associated with the child's diagnosis, medical treatment, and clinical setting may support behavioral change for both youth and their parents (Hovell & Hughes, 2009; Tyc et al., 2008). Numerous parental factors have been identified as protective or risk factors and most prior interventions have focused on reducing exposure among youth via parent-directed interventions targeting these behaviors and attitudes associated with adolescents' personal tobacco use and exposure (Best et al., 2009; Chassin et al., 2002; Chassin et al., 2000; Ding et al., 2010; Lantz et al., 2000; Petrie, Bunn, & Byrne, 2007; Tyc et al., 2008). Parents of children with medical problems may be more amenable to health behavior change since their children's health is compromised (Hovell, Zakarian, Wahlgren, & Matt, 2000); and youth may simultaneously benefit from targeted interventions as they are increasing their personal health decision-making (Ding et al., 2010; Turner et al., 2004).

In this manner, the healthcare system holds promise as an intervention site due to HCPs regular access to both the children and parent during visits. Within this environment, individual factors (for the patient and parent) and socio-environmental variables might be

addressed in the same intervention, allowing for simultaneous tobacco messaging to children and parents. Interventions could focus on behavioral strategies that impact modifiable factors at the individual level, such as perception of harm, and at the socio-environmental level, such as parental smoking and health behavior choices that removes youth from SHSe (i.e., from peers or through smoking bans; Ding et al., 2010). Brief clinician-delivered interventions have been effective in modifying adolescent survivors' perceptions of health risks (Tyc et al., 2003), reducing child SHSe, and decreasing tobacco-use initiation and use (Hovell et al., 2000; Rosen, Noach, Winicoff, & Hovell, 2012; Song et al., 2009; Song, Glantz, & Halpern-Felsher, 2009).

This is the first study to examine differences between pediatric cancer patients and national data using a matched control design and suggested statistical techniques (Niven et al., 2012). Studies have found that pediatric cancer patients exhibit rates of SHSe similar to the general population, but report more tobacco risk perceptions and fewer intentions to smoke (Centers for Disease Control and Prevention, 2010; Kahalley et al., 2012; Klosky et al., 2012; Tyc et al., 2004; Tyc et al., 2009; Tyc et al., 2004). The present study largely replicates similar tobacco-related risk and use as compared to healthy peers; however, differences found between the samples are more concerning for the pediatric cancer youth by noting that SHSe in the car is higher and smoking bans and perceptions of the harmfulness of SHSe are lower for youth with cancer. The slight discrepancies in these results are likely due to methodological differences, such as the choice of the comparison population (local vs. national), how smoking history was measured (past and current vs. a dichotomy of 'never' or 'ever'), and the simultaneous inclusion of preadolescents and adolescents where the cut-off age for adolescents is 13 years (as comparison to 12 years for previous studies). Overall, current and past studies present a common message: contrary to what would be expected given their compromised health status, youth's history of tobacco use and exposure are comparable across youth with and without cancer. This highlights the need for comprehensive surveillance and intervention efforts focused on health behaviors that could both aim to decrease the prevalence of deleterious health behaviors and increase the prevalence of positive health behaviors (e.g., SHSe avoidance, nonsmoking status, home smoking bans, increased parental monitoring, etc.).

Important limitations must be acknowledged and should be considered for future studies. First, sample size and eligibility requirements for cancer patients in this study limited generalizability. Generalizability was further limited due to the potentially narrow scope of the questions asked. For example, it would be relevant to consider access to tobacco products and other smoking-related beliefs. In addition, although patients were instructed on confidentiality, response bias may be an issue given the age and health status of this sample. Lastly, the preliminary nature of this study limited the use of more sophisticated analyses examining potential predictors of use or exposure.

In summary, tobacco control interventions targeting youth on-treatment for cancer may be informed by aspects of programming designed for healthy youth, but must also address unique challenges associated with the cancer diagnosis and treatment at the individual and socio-environmental levels (Tyc et al., 2008; Hovel & Hughes, 2009). The current findings have important implications for developing programming targeting and integrating parents,

HCPs, and youth to reduce SHSe and tobacco use, congruent with the National Action Plan for Cancer Survivorship priority needs (Centers for Disease Control and Prevention & Lance Armstrong Foundation, 2004). The National Plan highlights the importance of the enhancement of cancer survivorship through improved surveillance, prevention, and intervention efforts, especially implementation on a public health level (e.g., utilizing the healthcare system, an influential delivery system for improving adolescents' behavioral health decision-making; Hum, Robinson, Jackson, & Ali, 2011; Alfano, Zbikowski, Robinson, Klesges, & Scarinci, 2002). Early and consistent assessment of deleterious health behaviors and risk factors could reduce tobacco-use initiation and risk for the development of tobacco-related morbidities among this sensitive population.

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TABLE 1

Demographics for pediatric cancer patients and NYTS.

	Pediatric Cancer Sample				NYTS	
	Preadolescents (n=21)	Adolescents (n=37)	Combined (n=58)	Preadolescents (n=63)	Adolescents (n=111)	Combined (n=174)
Gender (male) [% (n)]	66.7% (n=14)	59.5% (n=22)	62.1% (n=36)	66.7% (n=42)	59.5% (n=66)	62.1% (n=108)
Ethnicity [% (n)]						
Caucasian	66.7% (n=14)	75.7% (n=28)	72.4% (n=42)	66.7% (n=42)	75.7% (n=84)	72.4% (n=126)
African-American	28.6% (n=6)	24.3% (n=9)	25.9% (n=15)	28.6% (n=18)	24.3% (n=27)	25.9% (n=45)
Asian	4.8% (n=1)	0%	1.7% (n=1)	4.8% (n=1)	0%	1.7% (n=3)
Age [<i>M (SD)</i>]	11.37 (.92)	15.40 (1.34)	13.94 (2.29)	11.42 (.50)	15.43 (1.31)	13.98 (2.22)

NOTE: Percentages that do not add up to 100% for any given category indicates missing data due to the participant not completing that item.

TABLE 2
Comparisons of pediatric cancer and NYTS youth for SHSe and tobacco use broken down into age groups

	Full Samples <i>n</i> (%)		Preadolescents <i>n</i> (%)		Adolescents <i>n</i> (%)	
	Pediatric patients	NYTS	Pediatric Patients	NYTS	Pediatric Patients	NYTS
Home SHSe in past week						
No exposure	19 (33.3%)	61 (35.1%)	11 (52.4%)	25 (39.7%)	8 (22.2%)	36 (32.4%)
Exposure	38 (66.7%)	113 (64.9%)	10 (47.6%)	38 (60.3%)	28 (77.8%)	75 (67.6%)
Car SHSe in past week						
No exposure	14 (24.1%)	84 (48.3%)	8 (38.1%)	31 (49.2%)	6 (16.2%)	53 (47.7%)
Exposure	44 (75.9%)	90 (51.7%)	13 (61.9%)	32 (50.8%)	31 (83.8%)	58 (52.3%)
Smoking Status						
No history of smoking	41 (71.9%)	130 (74.7%)	17 (81.0%)	56 (88.9%)	24 (66.7%)	74 (66.7%)
History of smoking	16 (28.1%)	44 (25.3%)	4 (19.0%)	7 (11.1%)	12 (33.3%)	37 (33.3%)
Smokeless Tobacco Status						
No history of ST use	51 (89.5%)	166 (95.4%)	20 (95.2%)	62 (98.4%)	31 (86.1%)	104 (93.7%)
History of ST use	6 (10.5%)	8 (4.6%)	1 (4.8%)	1 (1.6%)	5 (13.9%)	7 (6.3%)

NOTE. Self-reports were available from 58 pediatric cancer youth, due to the 3:1 matching, 174 youth from the national dataset. Columns that do not equal these totals indicate item-level missing data. The following abbreviations are used above: SHSe (second smoke exposure) and ST (smokeless tobacco).

TABLE 3
Comparisons of pediatric cancer and NYTS youth for tobacco risk-factors broken down into age groups

	Full Samples <i>n</i> (%)		Preadolescents <i>n</i> (%)		Adolescents <i>n</i> (%)	
	Pediatric Patients	NYTS	Pediatric Patients	NYTS	Pediatric Patients	NYTS
Smoke-free home status						
No smoking allowed	19 (32.8%)	73 (42.0%)	7 (33.3%)	29 (46.0%)	12 (32.4%)	44 (39.6%)
Smoking allowed	39 (66.7%)	101 (58.0%)	14 (66.7%)	34 (54.0%)	25 (67.6%)	67 (60.4%)
Perceptions of SHSe harm						
Not harmful	11 (19.3%)	5 (2.9%)	7 (33.3%)	4 (6.3%)	4 (11.1%)	1 (0.9%)
Maybe harmful	20 (35.1%)	50 (28.7%)	6 (28.6%)	19 (30.2%)	14 (38.9%)	31 (27.9%)
Harmful	26 (45.6%)	119 (68.4%)	8 (38.1%)	40 (63.5%)	18 (50.0%)	79 (71.2%)
Number of smoking friends						
0	42 (72.4%)	126 (72.4%)	16 (76.2%)	51 (81.0%)	26 (72.2%)	75 (67.6%)
1	8 (13.8%)	24 (13.8%)	3 (14.3%)	6 (9.5%)	5 (13.9%)	18 (16.2%)
> 1	8 (13.8%)	24 (13.8%)	2 (9.5%)	6 (9.5%)	6 (16.2%)	18 (16.2%)

NOTE. Self-reports were available from 58 pediatric cancer youth, due to the 3:1 matching, 174 youth from the national dataset. Columns that do not equal these totals indicate item-level missing data. The following abbreviations are used above: SHSe (second smoke exposure).