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Anti-Smoking Communication to Preadolescents with and without a Cancer Diagnosis: Parents and Healthcare Providers as Important Communicators

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Abstract

A cancer diagnosis does not prevent smoking among pediatric oncology patients, and anti-smoking communications among parents and health care providers have been proposed as influencing smoking outcomes in this group. Anti-smoking communications were compared among 93 preadolescents with cancer and 402 controls. After adjusting for demographics and covariates, preadolescents with cancer were less likely than control participants to report receipt of anti-smoking messages from physicians and parents, and recalled more messages ≥ 4 months post-diagnosis as compared to 1-3 months. Should anti-tobacco communications prove to influence smoking outcomes, parents and physicians may be uniquely positioned to provide smoking prevention interventions to these patients.

Keywords

smoking; pediatric cancer patients; preadolescents; anti-smoking communication; physician counseling; parental influences

Although smoking is the leading preventable cause of illness and death among adults in the US, tobacco prevention and control remains a pediatric health issue due to the initiation and progression of smoking during childhood and adolescence. (Centers for Disease Control and Prevention [CDC], 2005). Approximately 80% of those treated for childhood cancer survive greater than 5 years post treatment, and as a result, efforts to reduce secondary cancer events in this group have received increased attention (Jemal et al., 2004). Despite the magnified health effects of smoking experienced among young people diagnosed and treated for cancer, tobacco use exists among this high risk population.

The smoking rates of those surviving childhood cancer have been reported to be comparable to those of the US population. Specifically, between 15-38% of adolescents surviving childhood cancer are current smokers (Hollen & Hobbie, 1993; Mulhern et al., 1995; Tyc, Hadley, & Crockett, 2001; Verrill, Schafer, Vannatta, & Noll, 2000), while 13-53% have tried

cigarettes in the past (Hollen & Hobbie, 1993; Mulhern et al., 1995; Tyc et al., 2003). These rates are comparable to national surveys that identify between 14-29% of high school-aged students as smokers (CDC, 2002). The Childhood Cancer Survivor Study (CCSS), the largest research cohort of adults surviving childhood cancer, found that 17% of 5-year survivors reported current smoking while 10% reported smoking in the past (Emmons et al., 2002). Other studies report rates of current smoking to be as high as 29% in this group (Bellizzi, Rowland, Jeffery, & McNeel, 2005; Demark-Wahnefried et al., 2005a; Emmons et al., 2002; Larcombe, Mott, & Hunt, 2002; Meacham et al., 2005; Mulhern et al., 1995; Tao et al., 1998). Furthermore, the magnitude of smoking cessation is only modestly greater among survivors of childhood cancer as compared to the general population, O/E ratio, 1.22; 95% CL, 1.15, 1.30 (Emmons et al., 2002).

While limited and inconsistent data are available regarding the prevalence of smoking among youths in active treatment for cancer (Tyc & Throckmorton-Belzer, 2006), tobacco use rates of less than 10% are typically reported in the literature (Tyc et al., 2003; Tyc et al., 2004; Tyc, Lensing, Klosky, Rai, & Robinson, 2005). For example, one recent study conducted with adolescents receiving treatment for cancer found that only 2.2% of those aged 12-18 years reported current smoking (Tyc et al., 2005). Current smokers were defined as those who had smoked a cigarette within the past 30 days.

Although the prevalence of smoking among those on treatment and surviving cancer appears to be slightly lower than US population norms, any smoking among those with a history of pediatric cancer is of significant concern due to the cardiac, vascular and pulmonary late effects frequently evidenced post treatment (Tyc & Throckmorton-Belzer, 2006). Young adults surviving childhood leukemia, for example, are at increased risk for hypertension and cardiovascular disease (Oeffinger et al., 2001) which is further potentiated by tobacco use. Immunosuppressed patients who smoke may be more likely to develop respiratory infections and increased severity/duration of radiation mucositis associated with radiation therapy (Harari, O'Connor, Fiore, & Kinsella, 1995). Other health concerns include increased risk of tobacco-related second malignancies among this group which has already demonstrated a genetic predisposition for developing cancer. Given their unique health related vulnerabilities, it is necessary to better understand mechanisms that may help prevent smoking acquisition among cancer patients who have not yet reached the age of smoking initiation, and who have compelling reasons to avoid behavioral health risks.

Anti-smoking communication from parents is an important component of smoking prevention interventions that has not yet been examined among preadolescent cancer patients. Studies have shown that parental messages about the negative effects of smoking (Henriksen & Jackson, 1998) and smoking bans established in the home (Proescholdbell, Chassin, & MacKinnon, 2000) were inversely related to smoking intention and initiation among healthy children and adolescents. Preadolescents who recalled parental discussions of emotional (i.e., parent would be upset) or behavioral (i.e., child would be punished) consequences if they smoked were significantly less likely to have tried cigarettes, even if one or more of their parents smoked (Ey, 2000). The same is true for older adolescents in that beliefs that parents would be upset if he or she smoked were inversely related to smoking behavior (Sargent & Dalton, 2001). Although increased parental involvement is typically associated with the pediatric cancer experience (Rait et al., 1992), it remains unknown as to whether increased discussions of the dangers of smoking take place within the pediatric context.

In addition to parental messages, anti-smoking communications by physicians may also be a promising intervention to prevent smoking among pediatric cancer patients. Physicians are in the ideal position to provide anti-smoking advice to preadolescents prior to the age of smoking initiation due to the frequency with which children and adolescents routinely visit their

providers (Pbert et al., 2003). In this regard, the American Academy of Pediatrics (AAP) has developed clinical practice guidelines for the provision of anti-tobacco counseling to youth during routine medical visits (Pbert et al., 2003). Yet, as one study exemplifies, only 1.5% of 33,823 medical visits by children were reported to include anti-smoking recommendations, and children who had not reached adolescence were less likely to receive smoking-related counseling (Tanski et al., 2003). Furthermore, studies on the communication patterns between physician, child, and parent reveal that physicians communicate much less with young patients than they do the parents, even while the young patient is in the room (Tates & Meeuwesen, 2000; Tates, Elbers, Meeuwesen, & Bensing, 2002a; Tates, Meeuwesen, Elbers, & Bensing, 2002b). It is not yet known whether physicians provide anti-tobacco counseling to preadolescent patients diagnosed and treated for cancer, and whether pediatric patients are able to recall anti-smoking messages during the period of active cancer treatment.

Studies addressing adult onset cancer suggest that patients who smoke benefit from anti-tobacco counseling by healthcare providers at the time of diagnosis (McBride & Ostroff, 2003) and beyond (Demark-Wahnefried, Aziz, Rowland, & Pinto, 2005b). As physicians capitalize on these teachable moments, they may be able to impact the lifestyle behaviors that compromise long-term cancer survivorship. Although anti-smoking messages at diagnosis appear to be effective among smoking adults, the optimal timing for clinician-delivered counseling with preadolescent cancer patients who do not yet smoke is unclear.

The purpose of this exploratory observational study is to systematically examine the anti-smoking communication received by preadolescent cancer patients from physicians and parents compared to community controls. Identifying whether preadolescents treated for cancer may differentially experience anti-smoking communication or parental influences associated with smoking prevention (compared with their peers without cancer) is critical for developing effectively tailored prevention efforts in this unique population.

Method

Participants

Participants enrolled in the study included 94 preadolescents aged 8 to 11 years ($M = 9.3$, $SD = 1.2$) on treatment for cancer at a large pediatric oncology center and 403 preadolescents ($M = 9.7$, $SD = 0.9$) without cancer from local elementary schools. Patients with a primary diagnosis of a malignancy, who were at least 1 month from diagnosis, were in active treatment, in the specified age range at time of enrollment, and spoke English were included in the study. Brain tumor patients with an $IQ < 70$ were excluded. Of the 100 eligible patients approached for the study, one patient was later deemed ineligible due to age, five patients subsequently refused to fill out questionnaires, and one patient did not complete the communication questionnaires required. Therefore, 93 cancer patients were deemed evaluable for this study.

In the design of the study, four local elementary schools were selected *a priori* for their demographic similarities to the anticipated distribution of the sample of cancer patients. Both the cancer and control participants were enrolled concurrently. In order to *a priori* approximate the socioeconomic status (SES) of the cancer sample, schools from middle to low SES levels were selected for inclusion using indirect methods based on the median income for each school's zip code. SES was not obtained directly as young students could not reliably provide information regarding their parents' occupation and education. Control participants were eligible for the study if they were within the specified age range, spoke English, and were not enrolled in full time special education programming. An explanatory cover letter and consent form were sent home with eligible students, and all students who returned consent forms were enrolled in the study ($n=410$). Of these, seven did not meet the age inclusion criteria, and one

did not complete the communication questionnaires. A total of 402 controls were determined to be evaluable for the present study.

Procedure

Preadolescent cancer patients were recruited during routine outpatient clinic visits. Patients were asked to participate in an institutional review board (IRB)–approved survey study to better understand preadolescent health behaviors. In accordance with institutional guidelines, trained master’s-level research assistants obtained parental informed consent and written assent from patients. Patients were asked to complete questionnaires and were assured that their responses would remain confidential and would not be reported in their medical chart. Eligible participants were assigned an identification number that was used on all forms rather than names to ensure confidentiality. After questionnaires were distributed, the investigator read aloud a set of instructions, emphasized confidentiality and honest responding, and encouraged questions when survey items were unclear. Questionnaires were usually self-administered within 30–40 minutes. All participants received a lapel pin to acknowledge their time and participation in the study. For control participants, data collection was conducted during regular class time. Classroom teachers and school administrative personnel did not participate in the administration of the survey, nor were they permitted to view participants’ responses.

Measures

All participants were asked to complete the following measures:

Smoking status—Smoking behavior was measured by preadolescent self-report using measures typically used in national surveys of similarly aged youth (CDC, 2003). Items assessed whether the preadolescent had “ever tried a cigarette, even a puff.” Preadolescents were considered ever-smokers if they reported “yes (1)” and never-smokers if they responded “no (0).” Participants were also asked if they had smoked a cigarette in the past 30 days, and whether their parents and/or peers were current smokers.

Anti-smoking communication—The anti-smoking communication variables were derived from existing surveys (Ey, 2000; Henriksen & Jackson, 1998). Scoring and use of these variables are detailed below.

Type: Eight types of anti-smoking communication were assessed. These included: (1) unacceptability of child smoking; (2) negative health effects of smoking; (3) the unattractive smell associated with smoking; (4) addictive nature of smoking; (5) high cost of smoking; (6) punishment if caught smoking; (7) religious beliefs regarding smoking; and (8) too young to smoke.

Amount: To determine the amount of anti-smoking messages received, participants were asked to indicate how often he or she had heard each communication type. For example, one item asked, “How often has someone told you, ‘smoking is bad for your health’?” Response options included “Never (0),” “Sometimes (1),” and “Many times (2).” Responses on the 8 items were summed to create a total amount score (range = 0–16). This 8-item scale demonstrated satisfactory internal consistency (Cronbach’s alpha for the current study = 0.65 control; 0.71 patient; 0.67 total sample).

Frequency: Another way to examine how much anti-smoking communication was recalled was to obtain a frequency count. Using the same 8 items detailed above, each participant’s responses were coded dichotomously as to whether the message was heard (1 or 2) or not heard (0) and then summed to provide a total frequency score (range = 0–8).

Source: Following each of the eight anti-smoking communication type items previously described, a list of sources (e.g., mother, doctor) was provided to allow participants to associate a source with each specific message received. For each of the eight communication types, participants were instructed to check the appropriate box indicating which one source delivered that particular message. Responses were coded “0” if they did not hear the message from a source, and “1” if the message was received from a source. Conservative crosscheck items assessed whether the child’s parent or physician has “ever talked” to the preadolescent about smoking, and responses were scored as “yes (1)” and “no (0).”

Intimate (Close) Parent-Child Discussion: Similar to previous research (Clark, Scarisbrick-Hauser, Gautam, & Wirk, 1999), one Likert-type item assessed the frequency of intimate parent-child communication per week as reported by the child. This item ranged from ‘0 to 10’, with ‘0’ indicating that the child reported “never” having intimate discussions with a parent and with ‘10’ indicating that intimate discussions take place “many times” per week.

Home Smoking Bans: Six items assessed what, if any, rules authority figures had established about smoking in the home. For each of the six items, the child checked whether the rule was “present (0),” or “absent (1).”

Data Analyses

To make group (cancer vs. control) comparisons of demographic and psychosocial variables, Pearson’s chi-square tests and the two-sample t-test were used (see Table 1). For preadolescent patients only, we examined whether the amount of anti-smoking communication recalled varied by the patients’ time from diagnosis. Given the demographic differences observed according to group in Table 1, logistic regression methods were used to adjust group comparisons on all communication variables (type, frequency, rules, and intimate discussions) for age (continuous), gender, race (white vs. non-white) and parent smoking (yes, no/don’t know). Ordinary least squares regression was used to investigate amount of communication messages recalled. Peer smoking was not significant in the multivariable models after adjusting for other covariates, so it was excluded from the model. Anti-smoking communication type variables were dichotomized according to many times vs. sometimes/never for logistic regression modeling. The intimate parent-child talk variable was dichotomized (median split) to 0-2 times per week vs. 3-10 times per week for multivariable modeling. *P*-values less than 0.05 were deemed significant. As this study was largely exploratory, *p*-values were not adjusted for multiple comparisons.

Results

Demographics

The demographic characteristics for the preadolescent cancer patients and controls are provided in Table 1. As shown, there were significant demographic differences between the two groups for age, gender, and race. A greater proportion of preadolescents in the cancer group were male ($p = 0.011$) and younger ($p = 0.002$) compared to controls. Additionally, the racial distributions differed between the two groups with the cancer group having a greater proportion of African-Americans and fewer Caucasians compared to controls ($p < 0.001$).

For the cancer group, the median time from diagnosis for the patient sample was 3.0 months (range 1 to 38 months). At the time of the study, the majority of patients were outpatients (90.4%), while approximately 34% were hospitalized in the preceding month with the median number of overnight stays being 5.5 days (range = 1 to 28 days). Over half (53.2%, $n = 50$) of the sample was in treatment for leukemias/lymphomas with the remaining sample being treated for brain tumors (33.0%, $n = 31$) or solid tumors (13.8%, $n = 13$).

Smoking Outcomes

As shown in Table 1, no significant differences were found in current smoking status or past smoking between preadolescent cancer patients and controls. No one in the cancer group compared with 2 controls (0.5%) reported current smoking. Two patients (2.2%) in the cancer group reported past smoking compared with 14 controls (3.6%). Because of the low rates of smoking in the patient group, smoking status was not included as an outcome variable in subsequent predictive analyses. For other smoking-related psychosocial influences, patients were less likely to report having a close friend who smokes (7.5%) compared with controls (17.0%; $p = 0.022$). No differences in parent smoking status were found between groups, with 40.9% of pediatric cancer patients and 35.6% of controls having parents who smoked.

Anti-Smoking Communication Outcomes

Type—After adjusting for age (continuous), gender, race (white vs. non-white) and parent smoking (yes, no/don't know), significant differences were found between patients and controls in the type of anti-smoking communication received. As shown in Table 2, those in the cancer group were significantly more likely to hear that “smoking costs a lot” compared to controls (OR: 2.90, 95% CI: 1.77-4.77, $p < 0.001$) but were less likely to hear that “smoking is against our religion” (OR: 0.41, 95% CI: 0.20-0.84, $p = 0.016$) compared to controls. A positive trend indicated that patients (94.6%) were more likely to hear “smoking is bad for your health” compared to controls (OR: 2.69, 95% CI: 0.93-7.79, $p = 0.069$). Preadolescent cancer patients and controls reported hearing all other anti-smoking communication types similarly.

Frequency—A similar multivariable logistic regression model was used to compare the two groups on the number of anti-smoking communications received. This variable was dichotomized as all possible communication types received (7) vs. 6 or fewer. After adjusting for covariates, patients were 0.70 (95% CI: 0.56-0.89, $p = 0.001$) times less likely to hear all anti-smoking communication types than healthy controls (see Table 2).

Source—Significantly fewer cancer patients (28.3%) compared with controls (43.1%), reported that their doctor talked with them about not smoking (OR: 0.37, 95% CI: 0.22-0.64, $p < 0.001$). Additionally, for 85.5% of preadolescents regardless of cancer status, mothers most frequently delivered anti-smoking communication.

Parental Influences Outcomes

Home smoking bans—As shown in Table 3, after adjusting for age (continuous), gender, race (white vs. non-white) and parent smoking (yes, no/don't know), a greater percentage of patients reported that adults or children in their family could not smoke in the home compared to controls (OR: 2.12, 95% CI: 1.24-3.60, $p = 0.006$). Also, fewer patients reported that adults could smoke in their home compared to controls (0.41, 95% CI: 0.18-0.94, $p = 0.036$).

Intimate parent-child discussion—Intimate parent-child discussions (described to children as “close talks”) were coded as a dichotomous variable (median split), with a response variable of 0-2 vs. 3-10 intimate discussions per week. As shown in Table 3, after adjusting for age (continuous), gender, race (white vs. non-white) and parent smoking (yes, no/don't know), preadolescent patients were 1.92 times (95% CI: 1.17-3.15) more likely to have frequent intimate discussions with their parents compared with controls ($p = 0.010$).

Time Since Diagnosis by Amount of Anti-Smoking Communication

For preadolescent patients only, we examined the relation between time since diagnosis and the amount of anti-smoking communication recalled. Results demonstrated that 89.1% (57/64)

of cancer patients surveyed one to three months after diagnosis reported hearing 4 or more anti-smoking messages as compared to 100% (29/29) of patients diagnosed 4 or more months from diagnosis. After adjusting for age, patients 4 or more months post diagnosis recalled a significantly greater amount of messages as compared to those one to three months post diagnosis ($B = 1.51$ ($SE = 0.72$); $p = 0.039$).

Discussion

The results of the present study indicate that compared with their peers without cancer, preadolescents in treatment for cancer were more likely to recall receiving messages regarding the negative health effects and financial cost of smoking, and to have smoking bans in place within the home. In contrast, preadolescents with cancer were less likely to report receiving messages of moral objections to smoking (i.e., against familial religious beliefs) and messages from their physicians about not smoking. Based on these findings, research is needed to examine whether differences in anti-tobacco communications associated with differential smoking outcomes among preadolescent cancer patients and their healthy peers. If the predictive validity of anti-tobacco communications and smoking outcomes is established among preadolescents surviving childhood cancer, interventions targeting these communications will be warranted.

Findings from the current study highlight the important role that parents play in creating a smoke-free environment and shaping the preadolescents' perceptions of later smoking. All preadolescents, regardless of health status, reported hearing anti-smoking communication primarily from their mothers. Previous research has found that mothers influence smoking outcomes among their children and can prevent or delay smoking by instituting home smoking bans or discussing the dangers of smoking to their children, even when they themselves use tobacco (Harakeh, Scholte, Vermulst, de Vries, & Engels, 2004; Harakeh, Scholte, de Vries, & Engels, 2005; Henriksen & Jackson, 1998; Jackson & Henriksen, 1997; Proescholdbell, Chassin, & MacKinnon, 2000). Furthermore, the pediatric cancer patients in our study more often reported smoking bans prohibiting adults and children from smoking within the home. It may be that these parents are more motivated to enforce home smoking bans in an effort to avoid the adverse health outcomes associated with environmental tobacco smoke among their medically compromised children.

The limited recall of anti-tobacco communications between physician and child was striking across groups (< 50%), but consistent with the general pediatric literature: physicians provide pediatric anti-smoking advice less frequently than recommended by best practice guidelines (Pbert et al., 2003; Tanski et al., 2003). It is particularly concerning that preadolescent cancer patients who are at high risk for tobacco-related complications reported receiving anti-smoking advice from their physicians less often than their peers without cancer. This finding may indicate physicians' reluctance to talk to pediatric oncology patients about the risks of smoking, or the belief that because they have cancer, these children are not at risk for smoking. Alternatively, it may be that distress associated with cancer diagnosis and treatment initiation among preadolescents prohibits effective processing of anti-tobacco messages. The AAP and World Health Organization recommend that physicians should regularly screen pediatric outpatients for smoking and provide a strong anti-tobacco message as well as reinforce anti-smoking messages delivered in community and school-based intervention activities (Pbert et al., 2003; Prokhorov et al., 2006; Winickoff et al., 2005). However, evidence-based guidelines are lacking for oncologists to provide tobacco counseling in primary care and subspecialty clinics where pediatric cancer patients would likely be seen (Pbert et al., 2003). This presents a challenge for providers intervening with children within an oncology context and remains an important area for future research (Tyc et al., 2006).

The results of this study reveal that preadolescent cancer patients appear to be most receptive to anti-smoking prevention messages delivered later (as opposed to earlier) in the process of diagnosis and treatment. Specifically, those patients who were four or more months post diagnosis recalled anti-smoking recommendations more often than those who were surveyed one to three months post diagnosis. These differences in recalled anti-smoking communications may reflect actual differences in communications at diagnosis because of hesitancy by parents and/or healthcare providers to offer the more long-term health protective warnings about smoking to patients at cancer diagnosis and initial treatment. Alternatively, preadolescents may be less receptive to health promotion messages delivered early in treatment when the medical focus is on eradication of disease. In contrast to the timing of anti-tobacco messages delivered to adults newly diagnosed with cancer, our results suggest that the interval of diagnosis and treatment induction may not be the optimal teaching moment context for the implementation of smoking prevention interventions among preadolescent cancer patients who have not yet begun to smoke. Rather, a 'modified teachable moment' is suggested that takes into account time since diagnosis and tailors anti-smoking communication to the patient's unique illness-related vulnerabilities.

The value of this research notwithstanding, our findings should be interpreted within the context of the study limitations. Because of the small number of preadolescents who reported no current or past smoking or future intentions of smoking, we were unable to examine the relation between communication and smoking behavior/intentions to smoke. Although low rates of smoking were expected among those with cancer, it is possible that these preadolescents underreported their smoking behavior due to social desirability or over reported the anti-smoking communications received, as the assessment for this sample was conducted within the oncology treatment setting. Future studies should test the validity of preadolescent self-reported smoking with biological markers. Our study would have also been improved with the inclusion of parent and physician report along with the utilization of a longitudinal study design. Finally, the control sample of this study was comprised of a limited number of schools from a single geographic area, and despite our efforts to select schools that would yield a demographically similar comparison sample of healthy children, significant differences in race, age, and gender emerged between groups. The study findings should be interpreted within the context of these limitations and may not generalize beyond the parameters of this study.

Despite study limitations, the current study contributes uniquely to the cancer control literature in many respects. This study is the first to compare preadolescents with and without cancer on specific anti-smoking communication types, amount, sources, and parental influences, while identifying aspects of anti-smoking prevention messages that may be specific to the pediatric cancer experience. Self-report data regarding anti-smoking communication from pediatric oncology patients in the preadolescent age range has not been previously obtained, but is necessary for developing effective smoking prevention programs for this population. Given the rates at which young adult cancer patients and survivors of childhood cancer smoke, it is imperative that physician-delivered counseling occur early at an early age, before the initiation of smoking. Provision of tobacco counseling to all youngsters as recommended by clinical best practice guidelines (Fiore, 2000), including preadolescents with cancer, may help to disrupt or delay the trajectory of smoking behavior in this population (Tyc, Hudson, Hinds, Elliott, & Kibby, 1997; Tyc et al., 2004). Taking into account time since diagnosis, healthcare providers are encouraged to first provide information about the general health risks associated with youth smoking, followed by a developmentally appropriate and tailored message linking specific health risks to the patient's particular treatment history. This communication sequence offers a more normalizing approach and takes into account the patient's need to identify with peers without producing unnecessary anxiety (Hollen & Hobbie, 1993; Tyc & Throckmorton-Belzer, 2006). The supportive and motivational aspects of the treatment setting and the unique patient-

provider relationship may further facilitate anti-smoking communication with the preadolescent treated for cancer (Tyc & Throckmorton-Belzer, 2006).

Implications for Practice

Our study suggests that future prevention programs for pediatric cancer patients built on parent and provider-delivered counseling, should consider the content of specific anti-smoking messages as well as the context and timing in which the communication occurs. Multiple and repeated intervention efforts along the child's treatment continuum, from multiple and salient sources, will likely be necessary to promote long-term smoking abstinence. Given that pediatric cancer patients experience differential anti-smoking communication as well as disparate parental and healthcare provider-delivered smoking prevention efforts, future studies should examine whether these differences lead to differential smoking intention or behavior compared with their healthy peers. Once this is known, parents and healthcare providers may be better equipped to intervene in preventing smoking among preadolescent cancer patients to promote long-term survivorship.

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Table 1

Comparison of demographic characteristics and psychosocial variables of pre-adolescents with and without cancer

Characteristic	Combined Sample <i>N</i> = 495	Cancer <i>n</i> = 93	Control <i>n</i> = 402	Statistical test <i>P</i> -value
Age – (<i>M</i> ± <i>SD</i>)	9.6 ± 1.0	9.3 ± 1.2	9.7 ± 0.9	<i>t</i> (121) = 3.3 ^{a*} 0.002
Gender - <i>n</i> (%)				
Male	234 (47.3)	55 (59.1)	179 (44.5)	χ^2 (1)=6.47*
Female	261 (52.7)	38 (40.9)	223 (55.5)	<i>p</i> = 0.011
Race - <i>n</i> (%)				
White	417 (84.6)	65 (69.9)	352 (88.0)	χ^2 (2)=26.98 ^{b**}
African-American	50 (10.1)	23 (24.7)	27 (6.8)	<i>p</i> < 0.001
Hispanic	13 (2.6)	3 (3.2)	10 (2.5)	
Asian	6 (1.2)	0 (0.0)	6 (1.5)	
Other	7 (1.4)	2 (2.2)	5 (1.3)	
SES - <i>n</i> (%)				
1, 2 (high)		23 (24.7)		
3 (medium)	-	26 (28.0)	-	-
4, 5 (low)		44 (47.3)		
Smoking Status – <i>n</i> (%)				
Never Smoked	464 (96.3)	91 (97.9)	373 (95.9)	χ^2 (2)=0.98
Past Smoker	16 (3.3)	2 (2.2)	14 (3.6)	<i>p</i> = 0.708
Current Smoker	2 (0.4)	0 (0.0)	2 (0.5)	
Close friend(s) smokes – <i>n</i> (%)				
1-7	75 (15.2)	7 (7.5)	68 (17.0)	χ^2 (1)=5.21*
None	419 (84.8)	86 (92.5)	333 (83.0)	<i>p</i> = 0.022
Parent(s) smokes – <i>n</i> (%)				
Yes	175 (36.6)	38 (40.9)	137 (35.6)	χ^2 (2)=2.45
No	298 (62.3)	53 (57.0)	245 (63.6)	<i>p</i> = 0.245
Don't Know	5 (1.1)	2 (2.2)	3 (0.8)	

^a t-test for unequal group variances used based on Satterthwaite method.

^b Hispanic, Asian, and Other categories combined for testing. Two control participants did not provide race information.

*
p < .05

**
p < .001

Table II

Anti-Smoking Communication for Cancer Group, Control Group and Combined Sample

Variable/Level <i>n</i> (%)	Cancer <i>n</i> = 93	Control <i>n</i> = 402	Combined Sample <i>N</i> = 495	<i>p</i> ^{<i>a</i>}
Type of Anti-Smoking Communication				
Bad for Health				
Many Times	88 (94.6)	371 (92.5)	459 (92.9)	0.069
Never/Sometimes	5 (5.4)	30 (7.5)	35(7.1)	
Unattractive Smell				
Many Times	55 (59.1)	221 (55.3)	276 (56.0)	0.478
Never/Sometimes	38 (40.9)	179 (44.8)	217(44.0)	
Addictive				
Many Times	67 (72.0)	302 (75.7)	369 (75.0)	0.719
Never/Sometimes	26 (28.0)	97 (24.3)	123 (25 .0)	
Financial Cost				
Many Times	57 (61.3)	138 (34.7)	195 (39.7)	<0.001
Never/Sometimes	36 (38.7)	260 (65.3)	296 (60.3)	
Punished if Caught				
Many Times	50 (53.8)	195 (48.8)	245 (49.7)	0.511
Never/Sometimes	43 (46.2)	205 (51.3)	248 (50.3)	
Against religion				
Many Times	12 (12.9)	70 (17.5)	82 (16.6)	0.016
Never/Sometimes	81 (87.1)	330 (82.5)	411 (83.4)	
Too Young				
Many Times	60 (64.5)	260 (65.0)	320 (64.9)	0.420
Never/Sometimes	33 (35.5)	140 (35.0)	173 (35.1)	
Frequency of Anti-Smoking Communication				
All 7 Possible	16 (17.2)	105 (26.7)	121 (24.9)	0.001
6 or Fewer	77 (82.8)	289 (73.4)	366 (75.2)	

^aComparison for Cancer vs. Control after adjusting for age (continuous), gender, race (white vs. non-white) and parent smoking (yes, no/don't know) in a multivariable logistic model.

Table III

Parental Influence Variables for Cancer Group, Control Group and Combined Sample

Variable/Level <i>n</i> (%)	Cancer <i>n</i> = 93	Control <i>n</i> = 402	Combined Sample <i>N</i> = 495	<i>p</i> ^a
Parental Influence Variables				
No adults or children may smoke in the home				
Endorsed	65 (69.9)	217 (54.4)	282 (57.3)	0.006
Not Endorsed	28 (30.1)	182 (45.6)	210 (42.7)	
Adults are allowed to smoke in the home				
Endorsed	8 (8.6)	64 (16.0)	72 (14.6)	0.036
Not Endorsed	85 (91.4)	335 (84.0)	420 (85.4)	
Close parent-child talks				
3-10 talks per week	60 (65.2)	184 (46.4)	244 (49.9)	0.010
0-2 talks per week	32 (34.8)	213 (53.6)	245 (50.1)	

^a Comparison for Cancer vs. Control after adjusting for age (continuous), gender, race (white vs. non-white) and parent smoking (yes, no/don't know) in a multivariable logistic model.