Exploratory Analyses of Substance Use in Adolescents With and Without Cancer

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Purpose: This study explored self-reported substance use and factors associated with use among adolescents with and without cancer.

Methods: Adolescents (aged 13–19) receiving cancer treatment at a Mid-Atlantic children's hospital ($n=103$) and healthy peers ($n=98$) answered questions about substance use (drinking or drug use in past 4 months) and psychosocial variables. Parents completed demographic and family functioning questionnaires.

Results: Healthy adolescents reported more substance use ($n=17$) than adolescents with cancer ($n=8$). Associates of substance use in adolescents with cancer included more avoidant and substance use-related coping, less positive affect, worse parent-reported family functioning, and less nausea.

Conclusion: Substance use and its health implications in adolescent oncology need enhanced awareness, intervention and prevention efforts, and further research.

Keywords: risk behavior, alcohol use, tobacco use, pediatric, treatment, psychosocial

ADOLESCENTS WITH CANCER face unique challenges during treatment, which occurs at a developmental stage of increased peer influence, risk-taking behavior, and experimentation with substances.¹ Rates of adolescent substance use (smoking, binge drinking, and/or drug use) in the past year range between 20% and 40%.² Substance use among adolescents with cancer can exacerbate hepatotoxicity, pulmototoxicity, or cardiotoxicity that result from chemotherapy or radiation.³ Substance use may also adversely impact mood and adherence or sensitivity to medications.⁴ Furthermore, avoiding health-risk behaviors is critical to reducing long-term cancer-related morbidity and promoting optimal health post-cancer.^{1,4}

Despite its high prevalence among community samples of adolescents and its relevance for the health of adolescents with cancer, little is known about the prevalence or factors associated with substance use in adolescents with cancer. Among adolescents on treatment, one study found reported rates of current smoking, drinking, and marijuana use were 4.8%, 4.8%, and 2.4% respectively,⁵ and were associated with older age and unmarried parent status.⁶ In another study, 2% of adolescents on treatment reported current smoking compared to 22% of healthy adolescents.⁷ Among long-term adolescent survivors, in one study, up to 16% reported recent

smoking or binge drinking,⁸ while in another, 25% reported tobacco use and 50% reported alcohol use.⁹ Associates of substance use in adolescent survivors include demographic,^{10–12} treatment-related,¹² and psychosocial variables.¹¹ Using substances to cope has been posited as an explanation for use in adolescent survivors.¹¹

In order to better understand the extent of substance use in adolescents with cancer currently on treatment—when they are most medically compromised and solidifying their health habits—the current study describes self-reported rates of substance use (drinking and drug use) among adolescents on active treatment for cancer (initial diagnosis or relapse) relative to a control group of healthy adolescents. It was expected that at least 5% would report using substances in the past 4 months based on previously reported rates.^{2,5} Cancer-related variables and demographics for each adolescent with cancer who reported using substances are described. Exploratory analyses investigated peer and family substance use, demographics, coping, quality of life (QOL), family functioning, and mood among four groups—adolescents undergoing treatment for cancer who reported substance use (SU-C), adolescents undergoing treatment for cancer who reported no substance use (NSU-C), healthy adolescents who reported substance use (SU-H),

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D.E. Szalda and L.A. Schwartz previously presented portions of this work as a poster titled "Predictors of substance use in adolescents with cancer" at the 2010 Annual Conference of the International Society of Paediatric Oncology Boston, MA, 2010.

and healthy adolescents who reported no substance use (NSU-H).

Methods

Data came from a broader study of the goals and well-being of adolescents with cancer and healthy adolescents, collected between March 2007 and April 2009. This study received Institutional Review Board approval from the large Mid-Atlantic children's hospital where the study took place.

Participants

Participants were 103 adolescents with cancer, 98 healthy peers, and a primary caregiver (parent/guardian) of each adolescent (with cancer or healthy). Adolescents were eligible if aged 13–19 at the time of study, fluent in English, without cognitive impairment (determined by their parent or health-care provider), and they had a parent/guardian willing to

participate. Potential participants with cancer also had to be currently receiving treatment for cancer for at least 1 month, available at a clinic appointment or non-palliative inpatient stay, and physically capable of completing questionnaires. Healthy adolescents were ineligible if they or an immediate family member ever had a chronic or life-threatening health condition. See Table 1 for demographics and disease-related information.

Procedure

Potential participants with cancer ($n=133$) were approached to participate in the original study in clinic ($n=38$) or inpatient rooms ($n=65$). Ten potential participants declined to participate. Reasons cited were too much work ($n=2$), child too ill ($n=1$), parent refusal ($n=4$), cognitive impairment ($n=1$), or no reason specified ($n=2$). Of the 123 who agreed to participate, 103 completed the study (reasons

TABLE 1. DISEASE, TREATMENT, DEMOGRAPHIC, AND SUBSTANCE USE-RELATED VARIABLES IN ADOLESCENTS WITH CANCER AND HEALTHY ADOLESCENTS

	Cancer (n = 103)	Healthy (n = 98)	p
<i>Disease/treatment variables</i>			
Diagnosis			
Leukemia	30 (29.1%)		
Lymphoma	20 (19.4%)		
Brain tumor	11 (10.7%)		
Other solid tumors	42 (40.8%)		
Age at diagnosis, M (SD; range)	14.0 (3.6; 0–19)		
Months since first diagnosis, M (SD; range)	20.9 (38.7; 1.0–193.2)		
Relapse (yes)	29 (28.2%)		
Treatment intensity ^a			
Least or moderately	21 (20.4%)		
Very	45 (43.7%)		
Most	37 (35.9%)		
<i>Demographic variables</i>			
Adolescent age, M (SD; range)	15.8 (1.8; 13.0–19.0)	15.6 (1.7; 13.0–19.0)	NS
Adolescent gender, male	58 (56.3%)	52 (53.1%)	NS
Adolescent race/ethnicity			0.03
Non-Hispanic White	65 (63.1%)	56 (54.4%)	
African American/Black	15 (14.6%)	22 (22.7%)	
Asian	3 (2.9%)	13 (13.4%)	
Hispanic	12 (11.7%)	3 (3.1%)	
More than one race	3 (2.9%)	3 (3.1%)	
Parent respondent			NS
Mother	79	78	
Father	18	17	
Other	6	3	
Parent age, M (SD; range)	45.0 (5.6; 28.0–59.0)	46.1 (5.9; 29.0–60.0)	NS
Household income			0.04
<\$39,999	23 (22.3%)	14 (14.3%)	
\$40,000–\$79,999	31 (30.1%)	23 (23.5%)	
\$80,000–\$99,999	9 (8.7%)	19 (19.4%)	
\$100,000 +	31 (30.1%)	40 (40.8%)	
<i>Substance use variables</i>			
Used substances in last 4 months	8 (7.8%)	17 (17.4%)	0.04
Substance use-related coping, ever	12 (11.7%)	8 (8.2%)	NS
Parent substance use in last 4 months	10 (9.7%)	15 (15.3%)	NS
Friends substance use in last 4 months	26 (25.2%)	27 (27.6%)	NS

Note. Data represent frequencies and percentages of the sample unless otherwise noted to be means and standard deviations. Percentages may not add up to 100% due to missing data.

^aBased on the Intensity of Treatment Rating Form 2.0 4-point scale of least, moderately, very, or most intensive.

NS, not significant; SD, standard deviation.

for non-completion of the larger study are unknown). Healthy adolescents were recruited with a snowball recruitment strategy¹³ via invitation from participants with ($n=32$; 33%) or without ($n=34$; 35%) cancer, or by responding to posted signs ($n=32$; 33%). Of 128 potential healthy participants, 114 agreed to participate and 98 completed the study.

Informed consent and assent (for those under 18) was attained. Adolescents and parents independently completed measures at the hospital or at home, and were subsequently compensated. The current study conducted secondary analyses on data about substance use and psychosocial variables from the original study.

Measures

Demographics. Adolescents' and parents' age, gender, household income, and race/ethnicity were reported by parents via a demographic questionnaire. For analyses, race/ethnicity and income were recoded into dichotomous variables of minority (yes/no) and low income (yes/no), determined using United States government poverty classification guidelines.¹⁴

Disease-related variables. Diagnosis, age at initial diagnosis, time since diagnosis, relapse history, and types of treatments received were attained via chart review. Two independent pediatric oncology providers used treatment data to complete the Intensity of Treatment Rating Form 2.0,¹⁵ and a third pediatric oncology provider reviewed ratings for discrepancies. Ratings were made on a 4-point scale of least, moderately, very, and most intensive; very few patients received a rating of least intensive so the least and moderately intensive scores were combined in the original data set. Adolescents and parents rated their perception of life threat from cancer on an item adapted from the Assessment of Life Threat questionnaire¹⁶ on a 5-point scale. Responses were dichotomized to reflect a belief that cancer could or could not kill the patient.

Substance use and peer pressure. Substance use in the past 4 months by the adolescents, their parents, and their friends, and whether the adolescents experienced peer pressure in the past 4 months were each assessed with single items

on the Adolescent Perceived Events Scale.¹⁷ The item for personal substance use was: "Drinking or drug use" (yes/no).

Coping. Adolescents rated items on the Brief COPE using a 4-point scale.¹⁸ Summary scores of greater than 2 on the 2-item substance use subscale were categorized as a history of substance use-related coping. Total scores for three factors were also examined: problem-focused coping ($\alpha=0.73$), emotion-focused coping ($\alpha=0.79$), and avoidance coping ($\alpha=0.71$).¹⁹

Quality of life. Adolescents completed the Pediatric Quality of Life inventory (PedsQL).²⁰ Total quality of life (QOL) and psychosocial and physical QOL subscales were calculated and standardized to a scale of 0 to 100; higher scores indicate better QOL. Cronbach's alpha for the scores ranged from 0.86 to 0.93. Adolescents with cancer also completed the PedsQL Cancer Module; α ranged from 0.78 to 0.94.

Affect. Adolescents rated the extent of 20 emotions felt in the past week on the Positive and Negative Affect Scale.²¹ Items were summed to form positive and negative affect subscales, with higher scores indicating higher positive ($\alpha=0.88$) or negative affect ($\alpha=0.87$).

Family functioning. Adolescents ($\alpha=0.86$) and parents ($\alpha=0.84$) completed the 12-item General Functioning subscale of the Family Assessment Device.²² The general functioning score was dichotomized according to guidelines for clinical level of dysfunction.

Data analytic plan

Descriptive analyses were conducted on all variables. Independent samples *t*-tests (for continuous variables) and chi-square analyses (for categorical variables) compared the adolescents with and without cancer on demographics, substance use variables, and coping. Chi-square (for dichotomous variables) and Analysis of Variance (ANOVAs; for continuous variables) analyses were conducted to compare groups (SU-C, NSU-C, SU-H, NSU-H) on demographic and psychosocial associates of substance use. Independent sample *t*-tests were also performed to compare groups with cancer on

TABLE 2. DEMOGRAPHIC AND DISEASE-RELATED CHARACTERISTICS OF ADOLESCENTS WITH CANCER THAT REPORTED SUBSTANCE USE WITHIN THE PAST 4 MONTHS ($n=8$)

Age at study	Gender	Diagnosis	Months since diagnosis	Treatment intensity ^a	Relapse	Single parent household	Minority	Low income	Life threat ^b (adolescent reported)	Life threat ^b (parent reported)
13	Female	Solid ^c	9.0	Very						×
15	Female	Leukemia	1.0	Most						
15	Male	Lymphoma	1.2	Mod					×	
17	Male	Leukemia	163.0	Most	×		×			
17	Male	Leukemia	6.2	Mod			×	×		
18	Female	Solid ^c	69.0	Most	×					×
18	Male	Lymphoma	20.1	Mod						
19	Female	Lymphoma	18.1	Most	×					×

^aBased on the Intensity of Treatment Rating Form 2.0 4-point scale of least, moderately, very, or most intensive. "Mod"=least or moderately intense.

^bEndorsed belief that cancer could kill the patient based on an item adapted from the Assessment of Life Threat questionnaire, recoded into a dichotomous variable.

^cSolid tumor (not a central nervous system or brain tumor).

cancer-related QOL and disease-related variables. Analyses are considered exploratory based on limited power given small subgroup sample sizes.

Results

There were no differences between those who agreed and those who refused to participate, nor between cancer and healthy groups on age, gender, or minority status. However, the healthy group had higher incomes. There were no differ-

ences between healthy adolescents on substance use variables (substance use by adolescents, their parents, or their friends) and hypothesized associates (peer pressure, coping, quality of life, affect, and family functioning) by recruitment method.

Substance use variables in adolescents with and without cancer

More healthy adolescents reported using substances ($n=17$; 17.35%) in the last 4 months than adolescents with

TABLE 3. COMPARISON OF SUBSTANCE USERS AND NON-USERS AMONG ADOLESCENTS WITH CANCER AND HEALTHY ADOLESCENTS

	SU-C (n=8)	NSU-C (n=95)	SU-H (n=17)	NSU-H (n=81)	p
Demographics					
Gender, male	4 (50.0%)	54 (56.8%)	10 (58.9%)	42 (51.9%)	NS
Age at study, M (SD)	16.5 (2.0) ^a	15.71 (1.7)	16.5 (1.9) ^a	15.36 (1.7)	0.05
Single parent household	0	18 (19.0%)	1 (5.9%)	14 (17.3%)	NS
Low income ^b	1 (12.5%)	28 (29.5%)	2 (11.8%) ^c	9 (11.1%) ^c	0.01
Minority	2 (25.0%)	31 (32.6%)	6 (35.3%)	35 (43.2%)	NS
Coping subscale^d					
Substance use-related coping (ever)	4 (50.0%) ^e	8 (8.4%)	4 (23.5%)	4 (4.9%)	0.00
Substance use-related coping, M (SD)	4.0 (2.5) ^e	2.19 (0.8)	2.41 (0.9)	2.1 (0.4)	0.00
Problem-focused coping, M (SD)	26.3 (7.2)	26.98 (5.1)	28.47 (4.9)	28.5 (4.2)	NS
Emotion-focused coping, M (SD)	13.1 (3.6)	13.12 (3.5)	14.00 (3.4)	14.2 (3.5)	NS
Avoidance coping, M (SD)	15.6 (5.9) ^a	11.58 (3.3)	13.94 (3.0)	13.9 (2.95)	0.00
Parent substance use, past 4 months	1 (12.5%)	9 (9.5%)	5 (29.4%)	10 (12.4%)	NS
Friend substance use, past 4 months	6 (75.0%) ^a	20 (21.1%)	10 (58.9%) ^a	17 (21.0%)	0.00
Peer pressure	3 (37.5%) ^a	15 (15.8%)	8 (47.1%) ^a	30 (37.0%)	0.00
Negative affect, M (SD) ^d	22.3 (9.0)	21.4 (8.5)	21.1 (8.2)	20.3 (6.5)	NS
Positive affect, M (SD) ^d	25.5 (8.2) ^f	30.4 (8.7)	33.9 (6.9)	34.6 (7.3)	0.00
Poor family functioning^g					
Parent-report	5 (62.5%) ^{e,h,i}	33 (34.7%)	5 (29.4%)	17 (21.0%)	0.04
Adolescent-report	4 (50.0%)	38 (40.0%)	4 (23.5%)	34 (42.0%)	NS
General QOL, M (SD)^d					
Total	68.9 (15.6)	60.8 (17.8)	80.8 (12.1) ^h	78.5 (11.2) ^h	0.00
Psychosocial QOL	70.1 (13.3)	64.2 (16.5)	75.5 (15.1) ^h	74.2 (13.1) ^h	0.00
Physical QOL	66.8 (20.9)	54.7 (26.4)	90.8 (8.5) ^c	86.5 (12.4) ^c	0.00
Cancer QOL, M (SD)^d					
Pain and hurt	57.1 (18.8)	58.7 (29.5)			NS
Nausea	75.0 (22.8) ^h	54.8 (22.7)			0.02
Procedural anxiety	66.7 (46.9)	70.4 (29.5)			NS
Treatment anxiety	80.2 (25.8)	81.6 (23.0)			NS
Worry	46.9 (36.8)	56.1 (25.5)			NS
Cognitive problems	63.1 (20.5)	68.1 (22.1)			NS
Perceived physical appearance	80.2 (27.8)	72.5 (22.7)			NS
Communication ⁱ	77.1 (25.5)	74.8 (23.3)			NS

Data represent frequencies and percentages of the sample unless otherwise noted to be means and standard deviations. Totals may not add up due to missing data. p -values reported for dichotomous variables are from chi-squares; p -values reported for continuous variables are from ANOVAs with the exception of Cancer QOL variables, which are from t -tests.

^a $p < 0.05$ compared with non-users.

^bAll participants did not provide income values; $n=94$ in cancer group and $n=94$ in healthy group. The difference in income is difficult to interpret given the small cell numbers and the fact that the healthy group reported higher income, in general, as indicated in Table 1.

^c $p < 0.05$ compared with adolescents on treatment for cancer.

^dFor Coping, Affect, and QOL scales, a higher number indicates greater use of coping style, type of affect, and QOL, respectively.

^e $p < 0.05$ compared with SU-H.

^f $p < 0.05$ compared with healthy adolescents.

^gFamily functioning represents the number of participants that exceeded the clinical cutoff on the General Functioning subscale of the Family Assessment Device.

^h $p < 0.05$ compared with NSU-C.

ⁱ $p < 0.05$ compared with NSU-H.

^jCommunication subscale of the Cancer Module of the Pediatric Quality of Life scale.

NS, not significant; NSU-C, non-users with cancer; NSU-H, healthy non-users; QOL, quality of life; SD, standard deviation; SU-C, substance users with cancer; SU-H, healthy users.

cancer ($n=8$; 7.77%; $\chi^2=4.23$; $p=0.04$). Report of substance use-related coping and parents' and friends' substance use did not differ between adolescents with and without cancer (Table 1).

Characteristics of SU-Cs

Of the eight SU-Cs, ages ranged between 13 and 19 (age range of the study). There were four males and four females. Most were non-Hispanic White, all were from married homes, one had a low income, and none had a brain tumor (Table 2). Median time since initial diagnosis was 13.53 months; half were at least 1 year post-initial diagnosis and three were being treated for a relapse. Half had the most intense treatment.

Exploratory analyses: demographic and psychosocial associates

Substance users tended to be older than non-users [$F(3)=8.13$; $p=0.05$]. Significantly more substance users reported having friends that used substances ($\chi^2=21.56$; $p=0.00$) and having experienced peer pressure ($\chi^2=13.77$; $p=0.003$) in the past 4 months than non-users (Table 3).

SU-C were significantly more likely to report using substances to cope than SU-H ($\chi^2=20.34$; $p=0.00$), and scored significantly higher [$F(3)=5.99$; $p=0.001$] on avoidance coping than NSU-C ($p=0.002$) and NSU-H ($p=0.04$). SU-C reported significantly less positive affect [$F(3)=6.25$; $p=0.00$] than SU-H ($p=0.02$) and NSU-H ($p=0.001$). Parents of SU-C reported poor family functioning at a significantly higher proportion than other groups ($\chi^2=8.20$; $p=0.04$).

Regarding QOL, the groups differed on total [$F(3)=23.74$; $p=0.00$], psychosocial [$F(3)=7.52$; $p=0.00$], and physical [$F(3)=41.30$; $p=0.00$] QOL. Specifically, healthy adolescents reported significantly better total and psychosocial QOL ($p=0.00$) than NSU-C, and significantly better physical QOL ($p<0.01$) than adolescents with cancer. Among the cancer-specific indices of QOL, SU-C reported less nausea (higher scores) than NSU-C [$t(101)=2.41$; $p=0.02$].

Discussion

To our knowledge, this is the first study to examine substance use among adolescents receiving treatment for cancer relative to healthy adolescents (beyond tobacco use⁷). Consistent with prior data,⁷ healthy adolescents were more likely to use substances than those with cancer. While adolescents often under-report use, even when assured of anonymity, adolescents with cancer may be especially hesitant to disclose use fully given their compromised health status.⁴ Alternatively, they may have less access to substances or less desire to use given their intense treatment. However, even patients with relapse and receiving the most intense treatment reported substance use, indicating that awareness of potential substance use and related additional toxicity in all adolescent patients is needed.

Exploratory analyses suggested some common factors that were consistent with the literature across groups for substance use such as older age,² peer pressure,²³ and friends' substance use.²³ QOL was better for healthy adolescents relative to adolescents with cancer, but also seemed to trend better for SU-C compared to NSU-C. Future research should explore the directionality of this relationship. SU-C also had worse parent-

reported family functioning, lower positive affect, less concerns about nausea, and increased use of avoidant- and substance-use related coping. This is consistent with stress-coping models that purport substance use as a coping response to stressors.²⁴ Thus, it is possible that SU-C may use substances to cope with physical (e.g., nausea) and psychosocial (e.g., poor family functioning, low positive affect) stressors.

It is important that providers recognize that both cancer-related stressors and adolescent tendencies toward experimentation and social conformity may influence substance use in adolescent patients.¹ Oncology providers may incorrectly assume that cancer negates the need to address substance use and defer to primary care providers who typically see the patient less often during treatment. However, these preliminary results suggest that comprehensive oncologic care should include routine counseling for substance use that includes discussion of the risks of substance use relevant to the patient's illness and long-term health as a survivor.⁴

Findings should be interpreted in light of several limitations. The current study is a secondary analysis of data from a larger study that was not intended to measure substance use. Thus, there is no information on the nature and specific timing of substance use and limited associates to examine. Future studies should ascertain the type, trajectory, and frequency of substance use. The small sample size limited power. The exploratory analyses should inform design of future studies examining associates of substance use among adolescents with cancer, including the temporal relationship between substance use and health-related variables (e.g., symptoms, QOL). Despite these limitations, results indicate that substance use and its health implications in adolescent oncology need enhanced awareness, intervention and prevention efforts, and further research.

Acknowledgment

This work was supported by NCI R03 126337, The Adverse Effect of Health on Personal Goal Pursuit of Adolescents with Cancer (PI: Schwartz).

Author Disclosure Statement

No competing financial interests exist.

References

1. Morgan S, Davies S, Palmer S, et al. Sex, drugs, and rock 'n' roll: caring for adolescents and young adults with cancer. *J Clin Oncol*. 2010;28(32):4825–30.
2. Johnston L, O'Malley PM, Bachman JG, et al. Monitoring the future national results on adolescent drug use: overview of key findings, 2011. Ann Arbor, Michigan: Institute for Social Research, The University of Michigan; 2012.
3. Klosky JL, Tyc VL, Garces-Webb DM, et al. Emerging issues in smoking among adolescent and adult cancer survivors: a comprehensive review. *Cancer*. 2007;110(11):2408–19.
4. Palmer S, Thomas D. A practice framework for working with 15–25 year-old cancer patients treated within the adult health sector. Melbourne, Australia: OnTrac@PeterMac Adolescent and Young Adult Cancer Service; 2008.
5. Carpentier MY, Mullins LL, Elkin TD, et al. Prevalence of multiple health-related behaviors in adolescents with cancer. *J Pediatr Hematol Oncol*. 2008;30(12):902–7.

6. Carpentier MY, Mullins LL, Elkin TD, et al. Predictors of health-harming and health-protective behaviors in adolescents with cancer. *Pediatr Blood Cancer*. 2008;51(4):525–30.
7. Tyc VL, Lensing S, Klosky J, et al. A comparison of tobacco-related risk factors between adolescents with and without cancer. *J Pediatr Psychol*. 2005;30(4):359–70.
8. Klosky JL, Howell CR, Li Z, et al. Risky health behavior among adolescents in the Childhood Cancer Survivor Study Cohort. *J Pediatr Psychol*. 2012;37(6):634–46.
9. Hollen PJ, Hobbie W, Donnangelo SF, et al. Substance use risk behaviors and decision-making skills among cancer-surviving adolescents. *J Pediatr Oncol Nurs*. 2007;24(5):264–73.
10. Bauld C, Toumbourou JW, Anderson V, et al. Health-risk behaviours among adolescent survivors of childhood cancer. *Pediatr Blood Cancer*. 2005;45(5):706–15.
11. Cox CL, McLaughlin RA, Steen BD, et al. Predicting and modifying substance use in childhood cancer survivors: application of a conceptual model. *Oncol Nurs Forum*. 2007;33(1):51–60.
12. Kahalley LS, Robinson LA, Tyc VL, et al. Risk factors for smoking among adolescent survivors of childhood cancer: a report from the Childhood Cancer Survivor Study. *Pediatr Blood Cancer*. 2012;58(3):428–34.
13. Biernacki P, Waldorf D. Snowball sampling: problems and techniques of chain referral sampling. *Socio Meth Res*. 1981;10(2):141–63.
14. U.S. Department of Health and Human Services. The 2009 HHS poverty guidelines. *Federal Register*. 2009;74(14):4199–201.
15. Werba B, Hobbie W, Kazak A, et al. Classifying the intensity of pediatric cancer treatment protocols: the intensity of treatment rating scale 2.0 (ITR-2). *Pediatr Blood Cancer*. 2007;48(7):673–77.
16. Kazak AE, Stuber ML, Barakat LP, et al. Predicting post-traumatic stress symptoms in mothers and fathers of survivors of childhood cancers. *J Am Acad Child Adolesc Psychiatry*. 1998;37(8):823–31.
17. Compas BE, Davis GE, Forsythe CJ, et al. Assessment of major and daily stressful events during adolescence: the Adolescent Perceived Events Scale. *J Consult Clin Psychol*. 1987;55(4):534–41.
18. Carver CS. You want to measure coping but your protocol's too long: consider the Brief COPE. *Int J Behav Med*. 1997;4(1):92–100.
19. Hasking P, Lyvers M, Carlopio C. The relationship between coping strategies, alcohol expectancies, drinking motives, and drinking behavior. *Addict Behav*. 2011;36(5):479–87.
20. Varni JW, Seid M, Rode CA. The PedsQL: measurement model for the pediatric quality of life inventory. *Med Care*. 1999;37(2):126–39.
21. Watson D, Clark LA, Tellegen A. Development and validation of brief measures of positive and negative affect: the PANAS scales. *J Pers Soc Psychol*. 1988;54(6):1063–70.
22. Epstein NB, Baldwin L, Bishop DS. The McMaster Family Assessment Device. *J Marital Fam Ther*. 1983;9(2):171–80.
23. Allen JP, Chango J, Szewdo D, et al. Predictors of susceptibility to peer influence regarding substance use in adolescence. *Child Dev*. 2012;83(1):337–50.
24. Wills TA, Shiffman S. Coping and substance use: a conceptual framework. In: *Coping and substance use*. Shiffman S, Wills TA (Eds). Orlando, FL: Academic Press Inc.; 1985; pp. 3–24.

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