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Out-of-School-Time and Adolescent Substance Use

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Abstract

PURPOSE—High levels of adolescent substance use are linked to lower academic achievement, reduced schooling, and delinquency. We assess four types of out-of-school-time (OST) contexts—unsupervised time with peers, sports, organized activities, and paid employment–in relation to tobacco, alcohol, and marijuana use at the end of high school. Other research has examined these OST contexts in isolation, limiting efforts to disentangle potentially confounded relations.

METHODS—Longitudinal data from the NICHD Study of Early Child Care and Youth Development (N=766) examined associations between different OST contexts during high school and substance use at the end of high school.

RESULTS—Unsupervised time with peers increased the ***odds*** of tobacco, alcohol, and marijuana use whereas sports increased the ***odds*** of alcohol use and decreased the ***odds*** of marijuana use. Paid employment increased the ***odds*** of tobacco and alcohol use. Unsupervised time with peers predicted increased ***amounts*** of tobacco, alcohol, and marijuana use, while sports predicted decreased ***amounts*** of tobacco and marijuana use and increased ***amounts*** of alcohol use at the end of high school.

CONCLUSIONS—Although unsupervised time with peers, sports, and paid employment were differentially linked to the ***odds*** of substance use, only unsupervised time with peers and sports were significantly associated with the ***amount*** of tobacco, alcohol, and marijuana use at the end of high school. These findings underscore the value of considering OST contexts in relation to strategies to promote adolescent health. Reducing unsupervised time with peers and increasing sports participation may have positive impacts on reducing substance use.

Keywords

adolescence; substance use; out-of-school time; adolescent development

For adolescents, drug and alcohol use is related to decreases in motivation and academic achievement, reductions in cognitive processes, and increases in school misbehavior[1]. Furthermore, substance use in adolescence is a strong predictor for subsequent substance abuse, health problems, educational failure, mental health services, and needs for drug and alcohol treatment[2].

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The purpose of this paper is to examine links between adolescents' out-of-school-time (OST) contexts and substance use at the end of high school. Four common OST contexts are considered: (a) unsupervised time with peers; (b) sports; (c) other organized activities such as band, speech, and student government; and (d) paid employment. These OST contexts constitute much of adolescents' discretionary time outside of the school day[3]. For the most part, the effects of these contexts on adolescent developmental outcomes have been studied in separate research literatures[3].

Unsupervised time with peers has been viewed as a problematic setting that promotes youth deviance[4] including substance use[5–7]. Osgood's extension of Routine Activity Theory[6] posits that unsupervised time with peers places youth at risk for misbehavior and deviant behaviors because of a convergence of three factors, the lack of adult supervision, a lack of structure, and the presence of peers who may encourage the risky acts[6]. Consistent with Routine Activity Theory, prior empirical research has found unsupervised time with peers to be linked to increased drug and alcohol use[5–7]. This research did not, however, take into account other OST contexts, such as organized activities and paid employment. Perhaps, it is not unsupervised time with peers, per se, the lack of organized activities that is linked to substance use.

Organized activities, in contrast, is an OST context that theorists[8,9] have identified as promoting positive youth development. Critical aspects of organized activities such as sports, arts, and community service clubs are opportunities for enrichment and challenge, supportive relationships with adult leaders, positive peer networks, and a chance for choice and voice[3]. Empirical research has found participation in community service clubs and sports to be related to higher graduation rates and less alcohol and marijuana use, although effects of sports participation vary in response to peer cultures in the high school[10]. The positive relationships from adults and peers gained in these organized activities may provide protection from the societal pressures of adolescent substance use.

Paid employment is a third out-of-school context that has been posited to have both negative and positive implications[11]. Paid employment has been linked to increased substance use for youth with high work intensity[12–16] but at the same time, has also been linked to lower rates of substance use when work quality is high[17]. Paid work may expose adolescents to more adult-like situations for which they are unprepared. For example, adolescents may spend time with older coworkers, increasing the chances of engaging in different substances.

Because prior research has examined OST contexts in separate studies, it has not been possible to disentangle potentially confounding relations. It is not clear, for example, if positive effects of organized activities are an artifact of less unsupervised time with peers or vice versa. Another limitation is that much of the prior research linking OST contexts to substance use has utilized a simple (yes/no) indicator of substance use instead of looking at amount of substance use[18]. High levels of substance use represent greater risk[19], so both are considered in this paper. Finally, prior research has typically measured participation in OST contexts at a single point in time rather than cumulative participation over time[4,6,7,10,12,14,20]. We expect OST participation across the high school years to be a more robust predictor.

In summary, the current paper examines the four different OST activities (unsupervised time with peers, sports, organized activities, and paid employment) measured early and late in the high school career in relation to both the odds and amounts of three different types of substance use (tobacco, alcohol, and marijuana), while controlling family and child factors and for prior substance use.

Data and Methods

Participants were part of the National Institute of Child Health and Human Development Study of Early Child Care and Youth Development (NICHD SECCYD), a prospective longitudinal study conducted at ten research sites (Pittsburg, PA; Seattle, WA; Philadelphia, PA; Little Rock, Arkansas; Boston, MA; Lawrence, KS; Chapel Hill, NC; Charlottesville, VA; Madison, WI; and Irvine, CA) across the United States. Children (n = 1352) were studied from birth until the end of high school. At birth, 26% of the mothers in the recruited sample had no more than a high school education at recruitment, 20% had incomes no greater than 200% of the poverty level, and 22% were of color[21].

The current study focuses on four OST contexts and substance use. These were measured at age 15 and the end of high school and substance use at age 15 (n = 955) and at the end of high school (n = 766). Because the analyses are based on secondary analysis of de-identified data, it was considered exempt from human subjects consideration from the Institutional Review Board.

Measures

Measures of the OST contexts at 15 years and end of high school are presented first, followed by measures of substance use collected at 15 years and end of high school. Variables used as covariates are then described.

Out-of-School Time Contexts

Unsupervised time with peers: At age 15 and at the end of high school, adolescents reported how many weekdays and how many weekend hours they spend at least 30 minutes in the afternoon or evening after school with other kids such as friends or neighbors, not including brothers or sisters, without an adult. The scores for weekdays ranged from zero to five weekdays and weekend hours ranged from zero to eight hours. At the two ages, the unsupervised time with peers variable was constructed by averaging the standardized value of weekdays and of weekend hours at age 15 and end of high school. Values at these two time points were then averaged to create the average intensity of unsupervised time with peers during high school. Higher values indicate more unsupervised time with peers.

Sports participation: At age 15 and end of high school, adolescents reported the number of days of sports-related activities during a typical week, ranging from zero to seven days. Participation at age 15 and at the end of high school were averaged.

Other organized activities: Adolescents also reported participation in each of the five other forms of organized activities during the past year: arts (music, dance, drama, or art); academic clubs (Spanish, computer, etc); nonacademic clubs or groups; religious groups;

and volunteer or community service work. For these activities, adolescents indicated the number of days of participation during a typical week, ranging zero to seven days. Participation was calculated by taking the sum of all non-sports activities participated by subjects, ranging from zero to a possible 7 days of participation. Participation at age 15 and at the end of high school were averaged to create a composite of structured activity participation through adolescence.

Paid employment: Adolescents reported if they had a paying job at age 15 and at the end of high school. If an adolescent reported having a paying job during the school year, he or she also indicated the number of hours per week typically worked using five categories (more than 20 hours, 16–20 hours, 11–15 hours, 6–10 hours, 1–5 hours). If adolescents reported that they were not employed, work hours per week were coded as zero hours. If participants indicated that they worked during the school year, the work hours per week was coded as the midpoint of each categorical variable. Values at age 15 and at the end of high school were averaged to create a variable: intensity of paid employment hours during high school.

Substance Use

Substance use at age 15: At age 15, adolescents were asked whether they ever used marijuana, drank alcohol, or smoked cigarettes.

Substance use at the end of high school: Students completed an online survey that asked (a) if they had ever used marijuana, (b) if they had ever drank alcohol, or (c) if they had ever smoked cigarettes at the end of high school.

To indicate the ***amount*** of substance use, adolescents reported how often they used (a) marijuana, (b) alcohol, and (c) cigarettes in the past 30 days using six categorical responses: more than once a day, once a day, more than once a week, once a week, once every two weeks, or none over the past 30 days. Responses to these categorical variables were converted to a continuous scale ranging from zero to 45 times over the past 30 days. If adolescents indicated that they never used marijuana, drank alcohol, or smoked cigarettes, number of times a participant used each substance in the past 30 days was coded as zero times, respectively.

Covariates—Measures of family and adolescent characteristics were collected and used as covariates. Demographic characteristics, reported by mothers at the child's birth were the study child's gender, race (white, black, Hispanic, other), maternal age, and maternal education in years. At age 15, mothers reported family income and family size, which was used to calculate income-toneeds ratio. Site fixed effects were also included to account for time invariant characteristics shared between subjects who were recruited at the same research site.

Two measures of the quality of the home environment were collected at age 15. The Home Observation for Measurement of the Environment (HOME)[22] assesses physical and emotional aspects of the home environment. Maternal support and sensitivity were assessed during a semi-structured mother-child interaction[23].

Adolescents self-reported their impulsivity at age 15 and end of high school, using the Impulsivity subscale of the Weinberger Adjustment Inventory[24]. Impulsivity has been found to be an individual characteristic related to substance use [25–27].

Analysis

To examine effects of the unique contribution of the four OST contexts on substance use at the end of high school, multivariate logistic and OLS regressions were conducted using robust standard errors[28], controlling for the full list of aforementioned covariates. Three forms of substance use (cigarette use, alcohol use, and marijuana use) were tested in separate models.

Following recommended analytic practices[29,30], multiple imputation techniques were used to account for missing values in our main predictors and various covariates. For each analysis, 50 datasets were created using chained equations using predictive mean matching to impute continuous variables, multinomial logistic regression for categorical variables, and logistic regression for binary variables. Cases with a missing dependent variable were used during the imputation process but deleted before the analysis following the MID method[30].

Results

Descriptive Statistics

Table 1 provides descriptive statistics for the four OST time contexts averaged between age 15 and end of high school and the three types of substance use, and the covariates used the analyses. The sample was 51% female, and in terms of race/ethnicity, the sample was 81% white, 8% black, 6% Hispanic, and 5% Asian/other at age 15. Mothers reported, on average, 14.69 years of schooling (standard deviation = 2.42) at childbirth. Prior cigarette, alcohol, and marijuana use at age 15 occurred in 10%, 24%, and 9% of the target sample, respectively.

Table 2 shows the correlations among the four OST contexts and among the three types of substance use. More unsupervised time with peers during high school was related to higher amounts of paid employment (r = .16) and less involvement in organized activities in high school (r = −.10). More time in paid employment was related to less time in sports (r = −.13). The three types of substance use at the end of high school were significantly correlated, whether looking at dichotomous (yes/no) usage or amount of substance use. Correlations ranged from r = .13 to r = .31.

OST contexts and substance use were also correlated. More unsupervised time was related to higher amounts of cigarette (r = .19), alcohol (r = .23), and marijuana use (r = .24). More sports was related to lower amounts of cigarette (r = −.17) and marijuana use (r = −.08) but more alcohol use (r = .10). More involvement in organized activities was related to lesser amounts of cigarette (r = −.14), alcohol (r = −.11), and marijuana use (r = −.15). More time in paid employment was related to higher amounts of cigarette (r = .10), and alcohol use (r = .08). [Table 1 and 2 about here]

Predicting the Odds of Substance Use

Table 3 shows the results for three logistic regressions using robust standard errors to test the unique associations between four OST contexts on ever using cigarette, alcohol, or marijuana at the end of high school while controlling for family and child factors and for prior substance use at age 15. These logistic regressions predict the increase or decrease in the odds of substance use at the end of high school. Robust standard errors were used to deal with issues concerning heterogeneity and lack of normality. The point estimates using these estimators are the same as an ordinary OLS but change the standard errors to deal with minor concerns such regarding normality, heteroskedasticity, or some observations with large residuals[28].

As shown in Table 3, more unsupervised time with peers during high school significantly increased the odds of using cigarettes, of using alcohol, and of using marijuana at the end of high school. More time in paid employment significantly increased the odds of cigarette and alcohol use, but not marijuana use at the end of high school. More time in sports increased the odds of alcohol use, but decreased the odds of marijuana use. More time in other organized activities during high school was not related to the odds of cigarette, alcohol, or marijuana use at the end of high school.

Predicting Amount of Substance Use (Number of times per month) at the End of High School

Table 4 shows the results of the OLS regressions predicting the effects of OST contexts on (a) amount of tobacco use, (b) amount of alcohol use, and (c) amount of marijuana use at the end of high school, controlling for family and child factors as well as prior substance use at age 15.

More unsupervised time with peers during high school predicted higher amounts of tobacco, alcohol, and marijuana use at the end of high school (effect sizes of .11, .13, and .16, respectively). More time in sports activities during high school predicted lower amounts of cigarette and marijuana use at the end of high school, but higher amounts of alcohol use (effect sizes of −.12, −.09, and .09, respectively). Intensity of paid employment and intensity of organized activities were not related to amount of substance use at the end of high school.

Follow-up analyses

In a series of follow-up analyses, we examined alternative explanations for the relations found between OST contexts and substance use. First, we tested the links between substance use at age 15 and amount of participation in the four OST contexts at the end of high school OST, controlling for family and child characteristics and amount of OST participation at age 15. This analysis tested the alternative hypothesis that adolescents' substance use resulted in differential selection of subsequent out-of-school contexts. Cigarette use, alcohol use, and marijuana use at age 15 were not related to intensity of participation in the four OST contexts at the end of high school.

Next, we tested associations between participation in the four OST contexts at age 15 and amount of substance use at the end of high school, controlling for family and child factors,

and age 15 substance use. This model differs from our primary models in that we focus on the OST contexts at age 15. The amount of unsupervised time with peers at age 15 predicted amount of cigarette use (β=.08, $p < .05$) and amount of marijuana use (β=.07, $p < .05$) at the end of high school. Intensity of organized activities at age 15 predicted amount of alcohol use at the end of high school (β=.09, $p < .05$). However, the size of the coefficients is smaller than those in Table 4—suggesting that looking only at age 15 was less informative.

A potential concern in our analysis was attrition. It is possible that cases who were lost between age 15 and end of high school are the most likely to be substance users. We ran a frequency table between substance use at age 15 and if they were in the sample at the end of high school. We find the attrition between age 15 and end of high school to be random, as the percentage of any substance use at age 15 was effectively consistent if they were in the sample or if they were a function of attrition. 219 cases were lost between age 15 and end of high school and 66 of these cases or 30% of the sample reported substance use at age 15. This is not statistically different from the 194 or 26% of the 736 who reported substance use at age 15 and are used in the analysis.

We were also concerned about the use of a fixed effects model to account for research site instead of a random effects model. The direction and magnitude of our coefficients from a random effects model matched those of our fixed effects models. However, the random effects models provide a smaller standard error and a less conservative estimate. Furthermore, the ICCs of the dependent variables range between 0.01 and 0.02 and indicate little between-site variance.

Another possible threat to the general conclusion is collinearity between the predictor variables. We calculated the centered variance inflation factors (VIFs) for the independent variables in our preferred OLS models. The largest VIF was 1.68 across all three OLS models, which is below the cutoff value regarded as high or indicative of collinearity[31].

Discussion

The results from our analyses both support and extend previous research examining relations between adolescent OST contexts and substance use. Consistent with predictions of Routine Activity Theory[6] and with prior empirical research[4], more unsupervised time with peers was found to increase both the odds and amount of substance use reported by adolescents at the end of high school. These effects were found for all three forms of substance use examined in the current study -- tobacco, alcohol, and marijuana. That these relations were found, even when time in other OST contexts were controlled, suggests that lack of adult supervision, the presence of peers, and minimal structure are important processes influencing substance use in adolescence.

Other forms of out-of-school time also appeared to be linked to substance use in adolescence, suggesting that these relations were not simply artifacts of a confounding with unsupervised time. Participation in sports appeared to be a protective factor for some forms of substance use: it was associated with reduced odds of marijuana use, as well as lower amounts of tobacco and marijuana use at the end of high school. At the same time,

consistent with some prior research[10,32], participation in sports was also linked to more alcohol use. Consistent with the prior literature, the results suggest adult supervision and potential peer effects in sports activities are important mechanisms that influence adolescent substance use.

Paid employment in high school, in contrast, was associated with increased odds of tobacco and alcohol use. Others have hypothesized that the workplace may expose adolescents to older coworkers who may influence substance use, but the developmental consequences of paid employment depend on the individual[11]. The results show adolescent employment was linked to the odds of cigarette and alcohol use but not to the amount of marijuana use, controlling for other OST contexts. The findings suggest that older coworkers may have introduced adolescents to these substances, but other contextual or individual factors are predictive of continued substance use.

A surprising finding, or lack of findings, in the current study pertained to organized activities. Prior research has found specific organized activities in high school to serve a protective role with respect to substance use[10,20]. No significant relations were detected in the current study, although these relations “approached” significance, perhaps due to aggregation across activities.

Limitations

The biggest limitation lies with the inability to make causal claims. Future work regarding adolescent substance use can examine causal links between unsupervised time with peers on substance use through interventions designed to reduce unsupervised time with peers in adolescents. Reducing the amount of unsupervised time that adolescents spend with peers may be an effective strategy for preventing adolescent substance use and abuse.

Another limitation of this study lies with adolescent participation in various types of organized activities and paid employment. In this study, we were able to separate sports from other types of organized activities but because grouped the other types of organized activities because an insufficient number of adolescents participating in these activities to study them separately. We also looked at amount of any type of paid employment rather than looking at amount of different types of paid employment. Future research should look into amount of participation in different types of OST organized activities and paid employment.

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Implications and Contribution

This study examines relations between four different out-of-school time contexts and adolescent substance use. When considered in the same analytic model, unsupervised time with peers and sports were the best predictors for substance use, underscoring the potential importance of out-of-school contexts as sources of risk and protection for substance abuse.

Table 1

Summary Statistics (N=766)

	Mean or %	Std. Dev.	Min	Max
Substance Use				
Age 15 (Yes/No)	*% Yes*			
Cigarette	9.93%			
Alcohol	24.33%			
Marijuana	8.59%			
End of High School (Yes/No)	*% Yes*			
Cigarette	26.68%			
Alcohol	59.97%			
Marijuana	25.07%			
Amount at End of High School (Times Per Month)				
Cigarette	5.61	13.67	0.00	45.00
Alcohol	4.00	7.21	0.00	45.00
Marijuana	3.94	10.77	0.00	45.00
Predictor Variables				
Out-of-School Contexts				
Unsupervised Time with Peers	0.00	1.00	−2.11	1.99
Sports	0.00	1.00	−0.94	1.73
Organized Activities	0.00	1.00	−1.33	4.46
Paid Employment	0.00	1.00	−0.96	3.50
Covariates				
Female	51.27%			
Race/Ethnicity				
White	80.86%			
Black	8.43%			
Hispanic	5.62%			
Asian/Other	5.09%			
Birth				
Maternal Age	29.24	5.34	18.00	46.00
Maternal Education	14.69	2.42	7.00	21.00
Age 15				
Income To Needs Ratio	5.40	5.39	0.08	42.92
Parenting Composite (Standardized)	−0.00	0.81	−4.10	1.78
Adolescent Impulsivity	2.38	0.75	1.00	4.71
N	766			

Note. Unsupervised Time with Peers is the standardized value of the average of standardized days per week and standardized hours per weekend. Paid Employment is the standardized value of hours per week. Sports and Organized Activities is the standardized value of days per week. Parenting composite is the average of age 15 standardized HOME and Maternal Sensitivity scores

Table 2

Correlations between Substance Use at End of High School and Main Predictor Variables (N = 747)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Amount of Substance Use							
Cigarette	1						
Alcohol	0.13***	1					
Marijuana	0.31***	0.27***	1				
OST Contexts							
Unsupervised Time with Peers	0.19***	0.23***	0.24***	1			
Sports	−0.17***	0.10**	−0.08*	0.00	1		
Organized Activities	−0.14***	−0.11**	−0.15***	−0.10**	−0.04	1	
Paid Employment	0.10**	0.08*	0.02	0.16***	−0.13***	0.00	1

+ $p < 0.10$,

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$

Table 3

Links between Out of School Time Contexts and Substance Use at the End of High School (N= 766) – Odds-Ratio

	Substance Use (Yes/No) at the End of High School		
	Cigarette Use	**Alcohol Use**	**Marijuana Use**
Predictor Variables (Standardized)			
Unsupervised Time with Peers	1.39** (0.15)	1.47*** (0.14)	1.71*** (0.18)
Sports	0.89 (0.09)	1.19* (0.10)	0.75** (0.08)
Organized Activities	0.82+ (0.09)	0.93 (0.08)	0.82+ (0.10)
Paid Employment	1.46*** (0.15)	1.28** (0.12)	1.10 (0.11)
Covariates			
Prior Substance Use at Age 15 (Yes/No)[a]	3.89*** (1.26)	3.38*** (0.83)	3.26*** (1.06)
Female	0.59** (0.11)	0.69* (0.12)	0.32*** (0.07)
Race/Ethnicity (Reference Category: White)			
Black	0.57 (0.25)	0.52+ (0.19)	1.04 (0.44)
Hispanic	0.61 (0.26)	1.25 (0.48)	1.14 (0.48)
Asian/Other	1.17 (0.50)	0.72 (0.29)	0.43 (0.27)
Birth			
Maternal Age	0.99 (0.02)	1.03 (0.02)	1.04* (0.02)
Maternal Education	1.00 (0.05)	1.08 (0.05)	1.07 (0.06)
Age 15			
Income To Needs Ratio	0.97 (0.02)	1.04+ (0.02)	1.02 (0.02)
Parenting Composite	1.07 (0.15)	1.13 (0.15)	1.22 (0.19)
Adolescent Impulsivity	1.71*** (0.18)	1.45*** (0.14)	1.74*** (0.19)
Observations	765	766	764

Note. Exponentiated Coefficients; Robust standard errors in parentheses. Site fixed effects included

[a] Prior use differed for each analytic model. Prior use in cigarette use model was an indicator if the adolescent ever smoked cigarettes at age 15. Prior use in alcohol use model was an indicator if the adolescent ever drank alcohol at age 15. Prior use in marijuana use model was an indicator if the adolescent ever smoked marijuana at age 15.

+ $p < 0.10$,

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$

Table 4

Links between Out of School Time Contexts and Amount of Substance Use at the End of High School (N= 766)

	Amount of Substance Use at the End of High School (Standardized)		
	Cigarette Use	**Alcohol Use**	**Marijuana Use**
Predictor Variables (Standardized)			
Unsupervised Time with Peers	0.11** (0.04)	0.13*** (0.04)	0.16*** (0.04)
Sports	−0.12*** (0.03)	0.09** (0.03)	−0.09** (0.03)
Organized Activities	−0.04 (0.03)	−0.05 (0.03)	−0.05 (0.03)
Paid Employment	0.04 (0.04)	0.07+ (0.04)	−0.02 (0.04)
Covariates			
Prior Substance Use at Age 15 (Yes/No)[a]	0.89*** (0.17)	0.37*** (0.10)	0.71*** (0.20)
Female	−0.13* (0.07)	−0.17** (0.06)	−0.38*** (0.07)
Race/Ethnicity (Reference Category: White)			
Black	−0.15 (0.15)	0.14 (0.18)	0.00 (0.17)
Hispanic	−0.29+ (0.15)	0.20 (0.20)	−0.14 (0.17)
Asian/Other	0.07 (0.19)	−0.10 (0.17)	−0.32** (0.11)
Birth			
Maternal Age	−0.01 (0.01)	−0.01 (0.01)	−0.00 (0.01)
Maternal Education	−0.01 (0.02)	0.05** (0.02)	0.02 (0.02)
Age 15			
Income To Needs Ratio	−0.01* (0.01)	0.01* (0.01)	0.00 (0.01)
Parenting Composite	−0.02 (0.06)	0.07 (0.06)	0.04 (0.05)
Adolescent Impulsivity	0.12** (0.04)	0.18*** (0.04)	0.17*** (0.04)
Constant	0.50+ (0.30)	−0.70** (0.27)	−0.04 (0.30)
Observations	765	766	764

Note. Robust standard errors in parentheses. Site fixed effects included

[a]Prior use differed for each analytic model. Prior use in cigarette use model was an indicator if the adolescent ever smoked cigarettes at age 15. Prior use in alcohol use model was an indicator if the adolescent ever drank alcohol at age 15. Prior use in marijuana use model was an indicator if the adolescent ever smoked marijuana at age 15.

+ $p < 0.10$,

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$

Table 5

Links between Age 15 OST Participation and Substance Use at the End of High School controlling for Age 15 Substance Use (N= 766)

	Amount of Substance Use at the End of High School (Standardized)		
	Cigarette Use	**Alcohol Use**	**Marijuana Use**
Age 15 Predictor Variables (Standardized)			
Unsupervised Time with Peers	0.08* (0.04)	0.03 (0.04)	0.07* (0.04)
Sports	−0.06+ (0.04)	0.09* (0.03)	−0.04 (0.03)
Organized Activities	−0.01 (0.04)	−0.04 (0.04)	−0.04 (0.03)
Paid Employment	−0.03 (0.04)	−0.00 (0.04)	0.05 (0.04)
Covariates			
Prior Substance Use at Age 15 (Yes/No)[a]	0.95*** (0.17)	0.41*** (0.11)	0.78*** (0.20)
Female	−0.13+ (0.07)	−0.18** (0.07)	−0.38*** (0.07)
Race/Ethnicity (Reference Category: White)			
Black	−0.19 (0.15)	0.12 (0.18)	0.02 (0.16)
Hispanic	−0.27+ (0.15)	0.19 (0.21)	−0.16 (0.17)
Asian/Other	0.03 (0.19)	−0.15 (0.17)	−0.35** (0.11)
Birth			
Maternal Age	−0.01 (0.01)	−0.01 (0.01)	−0.00 (0.01)
Maternal Education	−0.01 (0.02)	0.04** (0.02)	0.02 (0.02)
Age 15			
Income To Needs Ratio	−0.01* (0.01)	0.01+ (0.01)	0.00 (0.01)
Parenting Composite	−0.03 (0.06)	0.06 (0.06)	0.02 (0.05)
Adolescent Impulsivity	0.13** (0.04)	0.20*** (0.05)	0.18*** (0.04)
Constant	0.63* (0.30)	−0.65* (0.28)	−0.04 (0.29)
Observations	765	766	764

[a] Prior use differed for each analytic model. Prior use in cigarette use model was an indicator if the adolescent ever smoked cigarettes at age 15. Prior use in alcohol use model was an indicator if the adolescent ever drank alcohol at age 15. Prior use in marijuana use model was an indicator if the adolescent ever smoked marijuana at age 15.

+ $p < 0.10$,

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$