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RESEARCH ARTICLE

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Longitudinal associations between adolescent out-of-school time and adult substance use

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Abstract

Introduction: Based on Bronfenbrenner's bioecological theory and Bornstein's specificity principle, the purpose of this study was to examine adolescents' time in out-of-school settings as a precursor of three types of problematic substance use in adulthood (i.e., binge drinking, regular marijuana use, and use of illicit drugs).

Method: Adolescents ($N = 978$) reported the time they spent in four common out-of-school settings at ages 15 and 18: unsupervised time with peers, organized sports, other organized activities, and paid employment. At age 26, participants reported binge drinking, marijuana use, and illicit drug use.

Results and Conclusions: Adolescents' time in out-of-school settings during high school predicted age 26 substance use over and above family and adolescent factors, including adolescents' substance use during high school. Adolescents' unsupervised time with peers increased the odds and frequency of binge drinking and regular marijuana use at age 26. Time in high school organized sports increased the odds of binge drinking at age 26, but not marijuana or illicit drug use. Time spent in other organized activities, such as community service and the arts, lowered the odds of illicit drug use whereas paid employment in high school was not related to age 26 substance use. Aligned with Bornstein's specificity principle, time spent in specific out-of-school settings during adolescence were differentially related to substance use problems in early adulthood, with some activities serving as a risk factor and other activities serving as a protective factor for young adults.

KEYWORDS

binge drinking, employment, organized activities, organized sports, out-of-school time, substance use, unsupervised time

1 | INTRODUCTION

Adolescents spend more than half of their waking hours outside of school (Livingston, 2019; U.S. Bureau of Labor Statistics, 2022). During high school, this time can be spent in a variety of settings including hanging out with peers, participating in organized sports, participating in other organized activities, and working at part-time jobs (Vandell et al., 2015). These settings differ in their structure, potential for adult supervision, and opportunities for different types of interactions with adults and with peers. A robust literature has documented the relations between adolescents' time in out-of-school settings and their alcohol and marijuana use in high school through cross-sectional and short-term longitudinal studies (Adachi-Mejia et al., 2014; Albertos et al., 2021; Kwan et al., 2014; Lee & Vandell, 2015). What is less clear is whether there are lingering long-term effects of adolescents' time in out-of-school settings on their substance use in adulthood. The current study asks if adolescents' time in out-of-school settings during high school serves as a risk factor or a protective factor with respect to binge drinking, regular use of marijuana, and illicit drug use among young adults 8 years later at age 26.

We focus on this developmental period because sizable proportions of young adults in the United States report binge drinking in the past 2 weeks (32%), regular marijuana in the past month (27%), and use of illicit drugs in the past year (19%) (Schulenberg et al., 2020), and substance abuse among young adults is a significant risk for later substance abuse as well as employment and health problems (Merline et al., 2004). The important research questions addressed in the current study are whether adolescents' unsupervised time with peers, participation in organized sports, participation in other organized activities, and paid employment increase (or decrease) the odds and frequency of problematic substance use in young adulthood even after taking into account adolescents' substance use in high school. This knowledge can be used to guide the development and focus of substance abuse prevention programs.

2 | OUT-OF-SCHOOL SETTINGS AS RISK AND PROTECTIVE FACTORS

Our examination of adolescent out-of-school time and adult substance use is guided by Bronfenbrenner's bioecological theory (Bronfenbrenner, 1979; Bronfenbrenner & Morris, 2006) and Bornstein's specificity principle (Bornstein, 2017, 2019). Bioecological theory emphasizes the importance of microsystems composed of different social partners and activities that provide proximal settings for development. Adolescents' experiences within out-of-school microsystems or settings shape their development including their substance use. In the current study, we focus on four out-of-school settings: unsupervised time with peers, organized sports, other organized activities such as performing arts and service clubs, and paid employment. These four settings cover the central areas of adolescents' out-of-school time; and, as noted earlier, they vary in terms of their structure, adult supervision, and developmental opportunities. Bornstein's specificity principle emphasizes that specific experiences within different settings likely affect different outcomes over time. Thus, the differences across these four out-of-school settings suggest that some settings may serve as risk factors whereas others may serve as protective factors in terms of young adults' binge drinking, regular marijuana use, and use of illicit drugs—though this remains to be tested.

On the risk side, unsupervised socializing time with peers in the absence of adults is believed to provide conditions that encourage problem behavior. Based on routine activity theory, Osgood et al. (1996) observed that being in the presence of peers but the absence of authority figures reduces the potential for youth to exercise social control in response to problem behaviors, making deviant acts easier and more rewarding. The lack of structure also provides time and opportunities for adolescents to engage in problem behavior. Consistent with routine activity theory, studies conducted in the United States, European, and South American contexts have found unsupervised, unstructured time with peers to be linked to higher alcohol and marijuana use during the middle and high school years (Albertos et al., 2021; Badura et al., 2018; Lee & Vandell, 2015).

On the protective side, organized afterschool activities, such as community service and the arts, have been found to afford opportunities for adolescents to spend time in supportive relationships with adult leaders and peers, as well as structured spaces and opportunities that reduce adolescents' engagement in risky behaviors (Badura et al., 2021; Feldman & Matjasko, 2005; García-Poole et al., 2019). These organized activities appear to provide protection from the societal pressures to use alcohol and marijuana during high school (Adachi-Mejia et al., 2014; Eccles et al., 2003; Lee et al., 2018; Nguyen, 2021).

Participation in sports yields a more mixed picture. Sports participants, especially those engaged in contact team sports, are more likely than their peers to drink alcohol in high school, although participating in high school sports has mixed relations to marijuana and illicit drug use (Eccles et al., 2003; Kwan et al., 2014; Lee & Vandell, 2015; Lisha & Sussman, 2010; Veliz et al., 2017). And, on the protective side, participating in sports has been linked to higher engagement with schooling and higher academic performance (Eccles et al., 2003). Scholars have argued that sports may be related to elevated alcohol use but also serve a protective function for other outcomes depending on the peer socialization processes (Cristello et al., 2020; Lisha & Sussman, 2010), which underscores the importance of controlling for selection factors including their prior substance use and other demographic factors (Dunn, 2014; Peck et al., 2008).

Similar to organized sports, paid employment is another setting that may present adolescents with mixed exposure to alcohol and drugs. While at work, adolescents may spend more time in the company of young adults for whom alcohol and marijuana use is legal. Adolescents who are employed also accrue the funds to purchase alcohol or marijuana. At the same time, there is evidence that high-quality work experiences during adolescence, for example, conditions that balance work and school, promotes adolescents' positive skill development (Mortimer, 2010; Staff et al., 2009). Consistent with these different affordances, prior research has found paid employment in adolescence to be linked to higher substance use when youth work a large number of hours, but to also be linked to lower substance use when work quality is high (Merline et al., 2008; Mortimer, 2010; Staff et al., 2009). One study found the association between 12th grade work intensity and later substance use to be generally small, especially compared to the effect of prior substance use and other demographic factors (Bachman et al., 2011). More research is needed to determine if substance use in young adults is linked to employment during adolescence.

The current study uses a prospective longitudinal investigation of 978 adolescents to ask if time spent in different types of out-of-school settings during high school (i.e., unsupervised time with peers, organized sports, other organized activities, and

paid employment) predicts binge drinking, regular marijuana use, and illicit drug use when the participants were 26 years old. It builds on an earlier study (Lee & Vandell, 2015) that used the same sample to examine relations between adolescents' time in four different types of out-of-school contexts and substance use at the end of high school (i.e., age 18). In that study, unsupervised time with peers during high school increased the odds and frequency of both alcohol and marijuana use at the end of high school, whereas organized sports and paid employment increased the odds of alcohol use but not marijuana use. Other organized activities such as performing arts and community service clubs were not related to alcohol or marijuana use. Here, we ask if the effects associated with adolescent out-of-school time fade or if they predict young adults' substance use at age 26. To determine if any effects in adulthood are due to out-of-school settings or the stability of individuals' substance use from high school to young adulthood, we controlled for adolescents' high school substance use in our analyses. Finally, we also consider the use of illicit drugs at age 26 because it is a serious health issue among young adults (Schulenberg et al., 2020).

There is some longitudinal evidence that adolescent out-of-school time is linked to adult substance use, but these studies have focused on only one type of out-of-school setting. For example, adolescents' unsupervised socializing with peers, especially with delinquent peers, positively predicted their later substance use (Hoeben et al., 2021; Osgood et al., 1996). In other research, adolescents who worked 20 or more hours a week on a consistent basis had higher rates of alcohol and marijuana use in their 20s, although more research is needed to examine this association with substance use during adolescence taken into account (Safron et al., 2001; Staff et al., 2009; Mihalic & Elliot, 1997). High school community service and volunteering predicted lower rates of drinking alcohol, getting drunk, and using drugs at age 22, but these beneficial effects were no longer evident at age 25 (Eccles et al., 2003). Finally, prior studies have found that participation in high school sports was linked to problematic alcohol use among young adults (Kwan et al., 2014; Wichstrøm & Wichstrøm, 2009). Although, a study found the relations between participating in team sports and getting drunk to be evident in high school, but not later when participants were in their 20s (Eccles et al., 2003). Because these longitudinal analyses focused on a single type of out-of-school setting, they were not able to disentangle potential confounded relations with other adolescent out-of-school settings. In the current study, we ask if the time that high school adolescents spent in multiple out-of-school settings increases or decreases individuals' susceptibility for substance use over 8 years later at age 26.

In nonexperimental studies such as this one, it is important to control for adolescent and family factors that might influence the extent to which individuals use substances and how they spend their time outside of school. Adolescents who regularly use alcohol or marijuana in high school may differ from other adolescents in how they spend their time outside of school, and it may be their early substance use that sets the stage for later substance abuse problems, not their out-of-school time. Thus, the current study asks the extent to which adolescents' out-of-school time predicts age 26 substance use when other factors including their alcohol and marijuana use in high school, parental monitoring, and parenting quality are controlled along with a set of other demographic factors.

3 | METHODS

Study participants were from the National Institute of Child Health and Human Development (NICHD) Study of Early Child Care and Youth Development (SECCYD), which is a prospective longitudinal study of 1364 children who were born in 1991 at 10 research sites[1] and studied through 2017–2018 when participants were 26 years old. See NICHD Early Child Care Research Network (2001) for a description of the study design and sampling frame.

The current study focuses on 978 participants (50% female; 77% White, 12% Black, 6% Latino/a; 21% low income) who were studied at age 15 (the beginning of high school). Among the 978 participants, 779 completed an online survey at age 18 (the end of high school). At age 26, 814 of the participants completed a 1-hour online survey that included questions about substance use. Appendix A provides a comparison of the original recruitment sample and our analytic sample. The research was approved by the Institutional Review Board at the University of California, Irvine (IRB HS#2006 –5347).

4 | MEASURES

Substance use measures collected at age 26 are presented first, followed by the out-of-school time and substance use measures collected in high school, and, finally, measures used as covariates.

[1]Little Rock, AR; Irvine, CA; Lawrence, KS; Boston, MA; Hickory, NC; Philadelphia, PA; Pittsburg, PA; Charlottesville, VA; Seattle WA; Madison, WI

4.1 | Age 26 substance use

Participants reported three types of substance use: binge drinking, marijuana use, and illicit drug, use with items developed for the Monitoring the Future Survey (Schulenberg et al., 2020). Because other studies have shown that the use of alcohol, marijuana, and illicit drugs are relatively distinct phenomena (e.g., Bachman et al., 2011; Kirby & Barry, 2012; Kwan et al., 2014; Lee & Vandell, 2015; Lisha & Sussman, 2010; Merline et al., 2004), we consider these three types of substance use separately. The frequency of binge drinking, defined as five or more drinks on one occasion, was measured using a 6-point scale during the past month (0 = *none*, 1 = *once*, 2 = *twice*, 3 = *3–5 times*, 4 = *6–9 times*, 5 = *10 or more times*). A categorical variable also was created to denote participants who had never binge drank (0) versus those who had at least one occasion of binge drinking in the past month (1).

Marijuana use in the past month was measured using a seven-point scale (0 = *never*, 1 = *1–2 occasions*, 2 = *3–5 occasions*, 3 = *6–9 occasions*, 4 = *10–19 occasions*, 5 = *20–39 occasions*, 6 = *40 or more occasions*). Marijuana use also was dichotomized into never used (0) versus used at least once in the past month (1).

Participants reported the use of heroin, cocaine, and opioids without a doctor's prescription during the past year using a 7-point scale (0 = *never*, 1 = *1–2 occasions*, 2 = *3–5 occasions*, 3 = *6–9 occasions*, 4 = *10–19 occasions*, 5 = *20–39 occasions*, 6 = *40 or more occasions*). We summed the three responses into the frequency of illicit drug use, and then also dichotomized it into never used (0) versus used at least once in the past year (1).

4.2 | High school out-of-school time

At both ages 15 and 18, participants reported how often they engaged in four out-of-school time settings: (1) unsupervised time with peers, (2) organized sports, (3) other organized activities, and (4) paid employment. For each out-of-school setting, participants' reports at ages 15 and 18 were averaged.

4.2.1 | Unsupervised time with peers

At ages 15 and 18, participants reported the number of weekdays (0–5) that they spent at least 30 min hanging out with peers without adults around. Participants also reported unsupervised time with peers on the weekends using a six-point scale that was recoded into 0 = *less than 1 hour*, 1 = *1–5 hours*, 2 = *5 or more hours*. The weekday and weekend measures were summed so that unsupervised time with peers ranged from 0 to 7 (days per week). Participants' reports at ages 15 and 18 were averaged into adolescents' high school unsupervised time with peers.

4.2.2 | Organized sports

Participants reported the number of days per week (0–7) they participated in organized sports at ages 15 and 18. Participants' reports at ages 15 and 18 were averaged into adolescents' high school time spent in organized sports.

4.2.3 | Other organized activities

Participants reported the number of days per week (0–7) they participated in organized activities such as arts, academic clubs, and community service at ages 15 and 18. Participation in these activities was summed and capped at 7 for each time point, then averaged across ages 15 and 18 to create the measure of high school participation in other organized activities.

4.2.4 | *Paid employment*

At ages 15 and 18, participants reported time in paid employment on a seven-point scale (0 = *no paid employment*, 1 = *1–5 hours per week*, 2 = *6–10*, 3 = *11–15*, 4 = *16–20*, 5 = *21–40*, 6 = *40 or more hours per week*). Participants' reports at ages 15 and 18 were averaged into adolescents' high school time spent in paid employment.

4.3 | High school substance use

At age 15, participants self-reported alcohol and marijuana use in the past year using a three-point scale (0 = *not at all*, 1 = *once or twice*, 2 = *more than twice*). At age 18, participants self-reported alcohol and marijuana use in the past year using a seven-point scale (0 = *none*, 1 = *once*, 2 = *once every 2 weeks*, 3 = *once a week*, 4 = *more than once a week*, 5 = *once a day*, 6 = *more than once a day*). Because the ages 15 and 18 reports used different scales, reports at each age were standardized and then averaged to create high school alcohol use and marijuana use. Additionally, two dichotomized variables were created for whether participants had ever used alcohol or marijuana in high school, respectively.

4.4 | Additional covariates

To minimize the likelihood that the effects associated with out-of-school time are artifacts of other factors, we included a rich set of covariates in our analyses. In terms of adolescent characteristics, we included participants' gender (1 = *female*), race/ethnicity (three dummy variables for Black, Latino/a, and participants of other race/ethnicity, respectively, with White participants as the reference group), and adolescent's self-reported impulsivity at age 15 (seven items; $\alpha = .83$; 1 = *false*, 5 = *true*; Weinberger & Schwartz, 1990). In terms of adolescent's family characteristics, we included maternal education (1 = *less than high school*, 8 = *PhD or other terminal degree*), family income calculated as the total family pre-tax income divided by poverty threshold for a household, supportive mother-adolescent interaction at age 15 rated by trained observers (six items; $\alpha = .81$; 1 = *very low*, 7 = *very high*; Vandell et al., 2010), and maternal reports of parental monitoring at age 15 (11 items; $\alpha = .77$; 1 = *don't know at all*, 4 = *know everything*; Stattin & Kerr, 2000). Finally, we also controlled for data collection sites (nine dummy variables). The continuous covariates were standardized to ease interpretation.

5 | ANALYSIS PLAN

All analyses were estimated using Stata version 14 (StataCorp, 2015) with robust standard error adjustments through two sets of analyses. First, the odds of binge drinking, marijuana use, and illicit drug use at age 26 were predicted using logistic regression. In these regressions, the dichotomous variables of whether participants reported at least one occasion of binge drinking, marijuana use, and illicit drug use at age 26 were regressed on the frequencies of unsupervised time with peers, organized sports, other organized activities, and paid employment, in addition to high school alcohol and marijuana use as well as other covariates. Second, the frequencies of binge drinking, marijuana use, and illicit drug use at age 26 were predicted by adolescents' high school out-of-school time, high school substance use, and additional covariates using negative binomial regressions. Negative binomial regressions were chosen to address the fact that substance use outcomes cannot be lower than zero, and that their variances were greater than their means. Finally, the three negative binomial regression analyses were replicated in ordinary least squares (OLS) regressions with standardized continuous variables to ease interpretation in terms of effect sizes.

Multiple imputations, with 20 imputed datasets and a set of auxiliary variables (Appendix B), was used to address missing data before conducting any of the predictive statistical analyses. Predictive mean matching (Morris et al., 2014) was utilized in the multiple imputation process to ensure that the imputed values fell within reasonable ranges (e.g., positive numbers for time use). The analysis sample was imputed to the full age 15 data set ($N = 978$). To understand if our findings hold without multiple imputation for missing data, we conducted a robustness check by replicating the logistic, negative binomial, and OLS regressions described above after excluding participants who had missing data on all of the age 26 outcomes or all of the out-of-school time use measures ($n = 665$; Appendix A).

6 | RESULTS

Table 1 provides the descriptive statistics and correlations among adolescents' out-of-school time, adolescents' substance use, and young adults' substance use. The mean of age 26 binge drinking in the current sample was 1.22, which was between once and twice in the last month. Categorically, 48% of the participants did not binge drink during the past month, whereas 52% of the participants had at least one occasion of binge drinking in the past month. The mean of age 26 marijuana use was 1.24, which corresponded to two to three occasions in the last month. Thirty-three percent (33%) of the participants reported using marijuana at least once in the past month. Age 26 illicit drug use had a mean of 0.39, corresponding to between never and one to two occasions in the last year. Seventeen percent (17%) of the participants reported using illicit drugs at least once in the past year. Binge drinking, marijuana use, and illicit drug use at age 26 were moderately correlated (r's = .22–.30, p's < .001).

TABLE 1 Bivariate correlations and descriptive statistics

Indicator	1	2	3	4	5	6	7	8	9
Age 26 substance use									
1. Binge drinking	–								
2. Marijuana use	0.22***	–							
3. Illicit drug	0.30***	27***	–						
High school out-of-school time use									
4. Unsupervised time with peers	0.14***	0.17***	0.09**	–					
5. Organized sports	0.11***	−0.05	.01	0.08**	–				
6. Other organized activities	−0.07*	−0.13***	−0.07*	−0.05	−0.02	–			
7. Paid employment	0.04	0.05	0.04	0.14***	−0.07*	−0.02	–		
High school substance use									
8. Drinking	0.16***	0.13***	0.20***	0.29***	0.09**	−0.12***	0.13***	–	
9. Marijuana use	0.06	0.27***	0.21***	0.21***	−0.07*	−0.12***	0.04	0.44***	–
Mean (frequency)	1.22	1.24	0.40	3.77	3.01	2.58	1.06	0	0
Standard deviation (frequency)	1.65	2.29	1.27	1.92	2.28	2.23	1.21	0.80	0.77
At least one occasion (dichotomized measure)	0.52	0.33	0.17					0.75	0.52

Note: The scale for age 26 substance use frequency was: 0 = *none*, 1 = *once*, 2 = *twice*, 3 = 3–5 times, 4 = 6–9 times, 5 = 10 or more times. The scale for high school out-of-school time use (except paid employment) was: 0–7 days/week. The scale for high school paid employment was: 1 = 1–5 h/week, 2 = 6–10, 3 = 11–15, 4 = 16–20, 5 = 21–40, 6 = 40 or more. The means for high school substance use were 0 because reports at ages 15 and 18 were standardized and then averaged.

*$p < .05$; **$p < .01$; ***$p < .001$.

In regard to high school out-of-school time (which was the average across ages 15 and 18), participants reported spending unsupervised time with peers for an average of 3.77 days per week, 3.01 days per week for organized sports, 2.58 days per week for other organized activities, and an average of 1–5 hours per week for paid employment ($M = 1.06$). Unsupervised time with peers in high school was positively associated with age 26 binge drinking ($r = .14$, $p < .001$), marijuana use ($r = .17$, $p < .001$), and illicit drug use ($r = .09$, $p = .004$). More time in organized sports was related to more binge drinking at age 26 ($r = .11$, $p < .001$), but not to marijuana or illicit drug use. Time in other organized afterschool activities was associated with less binge drinking ($r = -0.07$, $p = .037$), less marijuana use ($r = -0.13$, $p < .001$), and less illicit drug use ($r = -0.07$, $p = .020$) at age 26.

In regard to high school substance use, 75% and 52% of the participants reported having used alcohol and marijuana at least once, respectively; these rates are somewhat higher than the national averages for alcohol (59%) and marijuana use (44%) (Schulenberg et al., 2020). Bivariate relations were found between substance use in high school and at age 26. More frequent drinking in high school was related to higher binge drinking ($r = .16$, $p < .001$), marijuana use ($r = .13$, $p < .001$), and illicit drug use ($r = .20$, $p < .001$) at age 26. More frequent marijuana use in high school was related to higher marijuana ($r = .27$, $p < .001$) and illicit drug ($r = .21$, $p < .001$) at age 26, but not binge drinking.

7 | PREDICTING THE ODDS OF AGE 26 SUBSTANCE USE

Table 2 provides the results of the three logistic regressions on whether high school out-of-school time and substance use predicted the odds of binge drinking, marijuana use, and illicit drug use at age 26. Unsupervised time with peers significantly increased the odds of binge drinking (odds ratio [OR] = 1.22, $p = .016$) and marijuana use (OR = 1.31, $p = .002$) at age 26, and time in organized sports increased the odds of binge drinking (OR = 1.25, $p = .004$). In contrast, time in other organized activities served a protective function, reducing the odds of using illicit drugs at age 26 (OR = 0.80. $p = .044$). Paid employment in high school did not predict substance use at age 26. In addition, adolescents who reported more alcohol use in high school had higher odds of binge drinking at age 26 (OR = 1.59, $p = .028$).

The odds of participants using these substances at age 26 were also predicted by some of the covariates. Women had lower odds of binge drinking (OR = 0.64, $p = .005$) and marijuana use (OR = 0.51, $p < .001$) at age 26 than men. Additionally, higher family income-to-needs ratios (OR = 1.35, $p = .006$) and impulsivity during adolescence (OR = 1.28, $p = .022$) increased the odds of illicit drug use at age 26.

TABLE 2 High school out-of-school time and substance use predicting the odds of age 26 substance use

Predictor	Age 26 outcomes (dichotomized)		
	Binge drinking	Marijuana use	Illicit drug use
	OR (95% CI) [*p* value if significant]	OR (95% CI) [*p* value if significant]	OR (95% CI) [*p* value if significant]
High school out-of-school time			
Unsupervised time with peers	1.22* (1.04, 1.44) [$p = .016$]	1.31** (1.10, 1.55) [$p = .002$]	1.12 (0.90, 1.41)
Organized sports	1.25** (1.08, 1.46) [$p = .004$]	0.88 (0.75, 1.04)	1.05 (0.85, 1.29)
Other organized activities	0.93 (0.79, 1.08)	0.84 (0.70, 1.01)	0.80* (0.64,.99) [$p = .044$]
Paid employment	1.09 (0.92, 1.29)	1.05 (0.89, 1.24)	1.05 (0.83, 1.31)
High school substance use			
Drinking	1.59* (1.05, 2.41) [$p = .028$]	1.20 (0.78, 1.87)	1.54 (0.89, 2.65)
Marijuana	1.02 (0.71, 1.47)	1.49 (0.99, 2.25)	1.30 (0.80, 2.09)
Covariates			
Female	0.64** (0.47,.87) [$p = .005$]	0.51*** (0.36,.72) [$p < .001$]	0.75 (0.48, 1.17)
Black	0.84 (0.48, 1.45)	1.36 (0.75, 2.48)	0.77 (0.34, 1.76)
Latina/o	0.99 (0.50, 1.95)	1.12 (0.54, 2.33)	1.85 (0.82, 4.19)
Other race/ethnicity	0.69 (0.36, 1.30)	.98 (0.45, 2.15)	.20 (0.03, 1.17)
Mother education	1.11 (0.94, 1.32)	1.11 (0.92, 1.34)	1.00 (0.79, 1.26)
Income to needs ratio	1.02 (0.86, 1.21)	1.07 (0.90, 1.27)	1.35** (1.09, 1.67) [$p = .006$]
Maternal sensitivity	1.06 (0.90, 1.25)	.99 (0.84, 1.16)	.93 (0.75, 1.15)
Maternal monitoring	.94 (0.79, 1.13)	.90 (0.75, 1.07)	.85 (0.68, 1.06)
Adolescent impulsivity	1.04 (0.88, 1.24)	1.17 (0.98, 1.39)	1.28* (1.04, 1.59) [$p = .022$]

Note: Covariates also included (but not shown) site of data collection.

Abbreviations: CI, confidence interval; OR, odds ratio.

*$p < .05$; **$p < .01$; ***$p < .001$.

8 | PREDICTING THE FREQUENCY OF AGE 26 SUBSTANCE USE

Negative binomial regressions tested the relations between high school out-of-school time and the *frequency* of substance use at age 26 (Table 3). Unsupervised time with peers predicted more frequent binge drinking (incidence rate ratios [IRRs] = 1.12, $p = .023$) and more frequent marijuana use (IRR = 1.24, $p = .005$) at age 26. Specifically, one standard deviation more time spent hanging out with peers unsupervised corresponded to a rate 1.12 and 1.24 times greater for binge drinking and marijuana use, respectively. Results from the OLS regressions models (Table 3) were generally consistent; because both the predictors and outcomes were standardized, the results can be more easily interpreted as effect sizes ($d = .08,.09$ for binge drinking and marijuana use, respectively). Other types of out-of-school time use were not related to the frequencies of binge drinking, marijuana use, and illicit drug at age 26 in either the negative binomial or OLS regressions.

The frequency of adults' substance use was predicted by several of the covariates, including their prior substance use in high school (Table 3). More frequent alcohol use in high school predicted more frequent binge drinking at age 26 (IRR = 1.17, $p = .024$). More frequent marijuana use in high school predicted more frequent marijuana use (*IRR*= 1.33, $p < .001$) as well as more frequent use of illicit drugs ($B = 1.38$, $p = .029$) at age 26. Examining associations between high school substance use and age 26 substance use with OLS regressions yielded similar takeaways with effect sizes (Cohen's d) of.14 between high school drinking and age 26 binge drinking,.25 between high school marijuana use and age 26 marijuana use, and.17 between high school marijuana use and age 26 illicit drug use, respectively. In addition, women had lower binge drinking (IRR = 0.72, $p < .001$), marijuana use (IRR = 0.55, $p < .001$), and illicit drug use (IRR = 0.63, $p = .042$) than men. Adolescents with higher income to needs ratios used illicit drugs more frequently compared to their peers (IRR = 1.32, $p = .010$).

TABLE 3 High school out-of-school time and substance use predicting the frequency of age 26 substance use

Predictor	Age 26 outcomes (continuous)					
	Binge drinking		Marijuana use		Illicit drug use	
	IRR (SE) [*p* value if significant]	B (SE) [*p* value if significant]	IRR (SE) [*p* value if significant]	B (SE) [*p* value if significant]	IRR (SE) [*p* value if significant]	B (SE) [*p* value if significant]
High school out-of-school time						
Unsupervised time with peers	1.12* (0.06) [$p = .023$]	.08* (0.04) [$p = .037$]	1.24** (0.09) [$p = .005$]	0.09* (0.04) [$p = .020$]	1.02 (0.12)	0.01 (0.04)
Organized sports	1.09 (0.05)	0.07 (0.04)	0.88 (0.06)	−0.06 (0.04)	0.98 (0.10)	−0.01 (0.04)
Other organized activities	0.98 (0.04)	−0.02 (0.04)	0.89 (0.07)	−0.06 (0.04)	0.92 (0.10)	−0.03 (0.03)
Paid employment	1.06 (0.05)	0.04 (0.04)	1.03 (0.07)	0.03 (0.04)	1.09 (0.12)	0.04 (0.04)
High school substance use						
Drinking	1.17* (0.08) [$p = .024$]	.14* (0.06) [$p = .025$]	1.01 (0.10)	−0.02 (0.05)	1.36* (0.20) [$p = .035$]	.12 (0.07)
Marijuana	0.93 (0.07)	−0.05 (0.06)	1.33** (0.13) [$p = .004$]	0.25*** (0.06) [$p < .001$]	1.38* (0.20) [$p = .029$]	.17* (0.08) [$p = .037$]
Covariates						
Female	0.72*** (0.07) [$p < .001$]	−0.27*** (0.07) [$p < .001$]	0.55*** (0.08) [$p < .001$]	−0.31*** (0.07) [$p < .001$]	0.63* (0.14) [$p = .042$]	−0.15 (0.08)
Black	0.93 (0.16)	−0.06 (0.13)	1.09 (0.28)	0.06 (0.13)	0.71 (0.34)	−0.07 (0.13)
Latina/o	1.00 (0.18)	−0.01 (0.16)	1.21 (0.34)	0.10 (0.18)	1.26 (0.43)	0.10 (0.18)
Other race/ethnicity	0.69 (0.14)	−0.24 (0.13)	.97 (0.32)	−0.11 (0.16)	0.19* (0.14) [$p = .021$]	−0.24 (0.11)
Mother education	1.09 (0.06)	0.07 (0.04)	1.02 (0.07)	−0.01 (0.04)	1.07 (0.12)	0.02 (0.05)
Income to needs ratio	1.01 (0.04)	0.02 (0.04)	1.05 (0.08)	0.02 (0.03)	1.32* (0.14) [$p = .010$]	0.12* (0.06) [$p = .045$]
Maternal sensitivity	1.02 (0.05)	0.02 (0.04)	0.95 (0.06)	−0.02 (0.04)	0.86 (0.09)	−0.05 (0.04)
Maternal monitoring	0.94 (0.05)	−0.04 (0.04)	0.99 (0.07)	−0.00 (0.04)	0.91 (0.11)	−0.03 (0.04)
Adolescent impulsivity	1.04 (0.05)	0.03 (0.04)	1.17* (0.09) [$p = .036$]	0.08 (0.04)	1.20 (0.14)	0.05 (0.04)

Note. *B*, standardized coefficients from OLS regression models. IRRs from negative binomial regression models. Covariates also included (but not shown) site of data collection.

Abbreviations: IRR, incidence rate ratio; OLS, ordinary least squares; SE, standard error.

*$p < .05$; **$p < .01$; ***$p < .001$.

9 | ROBUSTNESS CHECK

A robustness check was conducted in which participants were excluded if they were missing all of the age 26 outcomes or all of the out-of-school time use measures. As shown in Appendices C and D, the results of the robustness check were largely consistent with the main analyses.

10 | DISCUSSION

Though prior work suggests that the time adolescents spend in out-of-school settings predicts their alcohol and marijuana use during high school, the existing research remains limited and mixed regarding the extent to which these effects persist into adulthood (e.g., Eccles et al., 2003; Lee & Vandell, 2015; Osgood et al., 1996). Moreover, prior work has often failed to consider central selection factors, including prior substance use and time in multiple out-of-school settings, making the existing evidence tenuous. The findings from this longitudinal study of more than 970 participants aligns with both Bronfenbrenner's bioecological theory and Bornstein's specificity principle (Bornstein, 2017, 2019; Bronfenbrenner & Morris, 2006); such that, adolescents' time in different types of out-of-school settings during high school were linked to different types of problematic substance use in early adulthood. Specifically, adolescents who spent more time unsupervised with peers in high school showed higher odds of and more frequent binge drinking and marijuana use at age 26. More time in high school organized sports increased the odds of binge drinking at age 26. In contrast, other high school organized activities such as community service and the performing arts appeared to serve a protective function, lowering the odds of using illicit drug at age 26. Because the current analyses took into account multiple out-of-school settings, alcohol and marijuana use in high school, and extensive demographic and psychological controls, they help pinpoint specific enduring relations consistent with the specificity principle (Bornstein, 2017, 2019).

The findings aligned with our hypothesis that unsupervised time with peers would serve as a general risk factor for later binge drinking and regular marijuana use. Of the four out-of-school settings, unsupervised with peers during high school was most consistently linked to problematic substance use among young adults, underscoring the heightened risks associated with unsupervised time with peers as identified by Osgood et al.s' routine activity theory (1996). We did not see evidence of fade-out in the relations between unsupervised time with peers and later substance use problems with either alcohol or marijuana.

The findings also suggest that long-term relations between participation in high school organized sports and binge drinking at age 26, which is consistent with prior research (Moore & Werch, 2005). The positive associations between organized sports and alcohol use (but not other types of substance use) and between unsupervised time and general problem behavior *during adolescence* are well established (e.g., Eccles et al., 2003; Lee & Vandell, 2015; Osgood et al., 1996). Bioecological theory (Bronfenbrenner & Morris, 2006) suggests that the continuity of these effects to early adulthood as shown in the current findings could emerge due to stability in individuals' behaviors and/or contextual influences. In addition to the stability of individuals' substance use behaviors over time, which we controlled for and indeed found positive associations between high school substance use and the frequency of age 26 substance use, it is possible that individuals who spent time unsupervised and time in organized sports find themselves in or select into contexts where substance use is modeled, encouraged, or reinforced. In other words, the effects may be more enduring if there is continuity in both individual behavior and contextual influences over time.

We expected the protective function of other (non-sport) organized activities during adolescence would extend into early adulthood (Eccles et al., 2003; Lee et al., 2018), but the current evidence was mixed. Participation in other organized activities during high school was associated with lower frequency of illicit drug use at age 26, a beneficial effect found in other research that focused on prosocial activities in high school and lower rates of using drugs (Eccles et al., 2003; Feldman & Matjasko, 2005). Though participation in other organized activities was significantly related to less binge drinking and marijuana use at age 26 in the bivariate correlations, these relations were no longer evident when all of the controls were included in the regressions. A possible explanation for mixed results regarding high school organized activities might be that the protective influence of adolescents' participation happens concurrently when high school organized activities lowers high school substance use, but this relation fades by early adulthood. Future work is needed to examine the possible mechanisms that account for how adolescent time use might affect substance use 8 years later, including early effects on substance use behavior that carry forward.

Although there have been concerns about the negative effects of paid employment on adolescents' well-being in the short-term and long-term (Mihalic & Elliot, 1997; Mortimer, 2010), the current findings align with other research to suggest that the time adolescents spend working may not be inherently risky with respect to binge drinking, regular marijuana use, or use of illicit drugs (Bachman et al., 2011). No relations between adolescent employment and age 26 substance use were found in either the bivariate correlations or regressions although it is possible that other aspects of adolescents' paid employment matter more, such as work quality or the amount of mentoring (Merline et al., 2008; Staff et al., 2009).

Although the current study's primary focus was on the extent to which adolescents' out-of-school time during high school predicted their problematic substance use in young adulthood while controlling for substance use in high school, our study covariates revealed that other factors were also related to substance use in young adults. Consistent with other research (Merline et al., 2008), adolescent substance use during high school was related to substance use in early adulthood. More frequent drinking and marijuana use in high school were linked to using those same substances at age 26. In addition, there was some evidence that alcohol and marijuana use in high school might serve as gateways to more frequent illicit drug use in early adulthood (Kirby & Barry, 2012; Secades-Villa et al., 2015). Importantly, the relations between adolescents' out-of-school settings and adult substance use were evident even when adolescents' alcohol and marijuana use in high school were controlled.

A strength of the current study is that we leveraged a prospective longitudinal research design to examine adolescents' out-of-school time in relation to binge drinking, marijuana use, and illicit drug use at age 26. We also incorporated a rich array of theoretically relevant covariates in our analyses to lessen the likelihood that selection effects or omitted variables might account for the obtained relations. Relations continued to be evident even when factors such as substance use during high school, parental monitoring, supportive parenting, and adolescent impulsivity were controlled along with demographic factors such as gender, race/ethnicity, and family income.

11 | LIMITATIONS AND FUTURE DIRECTIONS

Though these findings make several contributions to the literature, researchers need to consider these findings in light of some limitations. First, these findings highlight specific relations between adolescents' time in particular types of out-of-school settings and their substance use 8 years later, raising developmental questions about possible mechanisms and what transpired during those 8 years. According to Arnett (2007), emerging adulthood, which spans the 8-year period in this study from ages 18 to 25, is a period characterized by change and instability, including changes in living situations, educational/occupational goals, and romantic status. It is possible that the changes during this period create instability in substance use behaviors between the time immediately before and after emerging adulthood and may account for some of the nonsignificant findings. One critical next step is to chart the developmental paths and trajectories through emerging adulthood to test if this is a period marked by variable changes where some individuals maintain their adolescent substance use behaviors whereas others significantly increase or decrease their substance use due to other life changes such as living on one's own, starting a career, or having a serious romantic partner.

Some of the current findings confirmed our hypotheses, whereas other findings did not. The findings that unsupervised time with peers during adolescence appeared to be a general risk factor for later problematic substance use whereas organized sports was a risk factor for binge drinking supported our hypotheses. However, the mixed findings for non-sport organized activities and null findings for paid employment did not provide strong evidence for our hypotheses. It will be important to consider why unsupervised time with peers and organized sports had persistent relations compared to other organized activities and paid employment. We believe the possible mechanisms during the 8-year period will provide critical insight. Based on bioecological theory (Bronfenbrenner & Morris, 2006), we expect continuity in individuals' behaviors or contextual influences need to be considered. Also, it is possible that some out-of-school settings have more immediate effects on individuals' substance use in adolescence that then shape their later use in adulthood— a pattern that accounts for the significant bivariate findings for other organized activities that were nonsignificant in the multivariate analyses when we controlled for high school substance use. More enduring effects, in the case of unsupervised time with peers and organized sports, may emerge due to continuity of both individual behavior and contextual influences that also positively reinforce each other over time.

12 | CONCLUSION

Findings from the current study have several implications for theory and substance use prevention programs. The findings support both bioecological theory and the specificity principle in that the time adolescents spent in out-of-school settings was linked with their substance use in early adulthood in specific ways (Bornstein, 2017, 2019; Bronfenbrenner & Morris, 2006). Even after controlling for high school substance use, adolescents' time spent unsupervised with peers was associated with elevated binge drinking and marijuana use at age 26. In addition, the positive relations between time in organized sports and alcohol use commonly found in adolescence persist through early adulthood. Finally, time spent in other organized activities reduced the odds that adults would use illicit drugs when they were 26 years old. These patterns suggest that reducing the amount of unsupervised time that adolescents spend with peers may be an effective strategy for reducing alcohol and marijuana use in high school (Lee & Vandell, 2015) and early adulthood. At the same time, increasing adolescents' time in organized activities such as community service, school clubs, and the arts may serve a protective function against problematic substance use among young adults.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD). Restrictions apply to the availability of these data, which were used under license for this study. Data are available from https://www.nichd.nih.gov/research/supported/seccyd/overview.

ETHICS STATEMENT

The use of data for the current study was approved by the Institutional Review Board at the University of California, Irvine (IRB protocol number: HS#2006 –5347). Patient consent statement, permission to reproduce material from other sources, and clinical trial registration.

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APPENDIX A

Table A1

TABLE A1 Descriptive statistics of main analytic, recruitment, and robustness check samples

Indicator	Main analytic sample ($N = 978$) Mean	SD	NICHD recruitment sample ($N = 1364$) Mean	SD	Robustness check ($N = 665$) Mean	SD	*t* test 1	*t* test 2
Age 26 substance use outcomes								
Binge drinking (in the past month)	1.22	1.65	1.20	1.59	1.23	1.45	0.30	0.00
At least one occasion	0.52		0.51		0.52			
Regular marijuana (in the past month)	1.24	2.29	1.23	2.53	1.16	2.01	0.10	0.90
At least one occasion	0.33		0.33		0.32			
Illicit drug (in the past year)	0.40	1.27	0.38	1.34	0.35	1.02	0.36	1.06
At least one occasion	0.17		0.16		0.16			
High school substance use								
Standardized HS drinking	0.00	0.80	−0.00	0.79	−0.02	0.81	0.00	0.59
At least one occasion	0.75		0.77		0.74			
Age 18 drinking	1.65	2.13	1.65	1.78	1.62	1.67	0.00	0.38
Age 15 drinking	0.34	0.65	0.34	0.69	0.33	0.64	0.00	0.37
Standardized HS marijuana use	−0.02	0.77	−0.01	0.76	−0.07	0.76	0.31	1.56
At least one occasion	0.52		0.61		0.50			
Age 18 marijuana use	1.46	2.53	1.44	3.07	1.39	2.47	0.17	.67
Age 15 marijuana use	0.14	0.47	0.14	0.55	0.12	0.43	0.00	1.07
HS out-of-school time								
Unsupervised time with peers	3.77	1.92	3.79	2.16	3.69	1.83	0.23	1.02
Organized sports	3.01	2.28	3.01	2.62	3.07	2.19	0.00	0.64
Other organized activities	2.58	2.23	3.18	2.31	2.79	2.16	6.29***	2.29*
Paid employment	1.06	1.21	1.06	1.24	1.10	1.05	0.00	0.85
Covariates								
Female	50.05% female		48.26% female		54.59% female			
Race/ethnicity	11.73% Black, 5.92% Latina/o, 77.15% White, 5.19% other		12.60% Black, 6.08% Latina/o, 76.39% White, 4.18% other		6.92% Black, 4.96% Latina/o, 83.01% White, 5.11% other			
Mother education	4.21	1.83	4.16	2.06	4.48	1.81	0.61	3.54***
Income to needs ratio	5.18	5.85	5.04	6.51	5.52	5.63	0.54	1.45
Maternal sensitivity	5.19	0.90	5.17	0.95	5.24	0.86	0.51	1.36
Maternal monitoring	3.55	0.32	3.54	0.39	3.56	0.30	0.66	0.77
Adolescent impulsivity	2.50	0.92	2.49	0.99	2.41	0.91	0.25	2.35*

Note: Robustness check sample excluded participants who had missing data on all out-of-school time use or substance use measures. t test 1 was between main analytic and NICHD recruitment sample, t test 2 was between main analytic and robustness check sample.

Abbreviation: NICHD, National Institute of Child Health and Human Development.

*$p < .05$.; **$p < .01$.; ***$p < .001$.

APPENDIX B

Auxiliary variables for multiple imputation

Measured in age 15

- Number of children in the household
- Single parent or not
- H.O.M.E. learning materials (mean of 10 items, e.g., "access to 20 developmentally appropriate books or not")

Measured in 6th grade

- Youth report sense of autonomy (sum of 8 items, e.g., "how late you can stay up on a school night"; 1 = *my parent(s) decide*, 5 = *I decide all by myself*)
- Mother report of youth's play frequency with friends (1 = *daily*, 5 = *once a month or less*)
- Youth report of risky behaviors (sum of 26 binary items, e.g., "skipped school without permission")
- Youth report of school attachment (mean of 5 items, e.g., "I feel close to others at my school"; 1 = *not at all true*, 4 = *very true*)
- Youth report of engagement in bullying behavior (mean of 4 items, e.g., "do you pick on other kids at school"; 1 = *never*, 5 = *always*)
- Teacher report of academic performance (1 = *below grade level*, 5 = *excellent*)
- Mother report externalizing (standardized mean of delinquent, aggressive, and total problem scales) and internalizing (standardized mean of withdrawn, somatic complaints, and anxious/depress scales) behaviors using the Child Behavior Checklist

Measured in 5th grade

- Mother report of neighborhood safety (mean of 5 items, e.g., "How satisfied are you with the police protection around here?; 0 = *very dissatisfied*, 3 = *very satisfied*)
- Mother report of neighborhood social involvement (mean of 4 items, e.g., "How many of your neighbors do you know well enough to visit or call on?"; 0 = *none*, 3 = *many*)

APPENDIX C

Table C1

TABLE C1 Robustness check ($N = 665$; excluding participants who had missing data on all out-of-school time use or substance use measures): High school substance use and out-of-school time use predicting the likelihood of age 26 substance use

	Age 26 outcomes (dichotomized)		
	Binge drinking	Marijuana use	Illicit drug
Preditcor	OR (95% CI) [*p* value if significant]	OR (95% CI) [*p* value if significant]	OR (95% CI) [*p* value if significant]
High school out-of-school time			
Unsupervised time with peers	1.33** (1.11, 1.59) [$p = .002$]	1.38** (1.14, 1.66) [$p = .001$]	1.16 (0.91, 1.48)
Organized sports	1.26** (1.06, 1.48) [$p = .007$]	.88 (0.73, 1.06)	1.07 (0.85, 1.35)
Other organized activities	.93 (0.79, 1.11)	.87 (0.71, 1.05)	.79 (0.61, 1.02)
Paid employment	1.12 (0.94, 1.34)	1.05 (0.88, 1.26)	1.06 (0.83, 1.35)
High school substance use			
Drinking	1.75* (1.11, 2.77) [$p = .017$]	1.25 (0.79, 1.97)	1.59 (0.81, 3.11)
Marijuana	1.06 (0.71, 1.58)	1.37 (0.89, 2.13)	1.18 (0.67, 2.05)
Covariates			
Female	.54** (0.38,.76) [$p < .001$]	.49*** (0.34,.71) [$p < .001$]	.84 (0.51, 1.37)
Black	.75 (0.36, 1.58)	1.29 (0.62, 2.69)	.80 (0.30, 2.10)
Latina/o	.98 (0.46, 2.10)	1.06 (0.46, 2.44)	2.30 (0.93, 5.65)
Other race/ethnicity	.81 (0.39, 1.72)	.95 (0.41, 2.25)	.16 (0.02, 1.08)
Mother education	1.15 (0.96, 1.38)	1.20 (0.98, 1.46)	1.05 (0.81, 1.34)
Income to needs ratio	1.00 (0.83, 1.21)	1.06 (0.86, 1.30)	1.31* (1.04, 1.64)[$p = .021$]
Maternal sensitivity	1.08 (0.90, 1.30)	.96 (0.79, 1.16)	.93 (0.72, 1.20)
Maternal monitoring	1.04 (0.87, 1.23)	.86 (0.72, 1.04)	.87 (0.70, 1.09)
Impulsivity	.98 (0.83, 1.17)	1.07 (0.89, 1.30)	1.28* (1.01, 1.61)[$p = .043$]

Note: Covariates also included (but not shown) site of data collection.

Abbreviations: CI, confidence interval; OR, odds ratio.

*$p < .05$.; **$p < .01$.; ***$p < .001$.

APPENDIX D

Table D1

TABLE D1 Robustness check ($N = 665$; excluding participants who had missing data on all out-of-school time use or substance use measures): High school out-of-school time and substance use predicting the frequency of age 26 substance

	Age 26 outcomes (continuous)					
	Binge drinking		Marijuana use		Illicit drug use	
Predictor	IRR (SE) [*p* value if significant]	B (SE) [*p* value if significant]	IRR (SE) [*p* value if significant]	B (SE) [*p* value if significant]	IRR (SE) [*p* value if significant]	B (SE)[*p* valuee if significant]
High school out-of-school time						
Unsupervised time with peers	1.16** (0.06) [$p = .005$]	0.10* (0.04) [$p = .014$]	1.29** (0.11) [$p = .001$]	0.10* (0.04) [$p = .019$]	1.08 (0.14)	.02 (0.04)
Organized Sports	1.07 (0.05)	.06 (0.04)	0.86* (0.07) [$p = .043$]	−0.07 (0.04)	0.98 (0.12)	−0.02 (0.04)
Other organized activities	0.99 (0.05)	−0.01 (0.04)	0.91 (0.07)	−0.05 (0.04)	0.95 (0.12)	−0.02 (0.04)
Paid employment	1.06 (0.05)	0.05 (0.04)	1.00 (0.11)	0.02 (0.04)	1.10 (0.13)	0.05 (0.05)
High school substance use						
Drinking	1.19* (0.08) [$p = .013$]	0.17* (0.07) [$p = .011$]	1.03 (0.11)	−0.01 (0.06)	1.46* (0.23) [$p = .018$]	0.15* (0.06) [$p = .023$]
Marijuana	0.89 (0.07)	−0.08 (0.07)	1.29* (0.15) [$p = .025$]	0.23** (0.08) [$p = .002$]	1.31 (0.21)	0.12 (0.07)
Covariates						
Female	0.69*** (0.07) [$p < .001$]	−0.32*** (0.08) [$p < .001$]	0.55*** (0.09) [$p < .001$]	−0.29*** (0.08)[$p < .001$]	0.63 (0.15)	−0.15 (0.08)
Black	0.94 (0.20)	−0.07 (0.17)	1.07 (0.29)	0.06 (0.16)	0.78 (0.36)	−0.03 (0.15)
Latina/o	0.94 (0.19)	−0.04 (0.17)	1.47 (0.52)	0.18 (0.22)	1.07 (0.43)	0.02 (0.13)
Other race/ethnicity	0.75 (0.16)	−0.18 (0.14)	0.78 (0.31)	−0.22 (0.15)	0.14** (0.09) [$p = .003$]	−0.24* (0.11) [$p = .033$]
Mother education	1.10 (0.06)	.08* (0.04) [$p = .030$]	1.12 (0.09)	0.03 (0.04)	1.04 (0.13)	.03 (0.04)
Income to needs ratio	0.99 (0.05)	−0.00 (0.04)	1.05 (0.09)	0.03 (0.04)	1.34* (0.10) [$p = .026$]	0.07 (0.05)
Maternal sensitivity	1.03 (0.06)	0.02 (0.05)	0.91 (0.07)	−0.04 (0.04)	0.84 (0.10)	−0.05 (0.04)
Maternal monitoring	0.95 (0.05)	−0.03 (0.04)	0.99 (0.08)	−0.01 (0.04)	0.90 (0.12)	−0.02 (0.04)
Adolescent impulsivity	1.02 (0.05)	0.02 (0.04)	1.19 (0.11)	0.07 (0.04)	1.18 (0.14)	0.04 (0.04)

Note: *B*, standardized coefficients from OLS regression models. IRRs from negative binomial regression models. Covariates also included (but not shown) site of data collection.

Abbreviations: IRR, incidence rate ratio; OLS, ordinary least squares; SE, standard error.

*$p < .05$; **$p < .01$; ***$p < .001$.