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Delinquency, Aggression, and Attention-Related Problem Behaviors Differentially Predict Adolescent Substance Use in Individuals Diagnosed with ADHD

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Abstract

Objective—To measure the degree to which childhood and adolescent ratings of aggression, attention, and delinquency are related to adolescent substance use outcomes in youth diagnosed with Attention-deficit/Hyperactivity Disorder (ADHD).

Background—Childhood externalizing disorders have been shown to predict adolescent maladaptive substance use, but few studies have examined the differential predictive utility of two distinct dimensions of externalizing behavior; aggression and delinquency.

Methods—Ninety-seven clinically referred children with ADHD initially took part in this research protocol when they were on average 9.05 years of age, and were seen again on average 9.30 years later. Participants' parents were administered the Child Behavior Checklist (CBCL) at baseline and follow-up, and youth completed the Youth Self Report (YSR) in adolescence. At follow-up, substance use severity and diagnosis were assessed using semi-structured psychiatric interviews administered separately to parents and adolescents. Linear and binary logistic regressions were used to determine the association of CBCL- and YSR-rated attention problems, aggression and delinquency to adolescent substance use.

Results—Childhood and adolescent delinquency, but not aggression, as rated by parents and youths, predicted adolescent substance use disorders (SUD) and substance use severity (all $p < .05$). After accounting for the associations of delinquency and aggression with adolescent substance use, ratings of attention problems in childhood and adolescence were negatively associated with substance use outcome.

Conclusions—Children with ADHD who exhibit high rates of delinquency are at risk for later substance use and may require targeted prevention, intervention, and follow-up services.

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Introduction

A childhood diagnosis of attention-deficit/hyperactivity disorder (ADHD) has been repeatedly associated with elevated rates of adolescent and young adult substance use and substance use disorders (SUDs) ¹⁻⁴. Among individuals diagnosed with ADHD in childhood, the likelihood of late adolescent/young adult maladaptive substance use has been shown to be positively associated with the presence of comorbid conduct disorder (CD) ⁵⁻⁷, which is present in 30–50% of individuals diagnosed with ADHD ⁸. Some studies have shown an association between ADHD and increased substance use over and above the risk posed by CD ^{3;9;10}, while others have proposed that CD mediates the relationship between ADHD and later substance misuse ¹¹. As such, the degree to which ADHD and CD are independently associated with later substance use remains unclear. Past research has shown that behaviors associated with ADHD and CD are inter-correlated, but maintain a degree of independence in terms of etiology and developmental course ¹². It may be that ADHD and CD together generate a greater risk for later substance misuse than either disorder alone ¹³. Nevertheless, it is clear that overwhelming evidence suggests a key role of CD in the emergence of substance use in individuals diagnosed with ADHD.

Externalizing behaviors, which make-up the diagnosis of CD, can be divided into the two distinct dimensions: 1) aggressive behavior directed towards people and animals, and 2) delinquent acts such as coercive lying and vandalism ¹⁴. In combination, these externalizing behaviors have been shown to predict a number of adverse outcomes, including adolescent and adult substance use ¹⁵⁻¹⁸. Similarly, adolescents and young adults with substance use disorders exhibit high rates of externalizing behaviors ¹⁹ and related psychiatric diagnoses, such as Antisocial Personality Disorder ²⁰.

Several studies have examined the relationship between the components of childhood externalizing behaviors (i.e., aggression and delinquency) and late adolescent/young adult substance use outcomes in non-clinical populations. Many have concluded that delinquent behavior throughout childhood development is the stronger predictor of later maladaptive substance use ²¹⁻²³. However, others have found that the stability of physical aggression ¹⁸ best predicts later use.

While past longitudinal studies examining the long-term outcomes of a childhood diagnosis of ADHD have shown that co-occurring CD is associated with higher rates of later substance use, only one study, to our knowledge, has examined the degree to which delinquent behaviors are specifically associated with later substance use in this population. Molina et al. ²⁴ employed both dimensional measures of delinquency and categorical CD diagnosis at baseline to examine delinquent and substance use behaviors in children enrolled in the Multimodal Treatment Study of Children with ADHD (MTA) 24 and 36 months post treatment. Results showed that individuals diagnosed with ADHD displayed higher rates of delinquency and substance use in early adolescence when compared to the control group. Further, this study reported that delinquency predicted both 24- and 36-month substance use while CD alone did not predict substance use at either time point. Thus, it appears that delinquency is a powerful predictor of early adolescent substance use in children with ADHD. It is not known to what degree delinquency impacts late adolescent substance use outcomes among individuals diagnosed with ADHD or the degree to which aggression is independently associated with these outcomes.

To our knowledge, this is the first study to specifically examine differential associations of aggression and delinquency in youth with ADHD to maladaptive substance use. As individuals with ADHD exhibit higher rates of externalizing behaviors in childhood and substance use behaviors in adolescence when compared to those without ADHD, gaining a

better understanding of the predictive nature of such childhood behaviors can serve to inform preventive interventions targeting substance use behaviors.

The objective of this prospective almost 10-year follow-up study of ethnically and racially diverse urban youth from lower socioeconomic backgrounds diagnosed with ADHD in childhood was to measure the degree to which dimensional measures of attention, aggression and delinquency, as rated in childhood and late adolescent follow-up, were differentially associated with late adolescent substance use outcomes.

Methods and Materials

Participants

Ninety-seven adolescents/young adults who were evaluated in a research protocol during childhood (mean age at baseline = 9.05 years, $SD = 1.28$), were seen for follow-up on average 9.30 ($SD = 1.65$) years later. They were drawn from a group of 169 youth who were recruited between 1990 and 1997 for a study of ADHD with and without aggression²⁵. The baseline childhood sample were all clinically referred for behavioral difficulties by schools, physicians, or mental health providers as part of a study focusing on the biology of ADHD and other disruptive behavior disorders. In order to be included in this study, children had to be 7 – 11 years of age, have a teacher reported inattention/overactivity score on the IOWA Conners²⁶ questionnaire of 7 or greater, and meet criteria for a diagnosis of ADHD on the Diagnostic Interview Schedule for Children (DISC). The DISC was administered to parents and diagnoses were based upon DSM-III-R or IV criteria, depending upon when participants entered the study. Exclusionary criteria at study entry included having a chronic medical condition that required systematic medication, schizophrenia, a pervasive developmental disorder, Tourette's disorder, or having a Full Scale IQ < 70.

This childhood sample was predominately male (88.8%) and racially and ethnically diverse (27.6% African-American, 24.5% Caucasian, 30.6% Hispanic, and 10.2% mixed or other ancestry). Mean socioeconomic status, estimated from parental occupation and education using the socioeconomic prestige scale²⁷, was 36.92 ($SD = 17.42$), representing a low-middle status group.

Of these 169 participants, 18 refused to participate in the follow-up, two were known to be deceased, seven were incarcerated, and 45 were lost to follow-up. We attempted to locate missing participants by contacting known family members and via information publicly available on the internet. However, this sample was drawn from a highly mobile inner-city population and many individuals could not be found. Nevertheless, those who were and were not assessed at follow-up did not differ significantly with regard to age at initial evaluation, rates of childhood comorbid diagnoses, Full Scale IQ, socio-economic status (SES), or ADHD and other disruptive behavior disorder ratings at initial assessment (all $p > .10$).

Childhood Assessment

At baseline, parents completed the Child Behavior Checklist (CBCL). The CBCL is a frequently used parent report measure that assesses the dimensional nature of child emotional and behavioral difficulties²⁸. Individual items are collapsed into syndrome subscales such as Attention Problems, some of which are then further collapsed into the larger Internalizing (Withdrawn; Somatic Complaints; Anxious/Depressed) and Externalizing (Delinquency; Aggression) scales. Past research has shown that the CBCL is correlated with disorders seen in childhood and there are clear associations between CBCL attention score and a diagnosis of ADHD and the delinquent behavior scale and a diagnosis of CD^{29,30}.

Follow-up Assessment

As part of this follow-up evaluation, the accompanying parent (n = 88, 91%) and participants (n = 85, 88%) successfully completed the CBCL and Youth Self-Report (YSR) which is the self-report version of the CBCL²⁶. Treatment history was obtained through administration of a “Services Received Interview” where parents detailed participant exposure to psychosocial interventions and/or pharmacotherapy. Participants were specifically queried regarding duration, type, and age at which treatment occurred. Supplemental information was provided through the initial interview portion of the Kiddie-SADS Present and Lifetime Version (Kiddie-SADS – PL)³¹ and a review of records from the initial assessment, which included information regarding childhood medication status and history. History of stimulant medication was not associated with substance use outcomes in this sample³².

Participants and their parents were proficient in English, and were compensated for their time and travel. All procedures were approved by the Institutional Review Boards of the participating institutions. Written informed consent was obtained from all adolescents above the age of 18 years and the parents of those under the age of 18 years. Assent was obtained from youth under 18 years-old. For further participant protection, we obtained a Certificate of Confidentiality from the National Institutes of Health.

Substance Use Status

Determination of substance use disorder (SUD) and alcohol use disorder (AUD) status was made using the Kiddie-SADS – PL³¹, which was administered to each adolescent, and separately to each participant’s parent in order to ensure confidentiality. SUDs were defined as disorders resulting from illicit drug (non-tobacco, non-alcohol) misuse and AUDs were defined as disorders resulting from maladaptive alcohol use. Evaluators were Ph.D. level psychologists or trained psychology graduate students blind to childhood status. Parent and youth responses were combined for each item using an “or” algorithm; if either informant indicated that the item caused significant distress or impairment, the symptom was judged to be present. Diagnoses of drug and alcohol abuse and dependence, past and present, were collapsed into binary (yes/no) categories that combined diagnoses of abuse and dependence.

Severity of substance use was assessed using the Rutgers Alcohol and Drug Use Questionnaire³³. Adolescents (n = 95, 98%) were asked to report use of cigarettes, alcohol, and marijuana over the past 3 years. Participants were also asked to report on their 3-year use of more serious substances cocaine, amphetamines, hallucinogens, and opiates) but these drug classes were not included in our analyses due to low rates of reported use. The Rutgers substance use screening measure asks adolescents about the frequency (how often) and intensity (amount) of substance use. For example, at the beginning of the cigarette use module participants were asked if they had smoked a whole cigarette at least one time during the preceding 3 years. If they indicated that they had smoked during that time they were asked to indicate the frequency (1–2 times, 3–9 times....1000 or more times) and intensity of their use when they smoked (less than 1 a day, 1–4 cigarettes...More than 2 packs). Similar to Labouvie et al.³³, severity of substance use was defined as the product of frequency × intensity of use. As such, indicators of substance use frequency and intensity were itemized and a product was obtained, resulting in a unitary dimensional measure of substance use severity for each drug class. All severity variables were square root transformed to normalize their distributions.

Statistical Analysis

Pearson product-moment correlation coefficients were generated to assess the degree of association among the predictor variables. Hierarchical binary logistic and hierarchical

linear regressions were employed to measure the degree to which the externalizing behaviors of delinquency and aggression, and attention problems, were differentially associated with late adolescent SUD/AUD status and substance use severity, respectively. In all analyses, SES and age at follow-up were entered as control variables in the first block. CBCL/YSR ratings (delinquency, aggression, attention problems) were entered in the second block as either childhood predictor variables (parent ratings in childhood) or adolescent correlates (parent/youth ratings in adolescence). All variables were entered using Forced Entry. The results of categorical substance use outcomes are presented as odds ratios (ORs) together with 95% confidence intervals (CIs) as the indicator of statistical significance

Results

Demographic and Clinical Characteristics

As shown in Table 1, this sample was of average intellectual ability in childhood. As expected of a clinically-referred sample of youth with ADHD, they displayed elevated parent ratings ($T = 65$) of attention problems and externalizing (delinquency and aggression) behaviors, and had high rates of other comorbid psychiatric disorders. Age at late adolescent follow-up generally ranged from 16 to 22 years, however two individuals were 25 and 26 years old at follow-up, and one was 15. Seventy one percent ($n = 69$) of individuals received some treatment with psychostimulants (Mean duration = 4.26 years; $SD = 3.48$). Forty three percent ($n = 42$) of individuals in this sample met criteria for a SUD and 15% ($n = 15$) met criteria for an AUD. The majority of SUD diagnoses were for cannabis abuse/dependence.

As seen in Table 2, parent and adolescent reports of delinquency, aggression, and attention problems were significantly inter-correlated. However, measures of collinearity, calculated on all linear regressions, resulted in an acceptable range of Variance Inflation Factor (VIF) with scores between 1.01 and 3.16. Correlations between childhood and adolescent CBCL ratings were less robust than parent and youth reports derived in adolescence.

Childhood Predictors

Diagnostic Status—As shown in Table 3A column A, after controlling for childhood SES and age at adolescent follow-up, parent ratings of Delinquency in childhood significantly predicted adolescent SUD status. After accounting for the other variables in the model, CBCL Aggression and Attention Problems did not predict adolescent substance use diagnostic status. Parent reports of Delinquency, Aggression, and Attention Problems did not predict adolescent AUD (see Table 3B, column A).

Substance Use Severity—Results of linear regressions shown in table 4 indicate that parent rated Delinquency was a significant predictor of past 3-year cigarette and marijuana, but not alcohol, use severity. Aggression did not predict adolescent cigarette, alcohol, or marijuana use severity. Unexpectedly, after accounting for Delinquency and Aggression ratings, childhood Attention Problems were negatively associated with severity of late adolescent marijuana use.

Adolescent Correlates

Diagnostic Status—Similar to childhood report, results of logistic regression analyses shown in table 3 columns B and C, respectively, revealed that adolescent Delinquency ratings, as reported by parent and by youth were significantly associated with SUD status. Parent rated Delinquency was also positively associated with AUD. Aggression in adolescence was not associated with diagnostic outcome and adolescent Attention Problems, as rated by parent but not youth, was negatively correlated with adolescent AUD.

Substance Use Severity—As can be seen in tables 5 and 6, respectively, parent and youth ratings of Delinquency in adolescence were positively associated with 3-year cigarette, alcohol, and marijuana use severity. Aggression, as rated by parent but not youth, was negatively associated with adolescent marijuana use severity. Parent and youth report of Attention Problems in adolescence were negatively associated with past 3-year marijuana use severity, with parent ratings of Attention Problems also being negatively associated with past 3-year cigarette and alcohol use severity.

Discussion

This study examined the degree to which dimensional parent ratings of delinquency and aggression, and problems of attention, measured in childhood uniquely predicted later diagnostic and dimensional substance use outcomes in adolescence. Additionally, this study examined the degree to which parent and youth ratings of delinquency, aggression, and attention problems were differentially associated with concurrent maladaptive substance use in adolescence. Overall, results generated two notable findings: 1) Delinquency, but not aggression, is a robust predictor and concurrent correlate of adolescent substance use outcomes in individuals diagnosed with ADHD in childhood, and 2) After accounting for delinquency and aggression, severity of attention problems was negatively associated with multiple measures of substance use outcomes.

Pearson product-moment correlations revealed that regardless of rater and time-point, Delinquency, Aggression, and Attention Problems were highly inter-correlated. Such results were not surprising as all three measures are notable for dysregulated behaviors and past studies have demonstrated that conduct and attention related difficulties are inter-related¹². Also notable in these correlations were strong rater and temporal effects. Ratings of different dimensions by the same rater (i.e., parent or child), and ratings derived at the same time point (i.e., adolescence), were highly inter-correlated. However, correlations between childhood and adolescent CBCL ratings were less robust. That delinquency was such a robust predictor and correlate of outcome supports previous findings seen in prospective longitudinal studies^{21;24}. Effect sizes generated for dimensional and categorical outcomes (r^2 /OR) were generally in the moderate range, supporting the idea that delinquency, as related to adolescent substance use, is a robust correlate of current behavior and predictor of outcome. Interestingly, while a robust predictor of drug use outcome, childhood delinquency did not predict AUD status or alcohol use severity. Prior studies have shown delinquent behavior in childhood to be predictive of later alcohol related outcomes^{34–36}. However, studies examining such outcomes in individuals diagnosed with ADHD have generated equivocal findings⁶, with some studies finding no difference in adolescent alcohol use behaviors when compared to controls³⁷. It has been suggested that individuals diagnosed with ADHD may demonstrate a different developmental profile as related to alcohol use outcomes³⁸. The current sample had a mean age of 18.42 (SD = 1.78), with approximately 95% of the sample under the legal drinking age. As such, it may be that late adolescence is too early in the developmental course in which to predict alcohol related outcomes.

Our findings suggest that unlike delinquency, aggression, as measured by the CBCL and YSR, is neither a predictor nor a correlate of late adolescent substance use. Of the 15 analyses conducted in this study that included aggression as an independent variable, only one generated a significant result and the finding was in the opposite direction. It is hard to know what to make of the finding that adolescent aggression, as rated by parents, is negatively correlated with adolescent marijuana use severity when all other analyses that employed aggression as an independent variable failed to generate significant effects. As the effect size was relatively small ($r = -.29$; $p = .04$), it is likely that this finding represents a Type I error.

Previous studies examining predictors of substance use outcomes in individuals with ADHD have generated conflicting findings. Among studies that have reported a positive relationship between ratings of ADHD symptoms and substance use, some have shown that inattentive behaviors best predict later substance use outcomes^{9,37}, while others have shown that hyperactivity/impulsivity better accounted for substance use outcomes^{3,39}. The current study did not differentially examine the two ADHD behavioral domains (i.e., inattention; hyperactivity-impulsivity), and the Attention Problems syndrome scale on both the CBCL and YSR contains inattentive (“can’t concentrate, can’t pay attention for long”) and hyperactive/impulsive (“can’t sit still, restless, or hyperactive”) behaviors. However, that a validated measure of attention problems²⁵, shown to be correlated with diagnostic status²⁷, failed to predict substance use outcomes, furthers the argument that ADHD-related symptoms, after accounting for conduct problems, are not primary predictors of substance use outcome. Notably, although it is difficult to explain, unlike the singular finding with Aggression, the frequency with which this negative association emerged makes it unlikely to be a Type I error.

The results of this study must be viewed within the context of several limitations. First, and most importantly, we were unable to follow all 169 youth who originally participated in the childhood study, although available data suggest that the sub-sample that was reevaluated was representative of the original group. Second, of the 97 individuals that participated in the follow-up assessment, 88 (91%) parents and 85 participants (88%) completed the CBCL and YSR, respectively. Third, the YSR and CBCL are normed on adolescent populations up to the age of 18. The individuals in this study were brought in for late adolescent follow-up assessment and approximately 28% of adolescent and parent report at follow-up was concerned with individuals over the age of 18. Fourth, there is always the possibility of some recall bias in the reporting by adolescents of past substance use. Lastly, this sample of individuals diagnosed with ADHD has the advantage of being ethnically heterogeneous and from a primarily lower SES, aspects that contribute to a field where longitudinal studies have been characterized by relative lack of diversity^{1, 3, 5, 6}. However, it is important to note that findings, specifically in terms of the negative association between Attention Problems and substance use, may not generalize and these findings would benefit from replication.

By examining three distinct behavior patterns associated with maladaptive substance use this study extended previous findings that delinquent behavior is a robust predictor and correlate of adolescent/young adult substance use outcome. Behaviors of aggression, which along with delinquency constitute the diagnostic criteria of CD, itself a robust predictor of maladaptive drug use, were not associated with outcome. As such, future studies examining predictors of substance use such as CD may wish to examine the factors that contribute to the initiation and expression of delinquent behavior. Additionally, as aggression and delinquency are highly correlated behaviors, it is important that future research attempt to better understand the role of delinquency in prediction of SUD independent of aggression. Among individuals diagnosed with ADHD, those exhibiting high rates of delinquency may benefit from intensive strategies focusing on substance use prevention, targeted substance use interventions, and extended follow-up monitoring.

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Table 1

Childhood and Adolescent Assessments: Demographic and Clinical Characteristics

Baseline (n = 97)			Follow-up (n = 97)		
Measure	Mean	SD	Measure	Mean	SD
Age	9.05	1.28	Age	18.43	1.78
SES	36.34	17.89	SES	43.25	17.97
WISC-R/III FSIQ	93.96	14.27	WAIS FSIQ	93.29	14.94
CBCL *			CBCL *		
Internalizing problems	65.27	11.83	Internalizing problems	56.75	13.36
Attention problems	72.43	10.01	Attention problems	61.44	10.39
Externalizing	70.03	11.27	Externalizing	60.73	12.99
Delinquency	68.42	9.71	Delinquency	61.83	10.48
Aggression	72.63	14.01	Aggression	62.57	11.95
IOWA Conners			YSR *		
I/O	11.30	3.19	Internalizing problems	50.26	11.62
O/D	8.18	4.69	Attention problems	57.46	9.59
DISC			Externalizing	58.62	11.64
%CD	32.7		Delinquency	61.40	8.96
% ODD	47.9		Aggression	59.07	10.29
% ANX	31.6				
% MOOD	10.2				

Note: SES = Socioeconomic Status; WISC-R/III FSIQ = Wechsler Intelligence Scale for Children, Revised/3rd Ed Full Scale IQ; CBCL = Child Behavior Checklist; I/O = Inattention/Overactivity; O/D = Oppositional/Defiant; DISC = Diagnostic Interview Schedule for Children; CD = Conduct Disorder, ANX = any anxiety disorder; MOOD = any mood disorder; WAIS FSIQ = Wechsler Adult Intelligence Scale 3rd Ed Full Scale IQ; YSR = Youth Self Report.

* CBCL and YSR data are reported as T-scores.

Table 2

Correlations among Parent and Youth Ratings of Delinquency, Aggression, and Attention Problems

	C-DEL	C-AGG	C-ATTN	A-DEL	A-AGG	A-ATTN	Y-DEL	Y-AGG	Y-ATTN
C-DEL	1.00	.76**	.51**	.36**	.14	.19	.20	.01	.02
C-AGG		1.00	.63**	.18	.19	.24**	.16	.13	.12
C-ATTN			1.00	.05	.15	.30**	.03	.12	.25*
A-DEL				1.00	.75**	.66**	.53**	.38**	.21
A-AGG					1.00	.75**	.38**	.47**	.19
A-ATTN						1.00	.31**	.39**	.30**
Y-DEL							1.00	.65**	.52**
Y-AGG								1.00	.74**
Y-ATTN									1.00

Note: C- = Parent report on the CBCL in Childhood; A- = Parent report on the CBCL in Adolescence; Y- = Youth Self-report (YSR) in Adolescence; DEL = Delinquency; AGG = Aggression; ATTN = Attention Problems.

* = p .05

** = p .01

Table 3

Predictors of adolescent diagnostic status from parent ratings in childhood and parent and youth-reports in adolescence as assessed using logistic regression

A. Adolescent SUD outcome			
	A. Childhood CBCL^a OR(CI)	B. Adolescent CBCL^a OR(CI)	C. Adolescent YSR^b OR(CI)
SES	.97 (.94 – 1.00) *	.96 (.93 – 1.00) *	.97 (.93 – 1.01)
Adolescent age	1.21 (.91–1.61)	1.40 (.93 – 2.01)	1.58 (.94 – 2.63)
Delinquency	1.10 (1.02–1.19) *	1.20 (1.09–1.33) *	1.27 (1.13–1.43) *
Aggression	.99(.93–1.04)	.96(.89 – 1.04)	.94 (.86 – 1.04)
Attention Problems	.95 (.89 – 1.04)	.93 (.85 – 1.02)	.99 (.91 – 1.09)

B. Adolescent AUD outcome			
	A. Childhood CBCL^a OR(CI)	B. Adolescent CBCL^a OR(CI)	C. Adolescent YSR^b OR(CI)
SES	1.01 (.98 – 1.05)	1.01 (.96 – 1.07)	.99 (.95 – 1.04)
Adolescent age	1.41 (1.02–1.94) *	1.41 (.79 – 2.48)	1.42 (.82 – 2.44)
Delinquency	1.07 (.96–1.20)	1.24 (1.06–1.45) *	1.08 (.97–1.21)
Aggression	.99(.92–1.07)	1.01(.93 – 1.10)	1.00 (.90 – 1.11)
Attention Problems	.95 (.87 – 1.03)	.78 (.64 – .94) *	.94 (.83 – 1.06)

Note: SUD = Substance Use Disorder; OR = Odds Ratio, CI = 95% Confidence Interval

^a parent rated,

^b self-report;

* = p .05

Note: AUD = Alcohol Use Disorder; OR = Odds Ratio, CI = 95% Confidence Interval;

^a parent rated,

^b self-report;

* = p .05

Table 4
Childhood predictors of adolescent substance use severity as assessed using linear regression

Cigarette Use	b	t	p	r ²
SES	-.02	-1.11	1.22	.23
Age at follow-up [*]	.51	.35	3.90	<.01
Delinquency [*]	.09	.33	2.40	.02
Aggression	.02	.11	.74	.46
Attention Problems	-.04	-.16	1.35	.18
Alcohol Use	b	t	p	r ²
SES	.02	.14	1.37	.17
Age at follow-up [*]	.61	.33	3.28	<.01
Delinquency	.04	.12	.75	.46
Aggression	.04	.07	.45	.66
Attention Problems	-.06	-.18	1.44	.15
Marijuana Use	b	t	p	r ²
SES	-.03	-.19	1.94	.06
Age at follow-up	.24	.14	1.44	.15
Delinquency [*]	.13	.41	2.84	<.01
Aggression	.01	.06	.38	.71
Attention Problems [*]	-.09	-.30	2.45	.02

Note:

^{*} = p .05;

⁺ = variance that can be attributed to SES and Age at follow-up;

⁺⁺ = total variance accounted for by control and predictor variables.

Table 5

Parent-rated adolescent correlates of adolescent substance use outcome:

Cigarette Use	b	t	p	r ²
SES	-.02	-.16	1.85	.07
Age at follow-up *	.78	.42	4.74	<.01
Delinquency *	.17	.66	4.88	<.01
Aggression	-.02	-.08	-.52	.62
Attention Problems *	-.08	-.31	-2.3	.02
Alcohol Use	b	t	p	r ²
SES	.01	.06	.57	.57
Age at follow-up *	.85	.36	3.69	<.01
Delinquency *	.14	.47	3.09	.003
Aggression	-.01	-.04	-.24	.81
Attention Problems *	-.13	-.41	-2.73	.01
Marijuana Use	b	t	p	r ²
SES *	-.05	-.25	-3.26	<.01
Age at follow-up *	.73	.33	4.25	<.01
Delinquency *	.26	.92	7.73	<.01
Aggression *	-.07	-.29	-2.14	.04
Attention Problems *	-.11	-.37	-3.15	<.01

Note:

* = p .05;

† = variance that can be attributed to SES and Age at follow-up;

†† = total variance accounted for by control and predictor variables.

Table 6

Adolescent self-report correlates of adolescent substance use outcome:

Cigarette Use	b	t	p	r ²
SES	-.02	-1.12	.29	
Age at Follow-up *	.65	3.36	<.01	.23 ⁺
Delinquency *	.12	.48	.63	
Aggression	-.03	-.13	.89	
Attention Problems	-.03	-.10	.92	
Alcohol Use	b	t	p	r ²
SES	.01	.07	.48	
Age at Follow-up *	.79	3.33	<.01	.19 ⁺
Delinquency *	.13	.36	.72	
Aggression	-.04	-.13	.89	
Attention Problems	-.09	-.26	.79	
Marijuana Use	b	t	p	r ²
SES *	-.04	-.22	.83	
Age at Follow-up *	.58	2.63	.01	.25 ⁺
Delinquency *	.19	.56	.58	
Aggression	-.03	-.09	.93	
Attention Problems *	-.08	-.26	.79	

Note:

* = p .05;

⁺ = variance that can be attributed to SES and Age at follow-up;

⁺⁺ = total variance accounted for by control and predictor variables.