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CONJOINT TRAJECTORIES OF DEPRESSIVE SYMPTOMS AND DELINQUENT BEHAVIOR PREDICTING SUBSTANCE USE DISORDERS

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Abstract

This study examines the conjoint trajectories of depressive symptoms and delinquent behavior from adolescence (age 14) into young adulthood (age 24) as predictors of substance use disorders (SUDs) in adulthood (age 32). Of the 816 participants, 52% were African American, and 48% were Puerto Rican. After we obtained the conjoint trajectory groups using Mplus, we performed logistic regression analyses using SAS to compare the Bayesian Posterior Probability (*BPP*) of each of the conjoint trajectory groups with the *BBP* of the reference conjoint trajectory group to predict SUDs. Four conjoint trajectory groups were obtained. The higher *BPPs* of both the high depressive symptoms and low delinquent behavior trajectory group (*AOR* = **3.54**, *p* < .05) and the medium depressive symptoms and high delinquent behavior trajectory group (*AOR* = **10.28**, *p* < .001), as compared with the *BPP* of the low depressive symptoms and low delinquent behavior trajectory group, were associated with an increased likelihood of SUDs in adulthood. These associations were maintained with control on gender, ethnicity, the use of alcohol, cigarette, and marijuana, socioeconomic status (SES) at age 14, and income and educational level at age 36. Prevention and treatment of delinquent individuals reporting SUDs might be more effective if their depressive symptoms were also addressed. Similarly, prevention and treatment of depressed individuals reporting SUDs might be more effective if their delinquent behavior was also addressed.

Keywords

depressive symptoms; delinquent behavior; substance use disorder; conjoint trajectories; longitudinal study

Depressive symptoms and delinquent behavior are two common adolescent **risk factors** (Wolff and Ollendick, 2006). Several recent studies have shown that depressive symptoms

and problem behavior (e.g., conduct disorder) are comorbid in adolescence or adulthood (Kessler et al., 2012; Linker et al., 2012; Reinke et al., 2012). More specifically, a cross-sectional study found that depressive symptoms, especially lack of future orientation, were associated with delinquent behaviors and partially mediated the relationship between adverse events and delinquent behaviors (Allwood et al., 2012). In addition, research suggests that adolescents who experience co-occurring depressive symptoms and delinquent behavior have significantly worse overall outcomes than do adolescents who report only depressive symptoms or delinquent behavior (Capaldi and Stoolmiller, 1999).

The present study adds to this research and examines the co-occurrence of depressive symptoms and delinquent behavior. More specifically, the study looks at the conjoint trajectories of depressive symptoms and delinquent behavior from adolescence into young adulthood as predictors of substance use disorders (SUDs) in adulthood. We also examined the relationship of adolescent marijuana use and adult SUDs.

Marijuana is the most commonly used illicit drug in the United States (Johnston, O'Malley, and Bachman, 2006). Bailey, Flewelling, and Rachal (1992) have noted that the early onset of marijuana use contributes to later drug use and dependence. More recently, several investigators have also reported that marijuana use in adolescence was associated with an increased likelihood of SUDs in adulthood (Green et al., 2012; Windle and Windle, 2012). In addition to marijuana use, the use of legal drugs (i.e., alcohol and cigarettes) may also contribute to later SUDs. Consequently, we controlled for these substances when examining the relationship between the conjoint trajectories of depressive symptoms and delinquent behavior and later SUDs.

Epidemiological and cross-sectional studies have documented an elevated prevalence of SUDs in individuals with emotional disorders (e.g., mood disorders) (Conway et al., 2006; Grant et al., 2004; Kessler et al., 2005). Several theories of patterns of comorbidity among emotional disorders and SUDs have been proposed. The “self-medication” theory suggests that individuals with emotional distress use substances to alleviate distress (Kushner, Sher, and Beitman, 1990; Smith and Book, 2010). Wolitzky-Taylor et al. (2012) found that unipolar mood disorders diagnosed at baseline assessment were associated with the later onset of SUDs. Maslowsky (2014) reported that depressive symptoms alone were associated with an increase in the probability of polydrug use. Furthermore, effective treatment for major depressive disorder reduced the probability of subsequent SUDs (Curry et al., 2012).

With regard to delinquency, adolescents reporting symptoms of delinquent behavior are at an increased risk for concurrent and future substance use/abuse (Fergusson, Horwood, and Ritter, 2007). It is well-documented in the literature that externalizing behavior (e.g., antisocial behavior) in childhood and adolescence is associated with a wide range of adverse concurrent and longitudinal outcomes (Dishion, French, and Patterson, 1995). Regarding longitudinal outcomes, studies report that children and adolescents with externalizing behavior problems (e.g., antisocial behavior) are at risk for substance use and/or abuse (Fergusson et al., 2007; Nock et al., 2007; Odgers et al., 2008). Reef et al. (2011) found that all high-level trajectories of four types of antisocial behavior (e.g., aggression, oppositional

behavior, property violations, and status violations) showed the highest probability for predicting adult disorders such as SUDs.

Considering both depressive symptoms and delinquent behavior in a national sample of adolescents, Maslowsky and colleagues (2014) reported that the heightened probability of polysubstance use was related to the co-occurrence of depressive symptoms and conduct problems.

We also considered **demographic** variables, including gender, ethnicity, socioeconomic status (SES) at T1, income at T5, and educational level at T5. Marijuana use disorders in the U.S. were significantly higher among men than among women across all age groups in 1991–1992 and 2001–2002 (Compton et al., 2004). Several college-based national studies have also reported a higher rate of marijuana use among men than among women (Bell, Wechsler, and Johnston, 1997; Johnston et al., 2005; Mohler-Kuo, Lee, and Wechsler, 2003). Indeed, Turner and Gil (2002) reported the prevalence of both marijuana abuse and dependence in males to be roughly two times higher than in females.

The past-year prevalence of DSM-IV marijuana use disorders increased significantly between 1991–1992 and 2001–2002, with the greatest increases observed among African American and Hispanic young adults. According to the 2003 National Survey on Drug Use and Health, the prevalence of African American young adults in the U.S. who used any illicit drugs in the past year was higher than that of Hispanics (Substance Abuse and Mental Health Services Administration, 2004). The same ethnic pattern was observed for the past-year prevalence of marijuana use and marijuana use disorders (Compton et al., 2004).

Our study is unique in two ways. First, we examined the trajectories of depressive symptoms (a component of internalizing symptoms) and delinquent behavior (a component of externalizing symptoms) simultaneously to predict SUDs among relatively understudied ethnic groups – namely, inner-city African Americans and Puerto Ricans. Second, a hallmark feature of adolescence and young adulthood is an increase in depressive symptoms and delinquent behavior. Therefore, we followed our adolescent sample from mean age 14 to mean age 32. In contrast, the majority of prior research has been conducted using samples either of adolescents or adults.

Based on the literature, we hypothesized that there will be at least four conjoint trajectory groups of depressive symptoms and delinquent behavior: 1) a high level of both depressive symptoms and delinquent behavior trajectory group, 2) a high level of depressive symptoms and low level of delinquent behavior trajectory group, 3) a low level of depressive symptoms and high level of delinquent behavior trajectory group, and 4) a low level of both depressive symptoms and delinquent behavior trajectory group. We also hypothesized that the high level of either depressive symptoms or delinquent behavior trajectory groups (i.e., the high level on both depressive symptoms and delinquent behavior trajectory group, the high level of depressive symptoms and the low level of delinquent behavior trajectory group, and low level of depressive symptoms and high level of delinquent behavior) compared to the low level on both depressive symptoms and delinquent behavior trajectory

group will be associated with an increased likelihood of SUDs. Finally, males as compared with females will be at an increased risk of being diagnosed with SUDs.

DATA AND METHODS

PARTICIPANTS

Data are from a five-wave longitudinal study of African American and Puerto Rican adolescents and young adults. The time 1 (T1; N=1,332; mean age=14) data was collected in 1990, time 2 (T2; N=1,190; mean age=19) in 1995, time 3 (T3; N=660; mean age=24) in 2000–2001, time 4 (T4; N=838; mean age=29) in 2001–2003, and time 5 (T5; N=816; mean age=32) in 2007–2010. The Institutional Review Boards of The Mount Sinai School of Medicine and New York University School of Medicine approved the study's procedures for all data collections. Data at T5 were collected by our research group. We obtained informed consent from all of the participants. A Certificate of Confidentiality was obtained from the National Institutes of Health.

The Harlem Longitudinal Development Study uses a representative sample of African American and Puerto Rican individuals who in 1990 attended one of 11 schools serving East Harlem, NYC. Participants in the current research were 816 young adults who completed the fifth wave (T5) questionnaire.

Of the 816 participants, 52% (n = 425) were African American, and 48% (n = 391) were Puerto Rican. Forty percent (n = 324) of the participants were male.

We compared the demographic variables for the 816 adults who participated at T1 and T5 with the 516 who participated at T1 but not at T5. There were no significant differences between the T5 participants and the T5 non-participants in the proportion of African Americans and Puerto Ricans ($\chi^2 = 0.01$, $p=0.9$, $df=1$), the frequency of alcohol use at T1 ($t=-0.03$, $p=0.98$), the frequency of marijuana use at T1 ($t=1.15$, $p=0.25$), school achievement at T1 ($t=-0.72$, $p=0.47$), and depressive symptoms at T1 ($t=0.2$, $p=0.90$). The percentage of males at T1 and T5, 40%, which was significantly lower than the percentage of males participating at T1 but not at T5, was 57% ($\chi^2 = 36.2$, $p<.001$, $df=1$). Those who participated at T1 and T5 reported lower average delinquent behavior at T1 than the participants who participated at T1 but not at T5 ($t=2.4$, $p=0.02$). Those who participated at T1 and T5 reported a higher frequency of cigarette smoking at T1 than the participants who participated at T1 but not at T5 ($t=-2.1$, $p=0.03$).

MEASURES

Table 1 presents the measures used as the independent variables in this study. The number of items, sample item for each of the scales, answer options, and Cronbach's alphas (item-correlations for a 2-item scale) are presented in Table 1.

SUDs at T5, the dependent variable, was assessed using the University of Michigan Composite International Diagnostic Interview SUDs measure (Wittchen and Kessler, 1994), which we adapted for consistency with the criteria used in the DSM-IV (American Psychiatric Association, 1994). The measure of substance use included marijuana,

stimulants, cocaine, narcotics, hallucinogens, inhalants, and tranquilizers. Substance use disorders was ascertained by the presence of three or more of the following criteria during the prior twelve months: tolerance, withdrawal, recurrent use to avoid withdrawal symptoms, impaired control over use, unsuccessful cessation, excessive time thinking about or engaging in use, relinquishing of normal activities for use, and continued use despite physical or psychological problems.

DATA ANALYSIS

We used Mplus (version 6) to obtain the conjoint trajectories of depressive symptoms and delinquent behavior. Each of the depressive symptoms and delinquent behavior at each point in time was treated as a censored normal variable. We used a cubic polynomial to fit each trajectory using a fixed effect model. We applied the full information maximum likelihood approach for missing data (Muthén and Muthén, 2010). We used the optimal Bayesian Information Criterion (*BIC*) to determine the number of trajectory groups. For Figure 1, each participant was assigned to the trajectory group with the largest Bayesian posterior probability (*BPP*) as depicted in Figure 1.

We then performed logistic regression analyses using SAS (version 9.3) to compare the *BPP* of each of the conjoint trajectory groups with the *BPP* of the reference conjoint trajectory group to predict SUDs. We used the censored normal maximum likelihood estimation of **trajectory coefficients**. Gender, ethnicity, alcohol use at T1, cigarette use at T1, marijuana use at T1, SES at T1, income at T5, and educational level at T5 were statistically controlled. Of the 816 participants who participated at T5, 67% had participated in all five time waves, 33% had participated in four waves, and none participated in three or fewer waves.

RESULTS

The mean and standard deviation (SD) of depressive symptoms at each point in time were 1.6 (0.9), 1.4 (0.9), 1.1 (0.7), and 1.0 (0.6) for T1-T4, respectively. The mean and SD of delinquent behavior at each time point were 0.5 (0.6), 0.5 (0.7), 0.6 (0.7), and 0.5 (0.5) for T1-T4, respectively. The number of participants who had SUDs was 69 (8.5%) out of 816.

The *BIC* scores were 12937, 12732, 12693, and 12699 for 2, 3, 4, and 5-group models, respectively. Since the 4-group model had the smallest *BIC* score, we selected it. The statistics are presented in detail for the 4-group model (see Table 2).

The mean *BPP* of the participants who were assigned to the corresponding groups ranged from 80% to 87%, which indicated a good classification (Nagin, 2005). Figure 1 contains the mean scores of depressive symptoms and delinquent behavior for each conjoint trajectory group.

We labeled the four trajectory groups as follows: 1) low depressive symptoms and low delinquent behavior (participants who reported little or no depressive symptoms, and rarely or never engaged in a delinquent act at all four time points), 2) decreasing depressive symptoms and low delinquent behavior (participants who reported high depressive symptoms at age 14, medium levels of depressive symptoms at age 19, and between low and

medium levels of depressive symptoms at age 24 and at age 29, and did not engage in a delinquent act at **each of** four time points), 3) high depressive symptoms and low delinquent behavior (participants who reported high depressive symptoms at all four time points, and reported less engagement in one delinquent act **on average** at all four time points), and 4) medium levels of depressive symptoms and high delinquent behavior (participants who reported medium levels of depressive symptoms at age 14, between high and medium levels of depressive symptoms at age 19, lower than medium levels of depressive symptoms at age 24 and at age 29, and reported more engagement in one delinquent act than a delinquent act at age 14, less than two delinquent acts at age 19 and at 24, and more than one delinquent act at age 29). The proportions for the four conjoint trajectory groups were: 1) 25% for low depressive symptoms and low delinquent behavior, 2) 52% for decreasing depressive symptoms and low delinquent behavior, 3) 14% for high depressive symptoms and low delinquent behavior, and 4) 10% for medium levels of depressive symptoms and high delinquent behavior. Table 3 contains summary statistics describing each of the trajectory group.

As shown in Table 4, males ($AOR = 3.20, p < .001$) were more likely to **have** in SUDs in adulthood. Puerto Ricans were less likely to receive a diagnosis of SUDs in adulthood ($AOR = 0.49, p < .05$). The *BPP* of high depressive symptoms and low delinquent behavior trajectory group ($AOR = 3.54, p < .05$) and the *BPP* of the medium depressive symptoms and high delinquent behavior trajectory group ($AOR = 10.28, p < .001$) as compared with the *BPP* of low depressive symptoms and low delinquent behavior trajectory group were associated with an increased likelihood of SUDs in adulthood.

DISCUSSION

We examined the developmental course of the conjoint trajectories of depressive symptoms and delinquent behavior from adolescence to adulthood as related to SUDs. To our knowledge, this is the first longitudinal study of African Americans and Puerto Ricans to assess the association of the conjoint trajectories of depressive symptoms and delinquent behavior and later SUDs.

Our hypotheses were supported: (1) The trajectory analysis yielded four conjoint trajectories of depressive symptoms and delinquent behavior. (2) The high level of either depressive symptoms or delinquent behavior trajectory groups (i.e., either high depressive symptoms and the low delinquent behavior group or medium depressive symptoms and the high delinquent behavior group) compared to the low depressive symptoms and the low delinquent behavior trajectory group was associated with an increased likelihood of SUDs. (3) Male gender was also associated with an increased likelihood of SUDs.

Membership in the co-occurring low depressive symptoms and low delinquent behavior group had the lowest prevalence of SUDs, 4% (see Table 2). The prevalence of SUDs in the cooccurring high depressive symptoms and low delinquent behavior group and the medium depressive symptoms and high delinquent behavior group were approximately 13% and 29%, respectively. Hence, higher depressive symptoms or delinquent behavior or both were associated with a greater likelihood of SUDs. The present results are in accord with the

findings of Reef et al. (2011) who reported that trajectories of high levels of antisocial behaviors (e.g., aggression) showed high probabilities for predicting adult SUDs. The present results are also consistent with those of Wolitzky-Taylor et al. (2012), who reported that unipolar mood disorders at baseline assessment were associated with later SUDs. In a related vein, Maslowsky et al. (2014) demonstrated that high levels of depressive symptoms and conduct disorder were a risk for polysubstance use among adolescents. We have advanced the literature by addressing the trajectories of both depressive symptoms and delinquent behavior simultaneously as related to subsequent SUDs in adulthood.

Our findings regarding gender differences in SUDs are consistent with those of other investigators. According to Turner and Gil (2002), the prevalence of both marijuana abuse and dependence among males was roughly two times higher than among females. There may be a number of social factors differentiating women from men with regard to substance use. Of major importance is the societal response to women with a SUD. Although having a SUD in general is stigmatized, women experience more social disapproval than men when they misuse substances (Blume, 1986; Sorsdahl, Stein, and Myers, 2012). Another possible explanation is that the use of drugs by women is strongly associated with a perceived inability to fulfill traditional gender roles, such as taking care of children (Toner, Hardy, and Mistral, 2008).

Although we did not hypothesize that there would be a difference between the two ethnic groups, the results indicated that being African American as compared with being Puerto Rican was associated with an increased likelihood of having a diagnosis of SUDs. This is consistent with the findings of Compton et al. (2004), who reported a higher prevalence of marijuana use disorder for the past-year among African Americans than among Hispanics. Identification of the ethnic factors leading to this increased use of substances would be a valuable contribution to the epidemiological literature dealing with the prevention of SUDs.

As regards the other control variables (i.e., alcohol use, cigarette use, and marijuana use), our findings differ from the results of Windle and Windle (2012) and Green et al. (2012) who found that early substance use was associated with later SUDs. The difference in the findings may be due to the differences in the sample such as the participants' mean age. In the study conducted by Windle and Windle (2012), the sample consisted of 98% Whites with a mean age of 16 years. In the study conducted by Green et al. (2012), the sample consisted of 99% African Americans with a mean age of 16 years. Another possible explanation is that early substance use may be mediated by depressive symptoms. According to the Avon Longitudinal Study of Parents and Children, earlier substance use (e.g., marijuana use) is associated with later depressive symptoms (Gage, 2014).

LIMITATIONS

A limitation of the present study is that data are based on self-report measures and were not verified by **external** information from additional sources. However, studies have shown that self-report data can yield reliable results (Mennes, Ben Abdallah, and Cottler, 2009). Other factors such as psychological distress may underlie the relationship between the conjoint trajectories of depressive symptoms and delinquent behavior and SUDs, although the relationship was maintained with control on gender, ethnicity, T1 alcohol use, T1 cigarette

use, T1 marijuana use, **T1 SES, T5 income, and T5 educational level**. Future studies should explore other areas of physical and psychological stress, in addition to early marijuana use, which may affect the associations of the conjoint trajectories of depressive symptoms and delinquent behavior with SUDs. Also, earlier SUDs may affect later depressive symptoms. However, we are not able to examine the association between earlier SUDs and later depressive symptoms, since we do not have earlier measures of SUDs at ages 19 and 24. The measures of depressive symptoms had varying numbers of items. However, the trajectories of depressive symptoms in 3 of the 4 groups were essentially constant over time. Therefore, there does not appear to be a time effect as a result of the different assessments of depressive symptoms over time. Lastly, this study's findings cannot be generalized beyond urban African Americans and Puerto Ricans until the findings are replicated using samples from different ethnic or cultural groups.

CONCLUSIONS

Despite these limitations, the simultaneous consideration of the conjoint trajectories of depressive symptoms and delinquent behavior beginning in adolescence and extending to adulthood in relation to SUDs is unique. Additionally, the urban sample is community-based, and the research is longitudinal, covering an 18-year period. The public health implications of the findings suggest that long-term depressive symptoms, independent of delinquent behavior, and delinquent behavior, independent of depressive symptoms, are both related to SUDs and are of concern.

Thus we have identified two aspects of a health-compromising life style, depressive symptoms and delinquent behavior. In a related vein, according to Capaldi and Stoolmiller (1999), the co-occurrence of depressive symptoms and conduct problems predicts poor young adult adjustment. Their research found that adolescents who reported both co-occurring depressive symptoms and delinquent behavior experienced significantly worse overall outcomes than did adolescents who reported only depressive symptoms or delinquent behavior.

In conclusion, the use of an integrative treatment approach when treating individuals who are delinquent, experience depressive symptoms, and have a substance use disorder is warranted. The findings suggest that prevention and treatment of depressed individuals reporting SUDs might be more effective if their delinquent behaviors were also addressed. At the same time, the treatment of delinquent individuals reporting SUDs might be more effective if their depressive symptoms were also addressed. From a research perspective, future studies are required to explicate the biological and psychological mechanisms that intervene between depressive symptoms and delinquent behavior, and later SUDs.

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Notes. The vertical bars represent 95% confidence interval at each time point; The answer options for depressive symptoms ranged from not at all

(0) to extremely (3), and for delinquent behavior ranged from never (0) to 5 or more times (4).

Figure 1.
Conjoint Trajectories of Depressive Symptoms and Delinquent Behavior from Adolescence to Young Adulthood (N=816)

Table 1

Measures: Independent variable

Variable (Number of items)	Sample item	Answer options
Gender (1)	Indicate your gender.	1=Female, 2=Male
Ethnicity (1)	Which ethnic group do you belong to?	1=African American, 2=Puerto Rican
Alcohol use at T1 (1)	How often do you drink beer, wine, or hard liquor?	never (0) to three or more drinks every day (4)
Cigarette use at T1 (1)	How many cigarettes per day do you smoke?	none (0) to more than a pack a day (5)
Marijuana use at T1 (1)	How often have you ever used marijuana?	never (0) to once a week or more (4)
Socioeconomic status at T1 (1)	Summed score of parent educational level and parent employment status	lowest (1) to highest (10)
Depressive symptoms at T1–T4 (2 at T1, T2; 5 at T3, T4)	Do you sometimes feel 1) unhappy, sad, or depressed? 2) hopeless about the future?	not at all (0) to extremely (3)
Delinquent behaviors at T1–T4 (6)	During the past 5 years, how often have you 1) gotten into a serious fight? 2) purposely damaged/destroyed property that was not yours? 3) gotten in trouble with the police for something you did?	never (0) to 5 or more times (4)
Income at T5 (1)	How much money did you make in the last year?	none (0) to 100,001 or more (12)
Educational level at T5 (1)	What year of school are you in? If not, what was the last grade you completed?	11th grade or below (0) to postgraduate degree (7)

Depressive symptoms: item correlation=.44, $p<.0001$ at T1, item correlation=.44, $p<.0001$ at T2, Cronbach's $\alpha=.76$ at T3, and $\alpha=.74$ at T4

Delinquent behaviors: $\alpha=.61$ at T1, $\alpha=.75$ at T2, $\alpha=.76$ at T3, and $\alpha=.54$ at T4

Table 2

Statistics for the 4-group model from the trajectory analysis (N=816)

Parameter		Estimate (Standard Error)			
		Low depressive symptoms and low delinquent behavior (25%, n=201)	Decreasing depressive symptoms and low delinquent behavior (52%, n=424)	High depressive symptoms and low delinquent behavior (14%, n=112)	Medium depressive symptoms and high delinquent behavior (10%, n=79)
Depressive symptoms	Intercept	0.70 (0.13) ***	1.92 (0.11) ***	2.18 (0.09) ***	1.41 (0.23) ***
	Slope	0.08 (0.26)	−0.46 (0.21) *	−0.17 (0.35)	0.84 (0.43)
	Quadratic	−0.10 (0.22)	−0.09 (0.17)	0.06 (0.30)	−0.70 (0.39)
	Cubic	0.02 (0.05)	0.05 (0.04)	−0.01 (0.07)	0.13 (0.09)
Delinquent behavior	Intercept	0.19 (0.04) *	0.47 (0.04) ***	0.50 (0.07) ***	1.06 (0.14) ***
	Slope	−0.26 (0.16)	−0.37 (0.12) **	0.10 (0.23)	1.01 (0.49) *
	Quadratic	0.20 (0.16)	0.14 (0.11)	−0.07 (0.20)	−0.31 (0.46)
	Cubic	−0.04 (0.04)	−0.01 (0.02)	0.02 (0.05)	−0.01 (0.10)

Note.

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$

Table 3

Summary Statistics (Mean with Standard Deviation or Percentage)

	Joint trajectory groups				Whole sample (N=816)
	Low depressive symptoms and low delinquent behavior (24%, n=201)	Decreasing depressive symptoms and low delinquent behavior (52%, n=424)	High depressive symptoms and low delinquent behavior (14%, n=112)	Medium depressive symptoms and high delinquent behavior (10%, n=79)	
Females	51.7% (n=104)	68.9% (n=292)	75.9% (n=85)	13.9% (n=11)	60.3% (n=492)
African Americans	61.7% (n=124)	51.2% (n=217)	45.5% (n=51)	41.8% (n=33)	52.1% (n=425)
Alcohol use at T1	0.2 (0.3)	0.3 (0.4)	0.4 (0.4)	0.5 (0.7)	0.3 (0.5)
Cigarette use at T1	0.2 (0.6)	0.3 (0.7)	0.5 (0.8)	0.5 (0.9)	0.3 (0.7)
Marijuana use at T1	0.1 (0.3)	0.1 (0.5)	0.3 (0.9)	0.4 (1.0)	0.2 (0.6)
Socioeconomic status at T1	6.2 (2.0)	6.1 (2.2)	5.8 (2.1)	6.1 (2.1)	6.1 (2.1)
SUDs at T5	4.0% (n=8)	5.7% (n=24)	12.5% (n=14)	29.1% (n=23)	8.5% (n=69)
	Females =1.9%	Females =3.1%	Females =8.2%	Females =9.1%	Females =3.9%
	Males=6.2%	Males=11.4%	Males=25.9%	Males=32.4%	Males=15.4%

Note. The answer options for alcohol use at T1 ranged from never (0) to three or more drinks every day (4). The answer options for cigarette use at T1 ranged from never (0) to more than a pack a day (5). The answer options for marijuana use at T1 ranged from never (0) to once a week or more (4). **Socioeconomic status at T1 was constructed by summing the scores of parent educational level and parent employment status. The score ranged from 1 to 10.**

Table 4

Adjusted Odds Ratios (confidence intervals) of Substance Use Disorders (T5) from Conjoint Trajectories of Depressive Symptom and Delinquent Behavior (T1–T4)

	Substance Use Disorders at T5
Gender	3.20 *** (1.66, 6.16)
Ethnicity	0.49 * (0.27, 0.89)
High depressive symptoms and low delinquent behavior vs. low depressive symptoms and low delinquent behavior	3.54 * (1.10, 11.34)
Medium depressive symptoms and high delinquent behavior vs. low depressive symptoms and low delinquent behavior	10.28 *** (3.41, 30.99)
Decreasing depressive symptoms and low delinquent behavior vs. low depressive symptoms and low delinquent behavior	1.44 (0.46, 4.57)

Note.

Males and Puerto Ricans coded higher score; Alcohol use at T1, cigarette use at T1, marijuana use at T1, **socioeconomic status at T1, income at T5, and educational level at T5** were not statistically significant at the level of 0.05.

*
 $p < .05$,

**
 $p < .01$,

 $p < .001$;