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Conjoint trajectories of depressive symptoms and delinquent behavior predicting substance use disorders

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HIGHLIGHTS

- First study of conjoint trajectories of depression & delinquency as related to SUDS
- Treatment of depressed individuals reporting SUDS should address their delinquency.
- Treatment of delinquent individuals reporting SUDS should address their depression.

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ABSTRACT

Aims: 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).
Methods: Of the 816 participants, 52% were African Americans, and 48% were Puerto Ricans. 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 *BPP* of the reference conjoint trajectory group to predict SUDs.
Results: 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, cigarettes, and marijuana, socioeconomic status (SES) at age 14, and income and educational level at age 36.
Conclusions: 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.

1. Introduction

Depressive symptoms and delinquent behavior are two common adolescent risk factors (Wolff & 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, Gillespie, Maes, Eaves, & Silberg, 2012; Reinke, Eddy, Dishion, & Reid, 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, Baetz, DeMarco, & Bell, 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 & Stoolmiller, 1999).

The present longitudinal 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, & Bachman, 2006). Bailey, Flewelling, and Valley 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

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(Green, Zebrak, Fothergill, Robertson, & Ensminger, 2012; Windle & 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 the use of 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, Compton, Stinson, & Grant, 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, & Beitman, 1990; Smith & Book, 2010). Wolitzky-Taylor, Bobova, Richard, Zinbarg, and Craske (2012) found that unipolar mood disorders diagnosed at baseline assessment were associated with the later onset of SUDs. Maslowsky, Schulenberg, O'Malley, and Kloska (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, John Horwood, & Ridder, 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, & 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, Kazdin, Hiripi, & Kessler, 2007; Odgers et al., 2008). Reef, Diamantopoulou, van Meurs, Verhulst, and van der Ende (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 et al. (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, Grant, Colliver, Glantz, & Stinson, 2004). Several college-based national studies have also reported a higher rate of marijuana use among men than among women (Bell, Wechsler, & Johnston, 1997; Johnston, O'Malley, Bachman, & Schulenberg, 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 of 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.

2. Data and methods

2.1. Participants

Data are from a five-wave longitudinal study of African American and Puerto Rican adolescents and young adults. The time 1 (T1; N = 1332; mean age = 14) data was collected in 1990, time 2 (T2; N = 1190; 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 Americans, and 48% (n = 391) were Puerto Ricans. Forty percent (n = 324) of the participants were males.

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%, was significantly lower than the percentage of males participating at T1 but not at T5, which was 57% ($\chi^2 = 36.2$, $p < .001$, df = 1). Those who participated at T1 and T5 reported a lower average delinquent behavior at T1 than the participants who participated at T1 but not at T5 ($t = 2.4$, $pf = 0.02$). 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 ($t = -2.1$, $p = 0.03$).

2.2. 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,