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Effect of adolescent substance use and antisocial behavior on the development of early adulthood depression

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ABSTRACT

Major depressive disorder (MDD) is a prevalent and frequently comorbid psychiatric disorder. This study evaluates the development of depressive symptoms, MDD diagnosis, and suicidal ideation in a high-risk sample ($N=524$) diagnosed with conduct disorder (CD) and substance use disorder (SUD) symptoms as youth and re-assessed approximately 6.5 years later. Dual trajectory classes of both alcohol and other drug use (AOD) and antisocial behavior (ASB), previously identified using latent class growth analyses (LCGA), were used to predict depression outcomes. The *Dual Chronic*, *Increasing AOD/Persistent ASB*, and *Decreasing Drugs/Persistent ASB* classes had higher past-week depression scores, more past-year MDD symptoms, and were more likely to have past-year MDD than the *Resolved* class. The *Dual Chronic* and *Decreasing Drugs/Persistent ASB* classes also had more past-year MDD symptoms than the *Persistent AOD/Adolescent ASB* class. Youth at highest risk for developing or maintaining depression in adulthood had the common characteristic of persistent antisocial behavior. This suggests young adulthood depression is associated more with persistent antisocial behavior than with persistent substance use in comorbid youth. As such, interventions targeting high-risk youth, particularly those with persistent antisocial behavior, are needed to help reduce the risk of severe psychosocial consequences (including risk for suicide) in adulthood.

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1. Introduction

Major depressive disorder (MDD) is one of the most common mental disorders. The past-year prevalence of MDD during adolescence and early adulthood reaches 12.4% (Kessler and Walters, 1998), and the lifetime prevalence in the U.S. general population is 16.6% (Kessler et al., 2005). MDD is associated with severe psychosocial consequences including role impairment, poor quality of life, and risk for suicide (Lewinsohn et al., 1998; Kessler et al., 2003) Because of these negative outcomes, depression has been a major focus of mental health prevention and intervention efforts, particularly in youth (Lewinsohn et al., 1995; Reinherz et al., 2000). Risk factors associated with higher levels of depressive symptoms in adolescence and early adulthood include low socioeconomic status (Melchior et al., 2013), delinquency or conduct problems (Kandel and Davies, 1982; Lewinsohn et al., 1994; Angold et al., 1999), cigarette smoking (Brook et al., 2004), and other substance use (Cook et al., 2007).

In U.S. epidemiological studies, MDD is associated with both alcohol use disorders (AUDs) and other substance use disorders (SUDs), as well as with conduct disorder (CD) and antisocial personality disorder (Regier et al., 1990; Kessler et al., 1996; Holdcraft et al., 1998; Wolff and Ollendick, 2006). Associations between SUDs and mood disorders are greater for dependence than abuse and are stronger in females than males (Conway et al., 2006). Longitudinal studies have demonstrated both unidirectional and reciprocal effects between SUDs and the development of MDD (Schuckit, 1983; Giaconia et al., 2001). Clinical studies indicate individuals with comorbid MDD and SUDs have poorer treatment outcomes (Schmitz et al., 2001; Kirchner et al., 2002; Cornelius et al., 2005).

Studies also demonstrate associations between depressive symptoms and antisocial behavior. For example, Bor and colleagues found adults with adolescent onset and life course persistent antisocial behavior exhibited elevated rates of depressive

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symptoms (Bor et al., 2010). Burke and colleagues reported that CD influenced later MDD through psychosocial impairment (Burke et al., 2005). In addition, some studies demonstrate that adolescent conduct problems tend to precede adult depression (Zoccolillo, 1992; Hofstra et al., 2002), and adults with histories of both CD and MDD have worse outcomes and poorer prognoses (Marmorstein and Iacono, 2003).

A few longitudinal studies have demonstrated prospective effects of adolescent antisocial behavior on later depression. The age of onset for antisocial behaviors usually precedes the age of onset for depression (Biederman et al., 1995; Nock et al., 2006) and data from the National Comorbidity Survey Replication study found that CD preceded depression in 72% of cases (Nock et al., 2006). These findings are consistent with a "failure model" hypothesis, which suggests depression results from the social and educational failures that often follow early onset antisocial behavior (Capaldi and Stoolmiller, 1999).

SUDs and antisocial behavior are often chronic conditions (Giaconia et al., 2001; Marmorstein and Iacono, 2003), and each have been shown to increase depression (Giaconia et al., 2001; Hofstra et al., 2002; Cornelius et al., 2005; Cook et al., 2007; Bor et al., 2010). The comorbidity of SUDs and antisocial behavior is well-documented, but few studies have investigated their combined influence on the emergence of depression. Wymbs et al. (2014) assessed early adolescent substance use as a risk factor for developing conduct disorder and depressive symptoms in a community sample of middle school students. Results indicated substance use predicted conduct disorder symptoms, but failed to predict depressive symptoms in last adolescence. Additional research is needed to understand how these comorbid disorders jointly influence the development of depression and affect psychosocial outcomes to improve our prognostic abilities and allow for better prevention and treatment of those at risk.

Trajectory analyses of longitudinal data increasingly have been used to examine substance use and antisocial behavior over time (Di Giunta et al., 2010; Ensor et al., 2010; Marti et al., 2010; Van Ryzin and Dishion, 2012). In addition, there are a few longitudinal studies using this methodology that have examined the effect of substance use and/or antisocial behavior on the development of depressive symptoms. For example, a study using trajectory analyses of an inpatient adult psychiatric sample found more severe depression trajectories were associated with female sex, trauma exposure, prior psychiatric hospitalization, and a primary MDD diagnosis, while a less severe depression trajectory was associated with AUDs/SUDs (Clapp et al., 2013). Wiesner et al. (2005) examined developmental trajectories in a sample of young adult offenders and found that even after controlling for antisocial propensity, parental criminality, demographic factors and baseline levels of each outcome, young adults who were chronic high-level offenders had higher levels of depressive symptoms compared with young adults in three other trajectory groups: very rare, decreasing low-level, and decreasing high-level offenders. Measelle et al. (2006) studied the temporal relationship between antisocial behavior and depression in adolescent girls using a developmental trajectory model and found that initial level of antisocial behavior predicted increases in depressive symptoms. Stice et al. (2004) evaluated data from 496 adolescent girls to test the temporal relationship between substance abuse and depression and reported that substance abuse symptoms predicted onset of depression. Using the same sample of adolescent girls, Marti et al. (2010) found problematic substance use and abuse trajectory groups showed elevations in depressive symptoms relative to non-problematic groups. The majority of these studies, to date, have only focused on the individual understanding of substance use or antisocial behavior on depression.

In a prior study from our laboratory, we used bivariate trajectory analyses to evaluate prospective data from a sample of high-risk youth who had both CD and SUD symptoms in adolescence (Trim et al., 2015). Using this novel person-centered analytic approach, we identified longitudinal patterns of conjoint substance use and antisocial behavior from adolescence into young adulthood. Five distinct subgroups were identified based on the combination of alcohol and other drug (AOD) use and antisocial behavior (ASB) trajectories: *Dual Chronic, Increasing AOD/Persistent ASB, Persistent AOD/Adolescent ASB, Decreasing Drugs/Persistent ASB,* and *Resolved*. The current study extends this work and evaluates depressive symptoms and diagnoses in these five subgroups to determine the combined influence of substance use and antisocial behavior on the development of depression in early adulthood. As a secondary outcome, we also examined suicidal ideation in those participants with a MDD diagnosis in early adulthood.

2. Methods

2.1. Participants

This study used a sample of youth 13–19 years of age and who were originally recruited for studies on familial transmission and genetic linkage of SUDs and CD (Derringer et al., 2015; Trim et al., 2015). The participants were recruited from three sites between 1993 and 2007: substance use treatment programs in Denver, Colorado ($n=352$); the Colorado criminal justice system ($n=202$); and treatment programs/alternative schools for behaviorally troubled youth in San Diego, California ($n=245$). All participants ($N=799$) met inclusion criteria for having at least one CD symptom and one non-tobacco alcohol or other drug symptom at the baseline assessment. Participants who completed a follow-up interview and were at least 19 years old at follow-up ($n=536$) were included in our prior study of bivariate trajectories (Trim et al., 2015). Depression measures were missing from 12 participants either at baseline or the early adult follow-up assessment. Thus, the current study includes 524 participants (66% of the initial sample) with a mean age of 16.1 ($SD=1.2$) years at baseline and a mean age of 22.6 ($SD=2.0$) years at follow-up approximately 6.5 years later. Attrition analyses revealed this subsample did not differ significantly from the initial sample on MDD severity ($p=.28$) or past-year MDD diagnosis ($p=.41$) at baseline, nor was there any evidence of bias due to attrition in any baseline demographic variables.

2.2. Measures

2.2.1. Baseline depression.

At baseline each participant completed the Diagnostic Interview Schedule for Children (DISC), a highly structured computerized interview designed for assessment of DSM-IV diagnoses by non-clinicians (Shaffer et al., 1993). In this study baseline DISC responses were used to assess the total count of past-year MDD symptoms and DSM-IV diagnosis of past-year MDD, which were used to examine potential baseline differences between trajectory classes and as covariates in the main analyses.

2.2.2. Follow-up depression.

At follow-up each participant completed the Center for Epidemiologic Studies Depression Scale (CES-D), a 20-item self-report measure of depressive symptoms during the past week (Radloff, 1977). The CES-D had high internal consistency in this sample (Cronbach's $\alpha=.88$). Participants also completed the Diagnostic Interview Schedule for DSM-IV (DIS-IV), a structured and computerized diagnostic interview designed for non-clinicians (Helzer et al., 1987). In this study DIS-IV responses were used to measure