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Does depression and substance abuse co-morbidity affect socioeconomic status? Evidence from a prospective study of urban African Americans

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Abstract

Studies have established a graded association between mental health and socioeconomic status (SES). However, scarce research has examined the impact of substance use disorders (SUD) and depression comorbidity on SES. We use data from the Woodlawn Study, a longitudinal cohort study, which recruited a cohort of first graders from Chicago starting 1966-1967 (N=1,242). Analyses focus on those interviewed in young adulthood and followed up through midlife. Regression analyses adjusting for childhood confounders showed that young adults with depression and SUD comorbidity had higher likelihood of having any periods of unemployment, higher likelihood of being unemployed for 3 or more months, and lower household income in midlife than those with neither disorder. Moreover, young adults with SUD without depression had higher odds of having any periods of unemployment and higher odds of being unemployed for 3 or more months than those with neither disorder. Findings point to the possibility of social selection where depression and SUD comorbidity contributes to a downward drift in SES. Clinical interventions that integrate the treatment of SUD and depression may be more effective at reducing socioeconomic disparities among minority populations.

Keywords

African American; Depression And Substance Use Disorders; Longitudinal Data; Social Selection; Psychiatric Comorbidity

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1. Introduction

Studies have established a graded association between socioeconomic status (SES) and health, including mental health. Socioeconomic differences in health have been shown to occur at every level of SES regardless of the measure employed (Williams, 1990; Adler et al., 1994). Specifically, research shows a higher prevalence of mental disorders among the lower social strata (Link and Dohrenwend, 1989; Dohrenwend et al., 1992; Kessler et al., 1994). Two hypotheses have been suggested to explain this socioeconomic gradient in mental health: social causation and social selection. Social causation theory posits that the stress and environmental adversity associated with low SES are contributing factors to the onset of mental disorders (e.g. Hollingshead and Redlich, 1958). On the other hand, social selection theory posits that people with mental disorders – whether caused by genetic predisposition and/or environmental factors and stress – tend to drift downwards in SES or fail to rise out of low SES (e.g., Wender et al., 1973).

While the literature is not conclusive regarding which theory has more support, Dohrenwend and colleagues (1992) showed that social causation may better explain depression in women and antisocial personality and substance use disorders in men while social selection is better suited for explaining schizophrenia. Another study by Johnson and colleagues (1999) showed that low family SES (maternal and paternal education and occupation, family income) was associated with higher risk of anxiety, depressive, disruptive, and personality disorders among offspring, whereas disruptive and substance use disorders among offspring were associated with their poor educational attainment. Thus, it seems that social causation and social selection processes differ in importance depending on the mental disorder being studied, and they may both operate at different times over the life course. However, from a health policy perspective, if indeed some mental disorders result in a downward drift in SES, then interventions that prevent or treat these disorders may have economic benefits to society.

An important gap in understanding this complex phenomenon is that individuals with mental health disorders tend to have a comorbid condition. Two of the most prevalent comorbid conditions are substance use disorders and depression (Helzer and Pryzbeck, 1988; Regier et al., 1990; Grant and Harford, 1995; Kessler et al., 1996). This consistent finding in the literature of a strong association between substance use disorders and depression has been documented in both national and community studies (Kessler et al., 1996; Swendsen et al., 1998; Grant et al., 2004; Roberts et al., 2007; Green et al., 2012). Moreover, each of these disorders as well as their comorbidity have been found to be associated with suicide and suicide attempts (Pompili et al., 2010), highlighting the importance of better understanding their consequences.

African Americans are an important study population to consider when examining the consequences of substance abuse disorders and depression comorbidity. Each of depression and substance abuse disorders has been shown to follow a chronic and persistent pattern among African Americans (Dawson et al., 2005; Walsemann et al., 2009) and the consequences of each of these disorders has been shown to be worse and more disabling in African Americans compared to other racial groups, including lower quality of life, higher

severity when these disorders are present, and lower rates of treatment (Caetano and Clark, 1998; Jackson-Triche et al., 2000; Williams et al., 2007; Sloan et al., 2009). In general, both substance use disorders and depression have separately been associated with poor SES outcomes. However, little is known about the prevalence of substance abuse and depression comorbidity and its effects on SES in the African American population that suffers disproportionately from poor socioeconomic outcomes (DeNavas-Walt et al., 2011).

The research literature has generally shown associations of each of substance abuse and depression with different indicators of SES. For example, there is strong evidence that substance use and abuse is associated with higher risk for poor educational attainment (Johnson et al., 1999; Green and Ensminger, 2006), negative effects on work performance (Siegal et al., 1996), unemployment (Green and Ensminger, 2006), negative employment outcomes among welfare recipients (Wickizer et al., 2000; Schmidt et al., 2007), and an increase in welfare dependency (Schmidt et al., 1998). Similarly, the literature shows that depression is associated with lower education (Miech and Shanahan, 2000), lower income (Whooley et al., 2002), and unemployment (Dooley et al., 1994; Whooley et al., 2002).

There is also evidence that together substance use disorders and depression lead to worse outcomes than either condition on its own. Studies have shown that individuals with comorbid substance abuse and depression are more frequent users of health services and have higher disability and worse treatment outcomes than those with one or none of these disorders (Drake et al., 1996; Burns and Teesson, 2002; Najt et al., 2011). However, scarce research has examined the impact of substance use disorders and depression comorbidity on socioeconomic status as described by the social selection hypothesis. Specifically, no studies have examined the socioeconomic effects of such comorbidity in the African American population, a minority group that has shown worse and more disabling outcomes for each of depression and substance use disorder than other racial groups.

This study attempts to bridge this gap in the literature by testing the social selection hypothesis through examining the impact of depression and substance abuse comorbidity in young adulthood on four measures of socioeconomic status in midlife among an African American sample: having any period of unemployment, unemployment for three or more months, household income, and poverty status. We compare individuals with a comorbid substance use disorder and major depression separately to individuals with either one of these mental health conditions and to individuals with neither condition to determine if comorbidity is worse in terms of socioeconomic outcomes than the single condition. Understanding the contribution of comorbid substance use and depression to poor SES offers potential opportunities for intervention among disadvantaged populations.

2. Methods

2.1 Population

The Woodlawn Study is a prospective, longitudinal cohort study of urban African Americans, which began in 1966-67, by recruiting an entire cohort of first graders from the Woodlawn neighborhood on the south side of Chicago (N=1,242, 52% female, 48% male). The study population included all children who attended one of the 12 public or private

schools in the neighborhood. Only 13 families declined participation, minimizing selection bias. At the study's initiation, Woodlawn was the fifth poorest community of the 76 community areas in Chicago, and yet variability existed in terms of socioeconomic outcomes due to residential segregation in the 1960s. In first grade, mothers provided in-depth interviews on the focal child and first grade teachers provided information on the child's classroom behavior and performance. The youth were followed up in adolescence (1976-77, age 16, N=705), young adulthood (age 32-33, N=952), and midlife (age 42-43, N=833). The current analyses focus on those interviewed in young adulthood with complete data to allow for diagnoses of depression and substance use disorders, excluding 18 individuals who were incarcerated at the midlife follow-up and unable to provide relevant SES outcomes, resulting in a final sample size of 935 after multiple imputation to handle missing data in midlife. This study has been approved by the Institutional Review Boards at the University of Maryland. Additional details on the Woodlawn Study are available in the literature (Kellam et al., 1977; Kellam et al., 1980; Ensminger et al., 2002; Fothergill et al., 2009).

2.2 Attrition

Attrition analyses comparing individuals who were re-assessed over time to those who were lost to follow-up reveal some differences. Only those who remained in Chicago were assessed in adolescence. Those interviewed in young adulthood did not differ on maternal education, first grade teacher ratings of behavior, or adolescent drug use. There were differences on first grade poverty status and family type. Those interviewed in midlife compared to those who were not showed no differences on numerous socioeconomic indicators including mother's education, childhood or adolescent poverty status or welfare receipt, or educational attainment in young adulthood. Significant differences were found based on gender, SUD, criminal record and marital status in young adulthood. Women and married individuals were more likely to be interviewed than men and unmarried individuals. Those with a substance use disorder in young adulthood were more likely to be deceased by midlife. Additional attrition analyses are provided elsewhere (Kellam, Brown & Fleming, 1982; Ensminger, Juon & Fothergill, 2002; Crum et al., 2006).

2.3 Measures

Main independent variable—Substance use and depression comorbidity by young adulthood (age 32-33) served as the primary independent variable. Individuals were classified as having comorbid substance use disorder (SUD) and major depression, major depression without a lifetime substance use disorder (SUD), a substance use disorder (SUD) without lifetime major depression, or neither. Lifetime major depression was assessed during the young adult interview using a module from the University of Michigan version of the Composite International Diagnostic Interview (UM-CIDI), a fully structured research diagnostic interview designed to assess mental health disorders in epidemiologic surveys by trained interviewers who are not clinicians (Kessler et al., 1994, Wittchen, 1994). A diagnosis of major depression is based on Diagnostic and Statistical Manual for Mental Disorders Revised Third Edition (DSM III-R, American Psychiatric Association (APA), 1987) criteria. The UM-CIDI was also used to assess substance abuse and dependence according to DSM III-R criteria (Kessler et al., 1994). Adult interviews assessed abuse and

dependence of alcohol, marijuana, cocaine, heroin, analgesics, inhalants, hallucinogens, barbiturates, tranquilizers, stimulants, and sedatives. Those meeting criteria for either abuse or dependence of any substance at young adulthood according to DSM III-R criteria were classified as having a lifetime substance use disorder (SUD).

Outcome variables—We included four outcome variables that were collected during the midlife interview. First we examined having any period of unemployment during the past 10-years (the interval between the young adult and the mid-adult interviews, 1=yes, 0=no). Sixty percent of individuals had some period of unemployment in the past 10 years, regardless of length. We also examined a significant period of unemployment including a variable that represented a period of unemployment of 3-months or more since the young adult interview (1=yes, 0=no); 45% had a period of unemployment of 3 months or more in the past 10 years. Household income before taxes for the previous year was self-reported on an 18-point scale (1=under \$1,000 and 19=100,000 or more, mean = 9.82). We also included poverty status (1=yes, 0=no) for the previous year. This poverty measure was based on federal guidelines for household income and family size. We chose four different indicators of SES as these indicators are not interchangeable and tap into different aspects of SES. While each indicator is suggestive of a person's position in the socioeconomic hierarchy, they may have a different relationship with comorbid depression and substance use.

Control variables—*Gender* was coded as 1=men, 0=women, with women serving as the reference group. *Childhood poverty status* was based on Federal guidelines and was established using mothers' reports in first grade of total household income and composition for the year preceding the mothers' interviews. *First grade aggressive behavior* was based on teacher reports using the Teacher Observation of Classroom Performance (0=adapting, 1=mildly maladapting, 2=moderately maladapting, 3=severely maladapting), whose validity and reliability is well established (Kellam et al., 1975). At the first grade interview, mothers reported the *number of years of schooling* they received (range=0 to 22), as well as their frequency of *depressive feelings* (0=hardly ever, 1=occasionally, 2=fairly often, and 3=very often). *High school dropout* was based on self-reports in young adulthood, as well as school records obtained from the Chicago department of education. We compared individuals who graduated from high school or obtained a General Education Development exam (GED) (=1) to individuals who dropped out (=0).

2.4 Analysis

First, to examine differences between the mental health groups on background characteristics, we conducted chi-square tests and ANOVAs. Then, to reduce bias due to differential attrition, we first employed multiple imputation techniques to handle missing data, which has been shown to produce unbiased estimates and standard errors (Graham, 2009; White et al., 2011). Since data was assumed to be missing at random (i.e., conditional on observed variables), we imputed 40 datasets to maximize study power (Graham et al., 2007) and lessen bias due to differential attrition. For subsequent regression analyses, the 40 datasets were combined according to Rubin's rule (1987) using StataSE11.2. We employed unadjusted and adjusted logistic regression for the midlife unemployment outcomes and poverty status and linear regression for household income. Adjusted analyses controlled for

gender, childhood family poverty, aggressive behavior in first grade, mother's education and depressive symptoms, and high school dropout. These analyses also held constant age, race, and childhood neighborhood by design. For all regression analyses we varied the reference group to allow us to compare the comorbid group to all other groups, as well as each of the three mental health disorder groups (comorbid depression and SUD, SUD without depression, and depression without SUD) to those without any of these conditions. For all outcome analyses, we tested for gender interactions since previous work suggests that SES outcomes of substance use and depression may vary by gender (Stuart and Green, 2008; Hudson et al., 2012). None of the gender interactions were statistically significant at the $p < 0.05$ level and therefore are not reported.

3. Results

3.1 Descriptive Statistics

Table 1 provides descriptive statistics of the study sample by SUD/depression comorbidity status. We found 7.1% of the population had comorbid SUD and depression, 8.6% had depression without SUD, 11.9% had SUD without depression, and 72.5% had neither mental health condition. As expected, men were overrepresented among those with substance use disorders, regardless of comorbidity with depression; 60.6% of those with comorbid SUD and depression and 65.8% of those with a SUD without depression are men. In contrast, women were overrepresented in the depression without a substance use disorder as 67.5% of individuals with depression without a substance use disorder are women, and these gender differences were statistically significant ($p < 0.001$). We also found that individuals with depression had the highest rate of childhood poverty of the four groups compared ($p = 0.036$). The groups did not differ substantially on either mother's years of schooling or her level of depressive symptoms. We did find statistically significant differences on childhood aggressive behavior ($p = 0.006$) with those with depression or a substance use disorder without the other condition having higher levels of childhood aggressive behavior. The majority of the study sample (79.7%) had a high school degree/GED, and rates differed by comorbidity status; those with an SUD without depression had the lowest rate of having a high school degree/GED (70.2%), followed by those with comorbid depression and substance use disorder (76.7%).

3.2 Logistic Regression Analyses

3.2.1 Dependent variable: any periods of unemployment between young adulthood and midlife—As shown in Table 2, unadjusted logistic regression analyses showed that people with depression and SUD comorbidity at age 32 had more than twice the odds of having any periods of unemployment between ages 32 and 42 than those with neither disorder (OR=2.63, $p = 0.004$). Moreover, young adults with SUD without depression had significantly higher odds of having any periods of unemployment than those with neither disorder (OR=2.04, $p = 0.005$). Adjusted logistic regression analyses showed similarly significant results for comorbid depression and SUD versus neither (OR=2.64, $p = 0.005$) and for SUD without depression versus neither (OR=1.91, $p = 0.014$) in relation to any periods of unemployment.

3.2.2 Dependent variable: unemployment for 3 or more months between young adulthood and midlife

—As shown in Table 3, unadjusted logistic regression analyses showed that people with depression and SUD comorbidity at age 32 had more than twice the odds of being unemployed for 3 or more months between ages 32 and 42 than those with neither disorder (OR=2.70, $p=0.003$). Moreover, young adults with SUD without depression had significantly higher odds of being unemployed for 3 or more months than those with neither disorder (OR=1.89, $p=0.007$). Adjusted logistic regression analyses showed similarly significant results for comorbid SUD and depression versus neither (more than twice the odds, OR=2.64, $p=0.005$) and for SUD without depression versus neither (OR=1.70, $p=0.032$) in relation to unemployment for 3 or more months.

3.2.3 Dependent variable: current poverty level at midlife

—As shown in Table 4, unadjusted logistic regression analyses showed that only young adults with depression without SUD had significantly higher odds of being poor in midlife than those with neither disorder (OR=1.97, $p=0.011$). However, this relationship became non-significant in the adjusted analyses (OR=1.54, $p=0.147$).

3.2.4 Dependent variable: current household income (18-point scale) at midlife

—As shown in Table 5, unadjusted linear regression analyses showed that people with comorbid SUD and depression at age 32 had significantly lower household incomes at age 42 than those with neither disorder ($=-1.90$, $p=0.006$). Similarly, young adults with depression without SUD had significantly lower household incomes than those with neither disorder ($=-1.23$, $p=0.004$). In adjusted linear regression analyses, only young adults with comorbid SUD and depression had significantly lower household incomes than those with neither disorder ($=-1.84$, $p=0.006$).

4. Discussion

The results of this study underscore the substantial prevalence of substance use disorders, major depression, and their comorbidity within this urban community cohort of African Americans. Around 7.1% of the sample had comorbid SUD and depression and in total, over one in four (27.5%) of the sample had one or both of these mental disorders in their lifetime.

This is also one of the first prospective studies spanning childhood to midlife to examine the association of comorbid substance abuse and depression by young adulthood with socioeconomic status indicators in midlife. We found that individuals with comorbidity of these two disorders had higher likelihood of having any periods of unemployment, higher likelihood of being unemployed for 3 or more months, and had lower household income in midlife (age 42-43) than those who did not have either disorder. These findings, although not causal, point to the possibility of social selection; where substance abuse and depression comorbidity, in particular, may contribute to a downward drift in SES or a failure to rise out of low SES. Clinical interventions that integrate the treatment of both substance abuse and depression have been proven to result in better outcomes among patients with these comorbidities than traditional interventions (Drake et al., 1996). Thus, these integrated treatments may be more effective at reducing socioeconomic disparities among minority and

disadvantaged populations than traditional interventions that treat substance abuse and depression separately given the high prevalence of comorbidity in these populations.

We did not find a statistically significant association between young adult depressive and substance use disorders and midlife poverty status, despite their association with unemployment and income. It is possible that individuals with mental health conditions may receive family support that prevents poverty despite the increased risk of unemployment. It is also possible given the significant relationship between comorbidity, unemployment and lower income that over time the association with poverty may emerge. These are potential areas for future research.

While our study only examined the possibility of social selection, other studies have also found evidence of social causation in the relationship between SES and comorbid substance abuse and mental health problems. For example, Lee and colleagues (2013) found high school graduation was related to the co-occurrence of mental health and substance abuse disorder symptoms in young adulthood while Salom and colleagues (2014) provided evidence that prenatal socioeconomic disadvantage predicted comorbid alcohol and mental disorders at age 21. In a previous research paper using data from the Woodlawn study, Green and colleagues (2012) found that mother's education measured in childhood differentiated those with comorbid substance use and depressive disorders compared to those with depression without a substance use disorder, but dropping out of high school only distinguished those with a substance use disorder without depression from those with depression without a substance use disorder and from those with neither condition. Thus evidence suggests that both social selection and causation phenomena may be operating over time.

We also found evidence of substance use disorders having a potentially negative impact on SES. Specifically, having substance use disorders without depression at age 32 was associated with a higher likelihood of any periods of unemployment between ages 32 and 42 and higher likelihood of being unemployed for 3 months or more compared to those with neither disorder. These associations are consistent with the literature on substance use disorders and unemployment (Henkel, 2011) and underscore the importance of interventions to decrease the prevalence of substance use disorders, which may in turn improve people's socioeconomic outcomes.

Findings from control variables highlight the sustained effect of earlier low education and poor SES outcomes more than 20 years later, even among a community cohort growing up in a low-income community. We found that high school dropouts had higher probability of lower SES, regardless of the measure employed, than those who did not drop out of high school. Moreover, the lower the mothers' years of education the higher the likelihood of being poor and of being unemployed for 3 or more months between ages 32 and 42, as well as, the lower the household income at age 42. In addition, higher scores on first grade aggression were associated with lower household income at age 42 and increased likelihood of being poor. These results underscore the role of individual and family education in people's ability to get employment, earn higher incomes, and escape poverty. School-based prevention programs targeted at reducing high school dropout rates, state investments in

early childhood education and state policies aimed at remedying disparities among schools in educational tools, services, and opportunities are potential strategies that can improve employment outcomes and raise people's potential incomes, especially for disadvantaged populations such as African Americans.

Limitations

The results of this study should be interpreted while taking into consideration the following limitations. The study sample consisted of African Americans living in an inner city community of Chicago in 1966 and thus findings can likely be generalizable to populations with similar demographic composition, from a similar birth cohort, and similar inner city community characteristics. Their generalizability to other populations, such as other racial groups or White low-income populations, should be tested. Moreover, generalizability of the study results may have been influenced by attrition, which we tried to address by using multiple imputation techniques. We did not examine other mental disorders that are known to co-occur with substance abuse and depression such as anxiety disorders, but these are important areas of research for future studies. Finally, while the longitudinal design of our study controls for temporal precedence and selection bias to some extent, our ability to draw causal inferences remains limited due to the observational nature of the data. We did attempt to take into account selection bias by controlling for a range of social and behavioral influences over the life course, including SES of the family of origin. Regardless, we remain cautious in drawing causal inferences regarding the relationship between substance abuse and depression and the different socioeconomic indicators.

Conclusion

This study showed that, in a cohort of African Americans, young adults with comorbid substance abuse and depression have a higher likelihood of experiencing unemployment and having lower incomes in midlife than those without either condition. Individuals with substance abuse disorders also have a higher likelihood of unemployment in midlife. Thus, policymakers interested in decreasing socioeconomic disparities could target resources towards interventions aimed to reduce depression and substance abuse comorbidity as well as substance abuse among minority populations. In terms of methodology, study results suggest that research on SES and mental health could benefit from studying comorbid mental disorders, rather than focusing on each disorder separately, as results show a high level of overlap and strongest effects for those with comorbid depression and substance use disorder. Future research should continue to examine whether there is a causal relationship between comorbid substance abuse and depression and SES using longitudinal data with multiple data points, carefully taking into account selection effects.

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Table 1
Descriptive Characteristics of the Woodlawn Cohort by SUD/Depression Comorbidity Status

	SUD and Depression (N=66)	Depression Without SUD (N=80)	SUD without Depression (N=111)	Neither (N=678)	Total (N=935)	F-statistic or Chi-Square, P-value
Male	60.61%	32.50%	65.77%	44.54%	47.17%	Chi-square =28.97, p<0.001
Childhood poverty status	55.38%	65.33%	45.79%	49.30%	50.67%	Chi-square = 8.53, p=0.036
Mother's years of schooling (range 0-22)	10.94	10.00	10.73	10.64	10.62	F=2.46, p=0.061
Mother's depressive feelings (0=hardly ever, 3=very often)	0.75	0.91	0.76	0.88	0.86	F=1.08, p=0.359
1 st grade teacher's rating of aggressive behavior (0=adapting, 3=severely maladapting)	0.54	0.70	0.73	0.46	0.52	F=4.19, p=0.006
High School graduate/GED	76.67%	77.88%	70.18%	81.73%	79.67%	Chi-square =8.71, p=0.033

Table 2
Logistic Regression Analyses of the Association between Substance Use and Depression
Comorbidity at Age 32 and Any Period of Unemployment Between Ages 32 and 42

	Unadjusted Analysis			Adjusted Analysis		
	Odds Ratio	P value	95% Confidence Interval	Odds Ratio	P value	95% Confidence Interval
Independent Variable						
Comorbid vs. Depression w/o SUD	1.69	0.208	0.75, 3.81	1.85	0.150	0.80, 4.27
Comorbid vs. SUD w/o Depression	1.29	0.522	0.59, 2.79	1.38	0.424	0.63, 3.05
Comorbid vs. Neither	2.63	0.004	1.37, 5.07	2.64	0.005	1.35, 5.15
Depression w/o SUD vs. Neither	1.56	0.098	0.92, 2.63	1.43	0.199	0.83, 2.45
SUD w/o Depression vs. Neither	2.04	0.005	1.24, 3.36	1.91	0.014	1.14, 3.20
Control Variables						
Male gender	-	-	-	0.94	0.693	0.68, 1.29
Childhood poverty status	-	-	-	1.02	0.930	0.71, 1.45
Mother's years of schooling	-	-	-	0.94	0.117	0.87, 1.01
Childhood aggressive behavior	-	-	-	1.12	0.264	0.92, 1.35
Mother's depression	-	-	-	0.98	0.788	0.81, 1.17
High School Graduate/GED	-	-	-	0.47	<0.001	0.31, 0.71

Table 3
Logistic Regression Analyses of Association between Substance Use and Depression
Comorbidity at Age 32 and Being Unemployed for Three or More Months between Ages
32 and 42

	Unadjusted Analysis			Adjusted Analysis		
	Odds Ratio	P value	95% Confidence Interval	Odds Ratio	P value	95% Confidence Interval
Independent Variable						
Comorbid vs. Depression w/o SUD	1.84	0.128	0.84, 4.02	1.98	0.097	0.88, 4.46
Comorbid vs. SUD w/o Depression	1.43	0.358	0.67, 3.06	1.55	0.277	0.70, 3.42
Comorbid vs. Neither	2.70	0.003	1.39, 5.23	2.64	0.005	1.33, 5.21
Depression w/o SUD vs. Neither	1.47	0.138	0.88, 2.44	1.33	0.290	0.79, 2.25
SUD w/o Depression vs. Neither	1.89	0.007	1.19, 2.99	1.70	0.032	1.05, 2.76
Control Variables						
Male gender	-	-	-	1.10	0.556	0.80, 1.52
Childhood poverty status	-	-	-	1.17	0.377	0.83, 1.64
Mother's years of schooling	-	-	-	0.92	0.024	0.85, 0.99
Childhood aggressive behavior	-	-	-	1.13	0.228	0.93, 1.38
Mother's depression	-	-	-	0.86	0.112	0.71, 1.04
High School Graduate/GED	-	-	-	0.50	0.001	0.33, 0.77

Table 4
Logistic Regression Analyses of the Association between Substance Use and Depression
Comorbidity at Age 32 and Poverty at Age 42

Independent Variable	Unadjusted Analysis			Adjusted Analysis		
	OR	P value	95% Confidence Interval	OR	P value	95% Confidence Interval
Comorbid vs. Depression w/o SUD	0.76	0.471	0.35, 1.62	1.11	0.804	0.48, 2.60
Comorbid vs. SUD w/o Depression	1.22	0.630	0.54, 2.76	1.55	0.354	0.61, 3.90
Comorbid vs. Neither	1.48	0.239	0.77, 2.87	1.72	0.148	0.83, 3.56
Depression w/o SUD vs. Neither	1.97	0.011	1.16, 3.32	1.54	0.147	0.86, 2.76
SUD w/o Depression vs. Neither	1.22	0.477	0.71, 2.08	1.11	0.746	0.59, 2.08
Control Variables						
Male gender	-	-	-	0.46	<0.001	0.30, 0.69
Childhood poverty status	-	-	-	1.11	0.654	0.74, 1.63
Mother's years of schooling	-	-	-	0.85	<0.001	0.78, 0.92
Childhood aggressive behavior	-	-	-	1.37	0.003	1.16, 1.69
Mother's depression	-	-	-	0.99	0.892	0.79, 1.22
High School Graduate/GED	-	-	-	0.22	<0.001	0.15, 0.34

Table 5
Linear Regression Analyses of the Association between Substance Use and Depression
Comorbidity at Age 32 and Current Household Income at Age 42

	Unadjusted Analysis			Adjusted Analysis		
	β	P value	95% Confidence Interval	B	P value	95% Confidence Interval
Independent Variable						
Comorbid vs. Depression w/o SUD	-0.16	0.853	-1.87, 1.55	-0.75	0.360	-2.37, 0.86
Comorbid vs. SUD w/o Depression	-0.85	0.313	-2.51, 0.81	-1.14	0.155	-2.72, 0.43
Comorbid vs. Neither	-1.90	0.006	-3.25, -0.54	-1.84	0.006	-3.14, -0.54
Depression w/o SUD vs. Neither	-1.23	0.004	-2.92, -0.55	-1.09	0.058	-2.21, 0.04
SUD w/o Depression vs. Neither	-1.04	0.062	-2.14, 0.05	-0.70	0.194	-1.75, 0.35
Control Variables						
Male gender	-	-	-	0.92	0.006	0.27, 1.57
Childhood poverty status	-	-	-	-0.53	0.135	-1.22, 0.17
Mother's years of schooling	-	-	-	0.23	0.003	0.08, 0.38
Childhood aggressive behavior	-	-	-	-0.70	0.001	-1.09, -0.31
Mother's depression	-	-	-	-0.04	0.851	-0.42, 0.34
High School Graduate/GED	-	-	-	3.45	<0.001	2.66, 4.24