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The Role of Insurance in the Treatment of Adolescents with Co-Occurring Major Depressive Episode and Substance Use Disorder

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Harvard University
2010

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An abstract of
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Abstract

The Role of Insurance in the Treatment of Adolescents with Co-Occurring Major Depressive Episode and Substance Use Disorder
By Laura Ann DiCola

Little is known about the treatment received by adolescents with co-occurring psychiatric and substance use disorders (SUD). Even among adolescents with only one diagnosis, the factors associated with treatment, insurance status in particular, are not fully understood. Prior studies examining the role of insurance in treatment have not differentiated between forms of private insurance coverage that do and do not cover mental health and/or substance abuse treatment. A better understanding of the role of insurance is necessary given recent legislative efforts to improve treatment rates through insurance coverage expansions and equalizing benefits for mental health and substance abuse treatment. We examined the patterns and predictors of treatment for major depressive episode (MDE) and SUD in U.S. adolescents with co-occurring MDE and SUD. Data came from seven years (2004-2010) of the National Survey on Drug Use and Health, a cross-sectional annual survey that collects information about of the use of alcohol, tobacco, and illicit drugs in the United States' noninstitutionalized civilian population. Using logistic regression, we examined the effect of insurance status on any treatment for MDE, treatment for MDE by a mental health professional, treatment for MDE by a medical professional, any treatment for SUD, treatment for SUD in a specialty setting, and treatment for SUD in a self-help group. We found overall treatment rates of only 47.7% for MDE and 10.2% for SUD. Public insurance and private insurance that covered mental health treatment were both positively associated with any treatment for MDE and treatment for MDE by a mental health professional. Public insurance also improved adolescents' odds of treatment for SUD in a specialty setting. The observed association of public and private insurance with MDE treatment supports the idea that expansions in public insurance coverage and benefit parity in private insurance plans may improve adolescent treatment rates. On the contrary, the exceptionally low rate of treatment for SUD and the limited associations between public and private insurance coverage and SUD treatment suggest that increased screening and integration of SUD treatment services may be more effective than changes in insurance coverage in improving rates of treatment.

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Table of Contents

List of Tables

List of Abbreviations

ACA	Affordable Care Act of 2010
ACASI	Audio computer-assisted self-interviewing
CAPI	Computer-assisted personal interviewing
CDC	Centers for Disease Control and Prevention
CSAT	SAMHSA's Centers for Substance Abuse Treatment
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders – 4th Edition
MH	Mental Health
MHSA	Mental Health and Substance Abuse/Dependence
MHPAEA	Mental Health Parity and Addiction Equity Act of 2008
MDD	Major Depressive Disorder
MDE	Major Depressive Episode
NSDUH	National Survey on Drug Use and Health
PI	Private Insurance
SAMHSA	U.S. Substance Abuse and Mental Health Services Administration
SCHIP	State Children's Health Insurance Program
SUD	Substance Use Disorder
Tx	Treatment

Chapter 1 - Introduction

Major depressive episodes (MDE) and substance use disorders (SUD) affect millions of adolescents in the United States (U.S.), but only a small fraction of those in need of treatment access care (SAMHSA 2010b). Depression in adolescents is associated with such severe consequences as suicide, future depressive episodes, and work and social role impairment, while substance use is associated with lower educational attainment, risky sexual behavior, greater disciplinary problems, and a host of adverse medical conditions (Weissman et al. 1999; Fergusson & Woodward 2002; Rao et al. 1995; Levy & Deykin 1989; Shaffer et al. 1996; Crumley 1990; CDC 1995; Hicks, Iacono & McGue 2010; Tapert, Aarons, Sedlar & Brown 2001; NIDA 2012; Stein 1999). Understanding patterns of treatment for adolescents with co-occurring MDE and SUD is therefore especially important given the severe impairment and poor health outcomes these individuals experience.

While understanding populations with co-occurring disorders presents a special challenge, the predictors of adolescent treatment for MDE or SUD individually are not fully understood. Only a few studies have analyzed the factors that affect treatment rates for adolescents in need of treatment, and the effect of insurance coverage on treatment for MDE and SUD in these studies has been variable. Our study is the first to address how private and public insurance coverage affect treatment rates in a population of adolescents with co-occurring disorders.

This study will therefore (1) describe treatment patterns for adolescents with co-occurring MDE and SUD, (2) identify the effect of insurance coverage on this population's receipt of treatment for MDE and SUD, and (3) discuss these findings in the context of recent

national healthcare insurance legislation, the Affordable Care Act (ACA) of 2010 and the Mental Health Parity and Addiction Equity Act (MHPAEA) of 2008.

Chapter 2 – Literature Review

The Prevalence and Consequences of Major Depressive Episode and Substance Use Disorders in U.S. Adolescents

Eight percent of U.S. adolescents (ages 12-17) experienced a MDE in 2010 (SAMHSA 2010b). SUDs, including illicit drug and/or alcohol dependence and abuse, affected 7.3 percent of U.S. adolescents (SAMHSA 2010b). The co-occurrence of these disorders was also very common: approximately one-fifth adolescents with past-year MDE also had at least one past-year SUD and approximately one-fifth of adolescents with at least one SUD also had past-year MDE (SAMHSA 2010b).[1]

Major depression and substance abuse are both associated with severe medical and economic consequences. Major depression in adolescents is associated with significantly increased likelihood of thoughts of suicide, suicide attempt, and completed suicide (Levy & Deykin 1989; Shaffer et al. 1996). These associations are significant given that suicide was the third leading cause of death for U.S adolescents between 2004 and 2009 (CDC 2012). Adolescent onset of depression is also associated with suicide attempts, depressive episodes, and role impairment in adults (Weissman et al. 1999; Fergusson & Woodward 2002; Rao et al. 1995). As a result of this excess mortality and morbidity, depression is associated with a multi-billion dollar economic burden in the U.S. (Greenberg 2003).

Substance abuse is also an independent risk factor for suicidal ideation and completion in adolescents (Bukstein et al. 1994; Levy & Deykin 1989; Shaffer et al. 1996;

[1] Dependence and abuse are mutually exclusive diagnoses for a single substance. However it is possible for an adolescent to have more than one SUD if they abuse or are dependent on more than one substance (i.e. an adolescent can have both alcohol dependence and illicit drug abuse, but not alcohol dependence and alcohol abuse). However, in this study, adolescents with multiple SUDs are not differentiated from those with only one SUD and adolescents with multiple MDEs in the past year are not differentiated from those with only one past-year MDE. Adolescents with co-occurring disorders refers to adolescents with at least one past-year MDE and at least one past-year SUD.

Crumley 1990). The U.S. National Highway Traffic Safety Administration also found that more than half of all fatal crashes involving adolescents ages15-17 involved alcohol intoxication (CDC 1995). In addition to increased mortality, substance abuse in adolescents has also been associated with lower educational attainment, greater disciplinary problems, more sexual risk-taking, and higher pregnancy rates (Hicks, Iacono & McGue 2010; Tapert, Aarons, Sedlar & Brown 2001). Long-tem, alcohol and drug use disorders have also been linked to a host of adverse medical risk factors and adverse health conditions, including liver cirrhosis, hypertension, stroke, heart failure, and sudden death (NIDA 2012; Stein 1999).

Adolescents with both major depressive disorder (MDD) and substance use also have significantly higher rates of suicide attempt than adolescents with only one disorder (Lewinsohn, Rohde, & Seeley 1995). Lewinsohn, Rohde, and Seeley (1995) also found that adolescents with lifetime MDD and substance use were more likely to have academic problems and poor global functioning than their peers with MDD alone, although the authors did not control for potential confounding factors. However, a similar uncontrolled study of adults with MDD found that those with concurrent SUD symptoms had a more negative self-outlook, more mood variation, and greater functional impairment than their peers with MDD alone (Davis 2005, 2006).

Despite the existence of effective treatments, only 37.8 percent of affected adolescents received any form of treatment for MDE and only 7.6 percent of affected adolescents received any form of treatment for SUD in the past year (SAMHSA 2010b). Among adolescents with MDE and co-occurring alcohol abuse/dependence or illicit drug abuse/dependence, still fewer than half (44.7 percent and 46.0 percent respectively) received any form of MDE treatment (Cummings & Druss 2011). There are no known estimates for

the SUD treatment rate in adolescents with co-occurring MDE and SUD. Given the severe under-treatment and consequences of substance abuse and depression in adolescents described above, there is an imperative to elucidate the barriers to treatment for this population.

Insurance Coverage and Treatment for MDE and SUD

Background

One of the largest and most common barriers to treatment for MDE and SUD is cost; in the U.S., the cost of services to patients is significantly affected by insurance coverage and plan benefits. With respect to coverage, 54 percent of children and adolescents in the U.S. are covered by private insurance. Another 36 percent are covered by public insurance programs (including Medicaid and the State Children's Health Insurance Program, SCHIP) and 10 percent are uninsured (KFF 2010). Adults ages 19-64 are also primarily covered by private insurance (65 percent) but only 13 percent are covered by public insurance and fully 22 percent are uninsured (KFF 2010). Children and adolescents are therefore both more likely to be covered by insurance overall and to be covered by public insurance than their adult counterparts (KFF 2010).

Until 1996, almost all private insurance plans had limited annual or lifetime benefits for mental health and substance abuse/dependence (MHSA) treatment and/or required higher copays and coinsurance for MHSA office visits than for medical office visits (Frank et al. 1996). The limitations imposed for MHSA coverage were motivated by findings from the RAND Health Insurance Experiment demonstrating that MHSA treatment utilization is especially susceptible to problems of moral hazard, as well as by insurers' fear of adverse selection of mentally ill patients into their risk pools (Frank et al. 1996; Glied et al. 1998; Manning et al. 1987). However, as noted by the U.S. Surgeon General, in practice, these

regulations limited not only excessive use of services but appropriate use as well (USDHHS 1999).

Changes to these limitations began in 1996 with the passage of the Mental Health Parity Act, the first piece of national legislation to require that annual and lifetime benefits for mental health treatment be offered at parity with those for medical/surgical treatment. However, parity was not extended to substance use treatment nor used to equalize copays or coinsurance for MHSA and medical treatment. Only since the passage of the MHPAEA in 2008 has there been national legislation mandating that MHSA treatment benefits (including copays and visit caps) be equivalent to those offered for medical/surgical treatment. The MHPAEA also extends parity requirements to Medicaid managed care plans (Bazelon 2008).

While the MHPAEA addresses MHSA benefit limitations, the ACA was designed to reduce barriers to MDE and SUD treatment primarily through expanding insurance coverage. Specifically, the ACA aims to provide more adolescents with insurance coverage by expanding Medicaid and streamlining Medicaid's enrollment and renewal procedures (Kenney & Pelletier 2010). In addition, under the ACA, private insurance companies will no longer be able to deny benefits to adolescents with pre-existing conditions (Kenney & Pelletier 2010). The ACA additionally extends parity requirements to Medicaid benchmark and benchmark-equivalent plans (Bazelon 2008).

It is unclear, however, what effect these two new pieces of legislation will have on treatment rates for adolescents with MDE and SUD. In particular, while the MHPAEA requires parity for MHSA benefits, it does not require these insurers to offer any benefits (Kenney & Pelletier 2010). Consequently, the law applies only to those plans that offer some MHSA coverage (Kenney & Pelletier 2010).

Perhaps more importantly however, the relationship between private and public insurance and MHSA treatment access may not be as direct as for medical treatment access. In the next section, evidence concerning the effect of insurance on MHSA treatment is reviewed.

Public Insurance Coverage and Treatment for MDE

Several studies found that public insurance coverage was associated with significantly improved odds of mental health treatment relative to the uninsured. Using a nationally representative sample of adolescents and controlling for gender, age, race/ethnicity, family status, health status, family income, and SUD diagnoses, Cummings and Druss (2011) found that public insurance coverage was associated with significantly higher rates of MDE treatment among adolescents with MDE. Using three years of data (1996-1998) from the National Survey of American Families, Kataoka, Zhang, and Wells (2002) found that public insurance was associated with lower odds of unmet need for mental health treatment in children (ages 3-17) after controlling for age, gender, race, and income in their regression analyses. Burns et al. (1997) also determined that public insurance was associated with significantly improved use of professional mental health and outpatient services by adolescents with serious emotional disturbance (SED).The authors controlled for race/ethnicity, gender, poverty, residence, family history of mental illness, family burden, and average number of symptoms (Burns et al. 1997).

However, two studies, Ma, Lee, and Stafford (2005) and Wu et al. (2001), found no differences in the treatment rates of individuals with public, private, and no insurance. Ma, Lee, and Stafford (2005) used National Ambulatory Medical Care survey data for children and adolescents (ages 7-17) from 1995 to 2002 to investigate the effect of insurance status on

the likelihood of receiving pharmacotherapy, psychotherapy/mental health counseling and/or combination therapy for depression. The authors found that public insurance did not significantly affect any of the three treatment outcomes (Ma, Lee & Stafford 2005). In a smaller clinical analysis, Wu et al. (2001) found that compared to no insurance, neither Medicaid nor private insurance had an effect on mental health service use for lifetime depression and dysthymia in children and adolescents (ages 9-17) in nonresidential child service systems in New York.

Private Insurance Coverage and Treatment for MDE

Only one controlled analysis by Cummings and Druss (2011) found that adolescents with private insurance coverage had higher treatment rates for MDE than their uninsured counterparts. Relative to no insurance, Kataoka, Zhang, and Wells (2002) found that private insurance did not have a significant impact on unmet need for depression treatment in children and adolescents. Burns et al. (1997) found that private insurance, relative to no insurance, did not have a significant impact on the treatment of SED in adolescents. Finally, as introduced above, two additional studies found no effect of any form of insurance coverage on the treatment of depression in adolescents (Ma, Lee & Stafford 2005; Wu et al. 2001). In a nationally representative study of children and adolescents, private insurance (compared to no insurance) did not affect the odds of receiving pharmacotherapy, psychotherapy/mental health counseling and/or combination therapy for depression (Ma, Lee & Stafford 2005). Relative to no insurance, private insurance also did not affect mental health service use for lifetime depression and dysthymia in children and adolescents (ages 9-17) in nonresidential child service systems in New York (Wu et al. 2001).

Public Insurance Coverage and Treatment for SUD

Very few studies have focused on the factors associated with treatment entry for adolescents with substance abuse, and all three the authors identified rely on data from the National Survey on Drug Use and Health (NSDUH). Cummings, Wen, and Druss (2011) found that public insurance (relative to no insurance) was associated with a significant increase in adolescents' rate of medical treatment for SUD but that public insurance did not affect the overall treatment rate nor the rate of treatment in a self-help group. Wu, Hoven, and Fuller (2003) found that public insurance improved adolescents' odds of drug treatment relative to no insurance before controlling for any treatment need factors. Once these need factors were incorporated into the regression model, however, the drug treatment rates for adolescents with public insurance were not significantly different from those for individuals without insurance (Wu, Hoven & Fuller 2003). Wu et al. (2002) also found that public insurance (compared to no insurance) did not increase adolescents' odds of treatment for alcohol use disorders even after controlling for gender, age, race/ethnicity, urbanicity, income, and several treatment need factors including tolerance and alcohol related problems at home or work.

Private Insurance Coverage and Treatment for SUD

Cummings, Wen, and Druss (2011) found that private insurance (relative to no insurance) was not significantly associated with rates of SUD treatment overall, SUD treatment in a medical setting, or SUD treatment in a self-help group. Compared to no insurance, Wu, Hoven, and Fuller (2003) found that private insurance did not improve adolescents' odds of drug treatment either before or after controlling for treatment need factors. Finally, Wu et al. (2002) found that private insurance (relative to no insurance) did

not improve adolescents' odds of treatment for alcohol use disorders after controlling for gender, age, race/ethnicity, urbanicity, income, and several treatment need factors including tolerance and alcohol related problems at home or work.

Limitations of Current Literature

Some of the inconsistencies in the current literature with respect to the influence of insurance coverage may be attributable to differences between the study populations. The ages of children and adolescents included in the study population, their specific diagnoses, and/or the scales used to assess their symptomatology varied widely. The variation in diagnostic inclusion criteria was especially present for the studies on insurance and depression; a diagnosis of MDE was required only for Cummings and Druss (2011) while Kataoka, Zhang, and Wells (2002) looked at all adolescents with a mental health indicator score of greater than or equal to three (higher scores indicate higher need for mental health services). Burns et al. (1997) looked at children and adolescents who met criteria for SED, defined as both a DSM diagnosis and significant impairment at home, in school or with peers at any of three annual assessments. Ma, Lee, and Stafford (2005) included children with a diagnosed depressive disorder, including MDD, dysthymia, depression not otherwise specified, and depressive adjustment reaction. Wu et al. (2001) similarly included adolescents diagnosed with either MDD or dysthymia.

With respect to variation in the studies on the role of insurance in treatment for substance use, Wu et al. (2002) looked at alcohol treatment for adolescent alcohol users (not those with abuse or dependence exclusively). Wu, Hoven, and Fuller (2003) similarly focused on drug treatment for past-year drug users (not those with drug abuse and

dependence). Only Cummings, Wen, and Druss (2011) focused on adolescents with alcohol and illicit drug abuse or dependence exclusively.

There was also some variation in the generalizability of these studies' results. Cummings and Druss (2011), Kataoka, Zhang, and Wells (2002), Ma, Lee, and Stafford (2005) Cummings, Wen, and Druss (2011), Wu et al. (2002), and Wu, Hoven, and Fuller (2003) all used data from nationally representative cross-sectional surveys, and specifically the NSDUH (excepting the study by Kataoka, Zhang, and Wells (2002), which relied on data from the National Survey of American Families). By contrast, Burns et al. (1997) used longitudinal data from 1,015 children and adolescents enrolled in the Great Smoky Mountains Study in western North Carolina. Wu et al. (2001) also focused on a regional sample of children and adolescents in Westchester County, New York.

Sample size was also a concern in two studies. Ma, Lee, and Stafford (2005) extrapolated their conclusions about national trends in treatment from a sample of only 530 visits. Wu et al. (2001) focused on only 206 children. All of the other studies previously discussed included a sample of at least one thousand affected children and adolescents. Therefore, the findings by Ma, Lee, and Stafford (2005) and Wu et al. (2001) that private insurance did not affect mental health treatment rates may be an artifact of these studies' limited sample size.

Perhaps most importantly, however, no studies in the literature have attempted to differentiate between private insurance plans that covered mental health and/or substance use benefits and those that did not when estimating the effects of private insurance coverage in treatment. This measurement error may help to explain the paradoxical findings by Kataoka,

Zhang, and Wells (2002) and Burns et al. (1997) that public insurance, but not private insurance, affected mental health treatment rates.

Summary

The literature on the effect of insurance on adolescents' receipt of care for MDE and SUD is inconsistent. No studies have addressed the specific effect of insurance status on treatment for dual diagnosis adolescent patients, the primary focus of this study. Perhaps even more significantly, no studies have differentiated between types of private insurance based on their MHSA benefits in examining the effect of insurance on treatment rates. Finally, the treatment rate for SUD in adolescents with co-occurring disorders has never been estimated in a large, nationally representative sample. These gaps position this study to make a unique contribution to the extant literature.

Chapter 3 - Methods

Data Source

The data source of this analysis was the NSDUH, a cross-sectional annual survey that collects information about of the use of alcohol, tobacco, and illicit drugs in the U.S. noninstitutionalized civilian population (SAMHSA 2010a). The NSDUH also collects information on mental health conditions and treatment. The NSDUH interviews approximately 70,000 randomly selected individuals age 12 and older each year. The NSDUH is sponsored by Office of Applied Statistics of the U.S. Substance Abuse and Mental Health Services Administration (SAMHSA) (SAMHSA 2010a).

Sampling Methodology

Since 1999, the NSDUH has used an independent, multistage area probability sampling methodology with participants from each of the 50 states and the District of Columbia (SAMHSA 2010a). In this '50-State' design, the eight states with the largest populations (California, Florida, Illinois, Michigan, New York, Ohio, Pennsylvania and Texas) are designated large sample states and had a target sample size of 3,600 (SAMHSA 2010a). The remaining 42 states and the District of Columbia had target sample sizes of 900 (SAMHSA 2010a). The sample size of 900 was selected based on small area estimation (SAE) methodology, a hierarchical Bayesian modeling technique designed to obtain valid state-level estimates of 20 measures of substance use (Hughes, Sathe, & Spagnola 2009). Exact state sample sizes ranged from approximately two percent under to ten percent above these target values (SAMHSA 2004-2010a). Young adults (ages 12 to 17) are oversampled so that participants are equally divided between the 12 to 17, 18 to 25, and 26 years or older age groups. The total sample for each year ranged from 67,760 to 68,736, and the range of

sample sizes available from the public use data files (used for this analysis) was 55, 279 to 57, 973 (SAMHSA 2004-2010a).

The NSUDH's person-level sample weights were used to adjust for non-response and selection probabilities at each sampling stage (SAMHSA 2010a). We divided the person-level analysis weights from each survey year by seven, the number of years of data used in this analysis, to adjust for pooling.

For all years of data included in this analysis, data was collected using a combination of computer-assisted personal interviewing (CAPI, carried out by a trained interviewer in the participant's home) and audio computer-assisted self-interviewing (ACASI) (SAMHSA 2010a). ACASI was used to improve the likelihood that an individual will respond honestly to the NSDUH's questions about sensitive and/or illegal activities (i.e. mental health problems and illicit substance use) (SAMHSA 2010a).

All survey responses were confidential, and participants are advised of this confidentiality at the time of their interview (SAMHSA 2010a). In addition, all directly identifying information, geographic indicators, and linkages between individuals from the same household were eliminated from the public-use data files (SAMHSA 2010a). The weighed screening response rates ranged from 88.8 to 91 percent and the weighted interview response rates ranged from 73.94 to 77 percent in the datasets pooled for this analysis (SAMHSA 2004-2010a). These high participation rates were encouraged by a $30 incentive offered to participants (SAMHSA 2010a).

Study Sample & Measures

This study focuses on the subset of NSDUH participants from 2004 to 2010 who were 12 to 17 years old and had both a past year MDE and an SUD. Seven years of data (2004 to

2010) were pooled to increase the study's sample size, resulting in a total population of 127,174 adolescents, of whom 2,227 (1.75 percent) had both a past-year MDE and an SUD (as determined by the criteria described below).

Sample Inclusion Criteria

MDE was assessed in the NSDUH through participants' responses to a diagnostic interview based on the depression section of the National Comorbidity Survey-Adolescent (NCS-A) (SAMHSA 2010a). The NCS-A questions are based on diagnostic criteria for MDE described in the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders – 4th Edition (DSM-IV). The adolescent depression screening module was administered through computer assisted interview in English and Spanish, and since 2004 its wording has been revised to be age-appropriate and distinct from the NSDUH's module used to assess MDE in adults (SAMHSA 2010a). Past-year SUD was measured with a series of questions designed to assess illicit drug or alcohol abuse and dependence according to DSM-IV diagnostic criteria (summarized in **Table 1**).

Table 1: NSDUH Criteria for Dependence or Abuse

Category	Criteria
Abuse	A respondent was defined as having alcohol, marijuana, cocaine, heroin, hallucinogen, inhalant, pain reliver, tranquilizer, stimulate or sedative abuse if they reported a positive response to one or more of the following: 1. Having serious problems due to substance use at home, work or school 2. Using substance regularly and then did something where substance use might have put them in physical danger 3. Substance use causing actions that repeatedly got them in trouble with the law 4. Having problems caused by substance use with family or friends and continued to use substance even though it was thought to be causing problems with family or friends
Dependence	A respondent was defined has having marijuana, inhalant, hallucinogen or tranquilizer dependence if the respondent reported a positive response to three or more dependence criteria 1-6. A respondent was defined as having alcohol, pain relivers, cocaine, heroin, sedatives or stimulants dependence if the respondent reported a positive response to three or more of dependence criteria 1-7: 1. Spent a great deal of time over a period of month getting, using, or getting over the effects of the substance 2. Unable to keep set limits on substance use or used more often than intended 3. Needed to use substance more than before to get desired effects or noticed that using the same amount had less effect than before 4. Unable to cut down or stop using the substance every time he or she tried or 5. Continued to use substance even though it was causing problems with emotions, nerves, mental health, or physical problems 6. Reduced or gave up participation in important activities due to substance use [7.] Experienced substance specific withdrawal symptoms at one time that lasted for longer than a day after they cut back or stopped using

Derivation of Analytic Samples

From the original sample of 2,227 adolescents with both a past-year MDE and an SUD, twenty-three individuals were excluded because of incomplete information on the key independent variable of interest in this study, insurance status, resulting in a final sample size of 2,204 for the analyses on SUD treatment. An additional seven adolescents were excluded from the analyses on MDE treatment because they had missing information on the key

dependent treatment variables, leaving a final sample size of 2,197 for analyses examining the role of insurance status in treatment for MDE.

Research Design & Data Analysis

This goal of this research was to describe the influence of insurance on the receipt of depression and substance use treatment by adolescents with co-occurring MDE and SUD. This study specifically posed the following research questions:

Analysis 1: How does insurance status affect the receipt of MDE treatment by adolescents with co-occurring MDE and SUD?

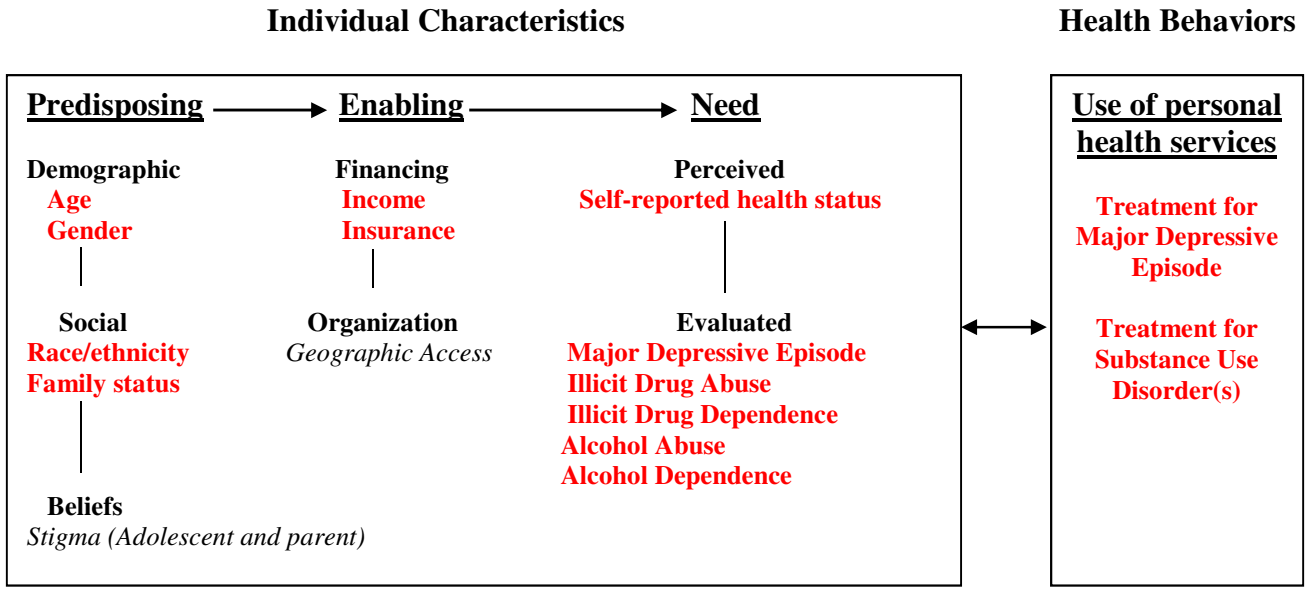
Analysis 2: How does insurance status affect the receipt of SUD treatment by adolescents with co-occurring MDE and SUD?

Theoretical Framework

The theoretical framework that guided this study (summarized in **Figure 1**) was Andersen and colleagues' behavioral model of health services use (Andersen 1995; Andersen & Davidson 2007). This model describes health care access as a function of individual characteristics that can be described as (1) predisposing factors, (2) enabling factors and (3) need factors.

Individual predisposing factors indicate individuals' propensity to use healthcare services. Predisposing factors include demographic and social characteristics like age, gender, race/ethnicity, education, and health beliefs (Andersen & Davidson 2007). Enabling factors are resources that allow individuals' to satisfy their healthcare needs (Andersen & Davidson 2007). Enabling factors include income and insurance coverage, which affect the affordability of healthcare, as well as organizational factors like having a regular source of care and access to specific treatment settings (Andersen & Davidson 2007). Individual need factors include both evaluated (i.e. clinical diagnosis) and perceived (i.e. self-reported health status) need of treatment (Andersen & Davidson 2007).

Figure 1: Conceptual Framework for Access to Treatment for MDE and SUD (from Andersen and Colleagues' Behavioral Model of Health services Use)



Key: Bold words in red are variables measured in the model. Italicized words represent unmeasured variables.

Hypotheses

Because insurance coverage is an enabling factor for mental health and substance use treatment according to this conceptual framework, we hypothesized that:

> H_1: Adolescents with private or public insurance coverage will be more likely to receive treatment for MDE than those with no insurance coverage
>
> H_2: Adolescents with private or public insurance coverage will be more likely to receive treatment for SUD than those with no insurance coverage

Both hypotheses were tested using pooled weighted logistic regressions using Stata's "svy" procedure to account for the NSDUH's complex study design. This regression analysis uses the binary logit functional form:

$$\Pr(y=1) = \frac{e^{(\alpha+\beta 1iX1i+\cdots\beta kiXki)}}{1+ e^{(\alpha+\beta 1iX1i+\cdots\beta kiXki)}}$$

where the probability of y=1 refers to the probability that an adolescent received treatment in the past year and β_i refers to the coefficient estimated by the model for a given independent variable X_i.

The estimated model from this regression takes the following form:

(Outcome) = α + $\boldsymbol{\beta_1}$[insurance status] + $\boldsymbol{\beta_2}$[SUD type] + β_3[health status] + β_4[gender] + β_5[age] + β_6[family status] + $\boldsymbol{\beta_7}$[race/ethnicity] + $\boldsymbol{\beta_8}$[family income] + $\boldsymbol{\beta_9}$[year] .

Bolded betas identify vectors of variables (i.e. $\boldsymbol{\beta_1}$ represents all of the betas associated with different categories of insurance status) while unbolded betas represent coefficients for dichotomous (i.e. β_4) or continuous (i.e. β_5) variables.

Dependent Variables

Past-year treatment for MDE was assessed with three dichotomous variables. The first indicated whether an individual had received any form of treatment for MDE, including counseling for MDE from a medical doctor or other professional or prescription medication.

Two additional variables specifically assessed whether an adolescent received treatment from a (1) mental health professional (psychologist, psychiatrist, social worker, counselor and other mental health professional) or (2) medical professional (general practitioner, nurse, occupational therapist, or other medical professional). In addition to specialty mental health settings, mental disorders in adolescents are commonly treated in the general medical sector (Narrow 1993).

Past-year treatment for SUD was also assessed with three dichotomous variables. The first indicated whether an adolescent received any treatment for alcohol or illicit drug use. The second indicated whether an adolescent received specialty treatment for SUD. Specialty treatment settings included hospitals, inpatient and outpatient rehabilitation facilities, and mental health centers. A final variable indicated whether an adolescent had received treatment in a self-help group (i.e. Alcoholics Anonymous or Narcotics Anonymous). Treatment in a self-help group was analyzed because 12-Step programs have been shown to be effective in reducing substance use in adolescents (Winters et al. 2000). Prior research has shown that most people with SUD are mostly treated in either specialty settings or in self-help groups (Narrow 1993; Weisner et al. 2001).

Key Independent Variable

Insurance status was determined using the NSDUH's questions about insurance coverage during the past 12 months. Individuals were first re-categorized as having any private insurance, public insurance (including Medicare, Medicaid, CHIP, TRICARE (formerly CHAMPUS), Veterans Affairs or military health care), or not having insurance. These insurance categories were used for all "basic insurance models."

For the "detailed insurance models" created for Analysis 1, privately insured adolescents were subdivided into three groups depending on their private insurance's coverage of treatment for "mental or emotional problems" (SAMHSA 2010a). Privately insured adolescents were classified as having coverage for mental health treatment, not having coverage for mental health treatment, or not providing enough information to determine their mental health treatment coverage.

In Analysis 2, privately insured adolescents were subdivided into three groups based on their insurance's coverage of treatment for their specific SUD. Privately insured adolescents were classified as having coverage for their SUD, not having coverage for their SUD, or not providing enough information to determine their SUD treatment coverage. Two NSDUH variables indicated whether their private insurance covered treatment for (1) alcohol abuse or alcoholism and (2) drug abuse. Adolescents were categorized into the three groups using both these variables and variables indicating their SUD type (alcohol abuse, alcohol dependence, illicit drug abuse, and illicit drug dependence). Adolescents with alcohol abuse were categorized as having coverage for their SUD if their private insurance covered treatment for alcohol abuse or alcoholism. Adolescents with both an alcohol and an illicit drug SUD were categorized as having coverage for their SUDs only if they responded affirmatively to both questions.

Other Independent Variables

The selection of the other independent variables included in our model was informed by both Andersen's conceptual model and prior studies on the determinants of treatment for SUD/substance use and MDE/mental health treatment.

Predisposing factors positively associated with depression treatment include age, and female gender (Cummings & Druss 2011; Wu et al. 2001; Glied et al. 1998; Olfson Gameroff, Marcus & Waslick 2003; Cunningham & Freiman 1996; Zimmerman 2005). Non-white race/ethnicity was the most common predisposing factor negatively associated with depression treatment (Cummings & Druss 2011; Zimmerman 2005; Alexandre et al. 2008; Olfson, Gameroff, Marcus & Waslick 2003). Need factors positively associated with depression treatment rates include self-reported health status and specific metrics of the severity of mental health symptoms (Burns et al. 1997; Wu et al. 2001; Alexandre et al. 2008). Family income and location in a metropolitan area are other enabling factors (in addition to health insurance) that have been significantly associated with depression treatment (Alexandre et al. 2008).

Fewer factors have been associated with adolescent substance abuse treatment rates, but there is some evidence in the literature of a negative influence of non-White race/ethnicity on alcohol and illicit drug treatment (Cummings, Wen & Druss 2011) and a positive influence of age (Wu, Hoven, & Fuller 2003; Wu et al. 2002) and family income (L.T. Wu et al. 2006).

In our regression analyses, predisposing factors for adolescents' MDE and SUD treatment were measured with age, gender, family status and race/ethnicity. Age was assessed as a continuous variable. Gender was assessed in the NSDUH as a dichotomous variable, male and female. Family status was assessed as a dichotomous variable that differentiated adolescents who lived with two parents and those who did not. Race/ethnicity was measured with four categories: (1) non-Hispanic White, (2) non-Hispanic Black /African-American (A-A), (3) Hispanic, and (4) non-Hispanic other race.

Enabling factors for adolescents' MDE and SUD treatment were measured with insurance status (as described above) and family income. Family income was categorized as: (1) less than $20,000, (2) $20,000 to $50,000, (3) 50,000 to $75,000, and (4) more than $75,000 per year.

Evaluated and perceived need factors for adolescents' MDE and SUD treatment were measured with their type of SUD (evaluated need) and their self-reported health status (perceived need). Type of SUD was assessed using four dichotomous variables that indicated whether an adolescent met the DSM-IV criteria for alcohol abuse, alcohol dependence, illicit drug abuse, or illicit drug dependence. A dichotomous variable of self-reported health status was created from reports of health in general as excellent, very good, good, fair or poor. Responses of fair and poor were grouped to represent below average health status.

Year Fixed Effects

Although the coefficients are not reported in the results tables, dummy variables for each survey year (2004-2010) were included in all models to account for any secular trend. **Table 2** summarizes all of the variables included in these analyses.

Analysis

An alpha level of 0.05 was used to determine statistical significance. All data cleaning, variable re-coding, and new variable definition was completed using SAS version 9.3 of the SAS System for Windows © (SAS Institute 2008). All other analyses were completed using Stata Statistical Software Release 11 (StataCorp 2009).

Table 2: Summary of Variables Used in Analyses

Dependent Variables	Description
Treatment for MDE	Evaluated with three dichotomous variables 1. Any MDE Treatment 2. Any Treatment from a Medical Professional a. General practitioner, nurse, occupational therapist, or other 3. Any Treatment from a Mental Health Professional a. Psychologist, psychiatrist, social worker, counselor or other
Treatment for SUD	Evaluated with three dichotomous variables 1. Any SUD Treatment 2. Any Specialty Treatment a. Treatment in a hospital, mental health center, inpatient or outpatient rehabilitation facility 3. Any Self-Help Group Treatment
Independent Variables	
Key Independent Variable	
Insurance Status (Analysis 1)	For basic insurance models, categorized as: 1. Any Private insurance 2. Public insurance 3. Uninsured For detailed insurance models, categorized as: 1. Private insurance and mental health treatment covered 2. Private insurance and mental health treatment not covered 3. Private insurance and mental health treatment coverage unknown 4. Public Insurance 5. Uninsured
Insurance Status (Analysis 2)	For basic insurance models, categorized as: 1. Any Private insurance 2. Public insurance 3. Uninsured For detailed insurance models, categorized as: 1. Private insurance and SUD treatment covered 2. Private insurance and SUD treatment not covered 3. Private insurance and SUD treatment coverage unknown 4. Public Insurance 5. Uninsured

Independent Variables	
Other Independent Variables	
Type of SUD	Evaluated with four dichotomous variables 1. Alcohol Abuse 2. Alcohol Dependence 3. Illicit Drug Abuse 4. Illicit Drug Dependence
Self-Reported Health Status	Categorized as: 1. Fair or Poor 2. Good, Very Good, or Excellent
Age	Continuous variable with range 12-17
Sex	Categorized as male or female
Family Status	Categorized as lives with two parents or does not
Race/Ethnicity	Categorized as: 1. Non-Hispanic White 2. Non-Hispanic Black/African-American (A-A) 3. Hispanic 4. Non-Hispanic Other Race
Income	Categorized as: 1. Less than $20,000 2. $20,000-$50,000 3. $50,000-$75,000 4. More than $75,000
Additional Variables	
Year	Dummy variables to control for year of survey (2004-2010)

Chapter 4 - Results

The overall treatment rates for MDE and SUD in this sample were extremely low **(Table 3)**. Only 7.6 percent of adolescents received treatment for both MDE and SUD. Nearly half (49.7 percent) received no treatment at all. It is also critical to note that only 15.9 percent of adolescents who received treatment for MDE also received treatment for SUD. The predictors of treatment for MDE and SUD individually will be examined below.

Table 3: Treatment for MDE and SUD in a Pooled Sample of U.S. Adolescents with Past-Year MDE and SUD

		Any SUD Treatment		
		Yes	No	Total
Any MDE Treatment	Yes	7.6%	40.1%	47.7%
	No	2.6%	49.7%	52.3%
	Total	10.2%	89.8%	100.0%

Treatment for Major Depressive Episode

Descriptive Statistics

Treatment

Weighted demographic comparisons of the sample population of 2,197 adolescents by insurance status are shown in **Table 4**. The overall MDE treatment rate in this group of adolescents was 47.7 percent. Overall treatment rates varied significantly by insurance status, and adolescents with private insurance coverage that covered mental health treatment, private insurance coverage with unknown coverage for mental health treatment, or public insurance coverage were all significantly more likely to be treated than their uninsured counterparts ($p<0.01$ for all comparisons). Treatment rates ranged from 33.3 percent among the uninsured to 50.7 percent among adolescents with public insurance coverage. Thirty-two percent of the study population received treatment from a mental health professional. Adolescents with private insurance that covered mental health treatment and those with public insurance were both significantly more likely to be treated by a mental health professional than those without

insurance ($p<0.01$ for private insurance that covered mental health treatment and $p<0.05$ for public insurance). Approximately 14.9 percent of adolescents were treated by a medical professional but insurance status did not affect treatment rates.

Predisposing, Enabling, and Need Factors

All groups were comparable with respect to age, gender, self-reported health status, and rates of alcohol dependence, illicit drug abuse, and illicit drug dependence. Adjusted Wald tests indicated that alcohol abuse was less common among adolescents with public insurance ($p<0.01$) and those with private insurance and unknown mental health treatment coverage ($p<0.05$) than among those without insurance. Individuals with private insurance that covered mental health treatment were more likely to live with two parents ($p<0.01$) than their uninsured counterparts. Adolescents with private insurance that covered mental health treatment were also significantly wealthier, and were more likely to have a family income of $50,000-$75,000 ($p<0.001$) or more than $75,000 ($p<0.001$) and less likely to have a family income of $20,000-$49,999 ($p<0.001$) or less than $20,000 ($p<0.001$) than those without insurance. Compared to uninsured adolescents, adolescents with private insurance coverage that did not cover mental health treatment were also more likely to have a family income of more than $75,000 ($p<0.05$) and less likely to have a family income of less than $20,000 ($p<0.01$). Finally, compared to uninsured adolescents, adolescents with private insurance coverage and unknown mental health treatment coverage were more likely to have a family income of $50,000-$75,000 ($p<0.05$) more than $75,000 ($p<0.001$) and less likely to have a family income of less than $20,000 ($p<0.001$).

The groups of privately insured adolescents with mental health treatment coverage and with unknown mental health treatment coverage included significantly larger percentages of non-Hispanic White youth ($p<0.001$ for known mental health coverage, $p<0.01$ for

unknown mental health coverage) and significantly lower percentages of Hispanic youth ($p<0.001$ for both comparisons) than the uninsured group. Compared to the uninsured group, the group of adolescents with private insurance coverage that did not cover mental health treatment also had a significantly smaller percentage of Hispanic youth ($p<0.05$). Adolescents with private insurance and no mental health treatment coverage were also significantly less likely to be Hispanic than those without insurance ($p<0.05$). Publicly insured adolescents were significantly more likely to identify as non-Hispanic Black / African-American than the uninsured ($p<0.001$).

Table 4: Analytic Sample 1 - Weighted Descriptive Statistics for Pooled Sample of U.S. Adolescents with a Past-Year MDE and SUD

	Total	Uninsured (Reference)	Private Insurance MH Tx Covered	Private Insurance MH Tx Not Covered	Private Insurance MH Tx Coverage Unknown	Public Insurance Coverage
	N= 2, 197	N=157	N=1,130	N=69	N=250	N=591
Outcome Variables						
Treatment for MDE						
Any Treatment	47.7	33.3	50.4**	37.5	41.1**	50.7**
Any Treatment by a MH Prof.	32.0	21.1	35.4**	22.2	26.9	31.9*
Any Treatment by a Med Prof.	14.9	11.7	15.8	12.0	11.2	15.7
Explanatory Variables						
Type of Substance Use Disorder						
Alcohol Abuse	33.5	46.4	34.4	38.0	33.1*	27.3**
Alcohol Dependence	30.1	24.6	29.8	31.6	33.1	31.2
Illicit Drug Abuse	27.0	27.4	25.4	24.2	30.7	29.0
Illicit Drug Dependence	40.2	34.7	40.3	36.6	38.1	43.2
Self-Rated Health Fair/Poor	8.0	7.6	7.5	9.4	4.4	10.5
Demographics						
Age	15.6	15.8	15.6	15.8	15.7	15.4
Male	24.8	28.2	23.3	36.3	24.4	25.6
Lives with two Parents	61.9	55.3	70.3**	64.2	62.4	46.2
Race/Ethnicity						
Non-Hispanic White	68.4	57.4	78.0***	71.4	77.5**	47.8
Non-Hispanic Black/A-A	7.4	3.2	4.7	8.8	6.7	14.5***
Hispanic	18.8	32.5	13.0***	14.9*	11.2***	29.9
Non-Hispanic Other Race	5.5	6.9	4.3	4.9	4.6	7.8
Family Income						
Income <20k	14.8	26.8	4.4***	9.9**	7.5***	35.9
Income 20-50k	33.7	50.8	23.9***	43.2	37.7	45.9
Income 50-75k	20.2	11.1	25.0***	19.6	23.9*	11.6
Income >75k	31.3	11.3	46.6***	27.3*	31.0***	6.6

* p < 0.05 **p < 0.01 ***p<0.001; All values are percentages; MH= Mental Health

Logistic Regression Results

Insurance Status

The results from the multiple logistic regressions are presented in **Tables 5-6**. After controlling for age, gender, race/ethnicity, family income, self-reported health status, SUD type, and year of survey, adolescents covered by public insurance had more than two times the odds of receiving any treatment for MDE (OR 2.10, 95% CI [1.22, 3.59]) and 77 percent higher odds of treatment by a mental health professional (OR 1.77, 95% CI [1.01, 3.12]) relative to their uninsured counterparts. There was no effect of public insurance coverage on treatment by a medical professional. In the basic insurance model, private insurance coverage was not significantly associated with any MDE treatment, treatment by a mental health professional, or treatment by a medical professional.

In the detailed insurance models, the results with respect to the effect of public insurance on any MDE treatment, treatment by a mental health professional, and treatment by a medical professional were similar. However, when implementing the detailed measure of private insurance, adolescents with private insurance and coverage for mental health treatment had 85 percent higher overall odds of treatment (OR 1.85, 95% CI [1.05, 3.26]) and 91 percent higher odds of treatment by a mental health professional (OR 1.91, 95% CI [1.07, 3.39]) than those without insurance. Other forms of private insurance were not significantly associated with treatment rates.

Table 5: Predictors of Any MDE Treatment

	N=2197			
	Basic Insurance Model		Detailed Insurance Model	
Variable	**OR**	**(95% CI)**	**OR**	**(95% CI)**
Insurance Status				
Private Insurance (all)	1.68	(0.98, 2.88)		
PI MH Tx Covered			1.85*	(1.05, 3.26)
PI MH Tx Not Covered			1.19	(0.50, 2.83)
PI MH Tx Coverage Unknown			1.28	(0.72, 2.29)
Public Insurance	2.10**	(1.22, 3.59)	2.09**	(1.22, 3.59)
Substance Use Disorder				
Alcohol Abuse	1.14	(0.81, 1.60)	1.15	(0.81, 1.62)
Alcohol Dependence	1.25	(0.88, 1.76)	1.26	(0.89, 1.79)
Illicit Drug Abuse	1.24	(0.87, 1.76)	1.25	(0.88, 1.77)
Illicit Drug Dependence	1.79**	(1.27, 2.51)	1.80**	(1.28, 2.53)
Self-Rated Health Fair/Poor	1.41	(0.93, 2.14)	1.40	(0.92, 2.12)
Age	1.00	(0.91, 1.10)	1.00	(0.91, 1.11)
Male	0.72*	(0.55, 0.94)	0.73*	(0.56, 0.95)
Lives with two parents	0.78	(0.60, 1.02)	0.78	(0.60, 1.02)
Race				
Non-Hispanic Black/A-A	0.53*	(0.32, 0.86)	0.53*	(0.32, 0.86)
Hispanic	0.70*	(0.50, 0.98)	0.69*	(0.50, 0.97)
Non-Hispanic Other Race	0.58*	(0.38, 0.89)	0.58*	(0.38, 0.89)
Income				
Income 20-50k	0.98	(0.82, 1.16)	0.98	(0.82, 1.17)
Income 50-75k	1.06	(0.64, 1.74)	1.03	(0.62, 1.70)
Income >75k	1.16	(0.73, 1.84)	1.11	(0.69, 1.77)

* $p < 0.05$ **$p < 0.01$ ***$p<0.001$; OR= Odds Ratio, CI= confidence interval; PI= Private Insurance, MH= Mental Health; Tx= Treatment

Table 6: Predictors of Treatment by a Mental Health Professional and by a Medical Professional

	N=2197							
	Tx MH Professional Basic Insurance Model		Tx MH Professional Detailed Insurance Model		Tx Medical Professional Basic Insurance Model		Tx Medical Professional Detailed Insurance Model	
Variable	**OR**	**(95% CI)**	**OR**	**(95% CI)**	**OR**	**(95% CI)**	**OR**	**(95% CI)**
Insurance Status								
Private Insurance (all)	1.70	(0.96, 2.99)			1.23	(0.62, 2.47)		
PI MH Tx Covered			1.91*	(1.07, 3.39)			1.34	(0.66, 2.70)
PI MH Tx Not Covered			1.10	(0.39, 3.15)			1.09	(0.35, 3.43)
PI MH Tx Coverage Unknown			1.21	(0.63, 2.30)			0.90	(0.37, 2.23)
Public Insurance	1.77*	(1.01, 3.12)	1.77*	(1.00, 3.12)	1.50	(0.79, 2.87)	1.50	(0.79, 2.87)
Substance Use Disorder								
Alcohol Abuse	1.34	(0.96, 1.87)	1.35	(0.97, 1.90)	0.97	(0.65, 1.45)	0.98	(0.66, 1.46)
Alcohol Dependence	1.49*	(1.07, 2.10)	1.52*	(1.08, 2.14)	0.83	(0.58, 1.19)	0.84	(0.58, 1.20)
Illicit Drug Abuse	1.32	(0.94, 1.85)	1.33	(0.95, 1.88)	1.04	(0.69, 1.57)	1.05	(0.69, 1.58)
Illicit Drug Dependence	1.63*	(1.12, 2.38)	1.64*	(1.12, 2.42)	1.55*	(1.05, 2.30)	1.56*	(1.06, 2.31)
Self-Rated Health Fair/Poor	1.25	(0.84, 1.85)	1.23	(0.83, 1.82)	1.25	(0.77, 2.05)	1.23	(0.76, 2.01)
Age	1.01	(0.91, 1.13)	1.02	(0.91, 1.13)	1.11	(0.99, 1.24)	1.11	(0.99, 1.25)
Male	0.59**	(0.42, 0.82)	0.59**	(0.43, 0.82)	0.59*	(0.39, 0.88)	0.59*	(0.39, 0.89)
Lives with two parents	0.87	(0.65, 1.15)	0.86	(0.65, 1.15)	1.12	(0.77, 1.63)	1.12	(0.77, 1.62)
Race								
Non-Hispanic Black/A-A	0.72	(0.40, 1.28)	0.71	(0.40, 1.27)	0.40*	(0.20, 0.80)	0.40*	(0.20, 0.80)
Hispanic	0.83	(0.56, 1.24)	0.83	(0.55, 1.24)	0.51*	(0.30, 0.88)	0.50*	(0.29, 0.88)
Non-Hispanic Other Race	0.64*	(0.42, 0.98)	0.64*	(0.42, 0.98)	0.88	(0.47, 1.67)	0.88	(0.46, 1.67)
Income								
Income 20-50k	0.91	(0.73, 1.14)	0.91	(0.73, 1.14)	0.87	(0.68, 1.11)	0.87	(0.68, 1.12)
Income 50-75k	0.95	(0.57, 1.58)	0.92	(0.55, 1.54)	0.90	(0.53, 1.55)	0.89	(0.52, 1.52)
Income >75k	1.08	(0.61, 1.90)	1.02	(0.57, 1.81)	0.71	(0.40, 1.25)	0.68	(0.38, 1.20)

* p < 0.05 **p < 0.01 ***p<0.001; OR= Odds Ratio, CI= confidence interval; PI= Private Insurance, MH= Mental Health; Tx= Treatment

Other Predisposing, Enabling and Need Variables[2]

This study also found that, compared to adolescents without illicit drug dependence, adolescents with illicit drug dependence had 80 percent higher overall odds of MDE treatment (OR 1.80, 95% CI [1.128, 2.53]), as well as 64 percent higher odds of treatment by a mental health professional (OR 1.64, 95% CI [1.12, 2.42]) and 56 percent higher odds of treatment by a medical professional (OR 1.56, 95% CI [1.06, 2.31]). Compared to adolescents without alcohol abuse or dependence, adolescents with alcohol dependence were more likely to be treated by a mental health professional (OR 1.52, 95% CI [1.08, 2.14]).

All minority racial/ethnic groups had significantly lower odds of receiving any treatment for MDE compared to non-Hispanic White adolescents. Non-Hispanic Black/African-American individuals had 47 percent lower odds of treatment (OR 0.53, 95% CI [0.32, 0.86]), Hispanic individuals had 31 percent lower odds of treatment (OR 0.69, 95% CI [0.50, 0.97]), and non-Hispanic other race individuals had 42 percent lower odds of treatment (OR 0.58, 95% CI [0.38, 0.89]) relative to non-Hispanic White adolescents. Non-Hispanic Black/African-American individuals also experienced 60 percent lower odds of treatment by a medical professionals than their non-Hispanic White counterparts (OR 0.40, 95% CI [0.20, 0.80]). Among Hispanic adolescents, the odds of treatment by a medical professional were also cut in half relative to non-Hispanic White adolescents (OR 0.50, 95% CI [0.29, 0.88]). Non-Hispanic other race individuals also had significantly lower odds of treatment by a mental health professional (OR 0.64, 95% CI [0.42, 0.98]) compared to their non-Hispanic White counterparts.

[2] The reported odds ratios (ORs) and 95 percent confidence intervals (95% CIs) for these variables are from the detailed insurance models. The significance of results was always consistent between the basic and detailed insurance models.

Males had 27 percent lower odds of any kind of treatment for MDE than females (OR 0.73, 95% CI [0.56, 0.95]). Males were also significantly less likely to be treated by a mental health professional (OR 0.59, 95% CI [0.43, 0.82]) and by a medical professional (OR 0.59, 95% CI [0.39, 0.89]) than females.

Treatment for Substance Use Disorder

Descriptive Statistics

Treatment

Weighted demographic comparisons of the sample population of 2,204 adolescents by insurance status are shown in **Table 7**. The overall SUD treatment rate for this group of adolescents was only 10.2 percent. Treatment rates ranged from 6.5 percent among the uninsured to 12.8 percent among adolescents with public insurance coverage. Adjusted Wald tests indicated that adolescents with public insurance coverage were significantly more likely to be treated than their uninsured counterparts ($p<0.05$). Specialty treatment was accessed by only 5.2 percent of the study population, and both adolescents with private insurance coverage that covered SUD treatment ($p<0.05$) and public insurance coverage ($p<0.05$) were more likely to receive specialty treatment than their peers without insurance. Finally, publicly insured adolescents were more likely to receive treatment in a self-help group than adolescents without insurance ($p<0.05$).

Predisposing, Enabling, and Need Factors

All groups were comparable in terms of their age, gender, self-reported health status, and rates of alcohol dependence, illicit drug abuse, and illicit drug dependence. Adjusted Wald tests indicated that alcohol abuse was less common among adolescents with public insurance coverage ($p<0.01$) and with private insurance that covered SUD treatment ($p<0.05$) than among uninsured adolescents. Individuals with private insurance that covered SUD

treatment were more likely to live with two parents ($p<0.01$) than their uninsured counterparts.

Adolescents with private insurance coverage and either known or unknown coverage for SUD treatment came from wealthier families than their uninsured peers, and were more likely to have a family income of $50,000-$75,000 ($p<0.001$) or more than $75,000 ($p<0.001$) and less likely to have a family income of $20,000-$49,999 ($p<0.001$ for private insurance that covered SUD treatment, $p<0.01$ for private insurance and unknown SUD treatment coverage) or less than $20,000 ($p<0.001$ for private insurance that covered SUD treatment, $p<0.01$ for private insurance and unknown SUD treatment coverage) than those without insurance. The group of privately insured adolescents with no SUD treatment coverage were more likely to have a family income of more than $75,000 ($p<0.001$) and less likely to have a family income of less than $20,000 ($p<0.01$) than those without insurance.

The groups of privately insured adolescents with known SUD treatment coverage and with unknown SUD treatment coverage included significantly larger percentages of non-Hispanic White youth ($p<0.001$ for both comparisons) and smaller percentages of Hispanic youth ($p<0.001$ for both comparisons) than the group of uninsured adolescents. Adolescents with private insurance coverage but no SUD treatment coverage were less likely to be Hispanic ($p<0.01$) than adolescents with no insurance. Publicly insured adolescents were significantly more likely to identify as non-Hispanic Black / African-American ($p<0.001$) than those without insurance.

Table 7: Analytic Sample 2- Weighted Descriptive Statistics for Pooled Sample of U.S. Adolescents with a Past-Year MDE and SUD

	Total	Uninsured (Reference)	Private Insurance and SUD Tx Covered	Private Insurance and SUD Tx Not Covered	Private Insurance and SUD Tx Coverage Unknown	Public Insurance Coverage
	N= 2, 204	N=157	N=823	N=140	N=490	N=594
Outcome Variables						
Treatment for SUD						
Any Treatment	10.2	6.5	9.7	10.9	9.2	12.8*
Specialty Treatment	5.2	2.3	4.9*	4.7	4.8	7.0*
Treatment in a Self-Help Group	3.7	2.4	2.4	2.7	3.8	6.2*
Explanatory Variables						
Type of Substance Use Disorder						
Alcohol Abuse	33.5	46.3	35.5	31.4	33.1*	27.2**
Alcohol Dependence	30.1	24.4	30.1	34.8	29.7	31.1
Illicit Drug Abuse	27.0	27.4	26.6	22.4	26.8	28.9
Illicit Drug Dependence	40.3	34.7	39.4	37.4	40.9	43.3
Self-Rated Health Fair/Poor	8.0	7.6	9.2	9.1	9.4	10.4
Demographics						
Age	15.6	15.8	15.6	15.8	15.7	15.4
Male	24.7	28.2	24.7	27.6	22.0	25.5
Lives with two Parents	61.9	55.3	71.8**	68.0	63.8	46.3
Race/Ethnicity						
Non-Hispanic White	68.4	57.4	78.6***	64.0	79.4***	48.0
Non-Hispanic Black/A-A	7.5	3.2	5.2	7.7	4.6	14.5***
Hispanic	18.7	32.5	12.6***	15.9**	12.3***	29.8
Non-Hispanic Other Race	5.5	6.9	3.5	12.5	3.7	7.7
Family Income						
Income <20k	14.8	26.8	3.3***	5.3***	8.3***	35.8
Income 20-50k	33.8	50.8	22.0***	46.5	30.7**	46.0
Income 50-75k	20.2	11.1	25.2***	22.3	24.0**	11.6
Income >75k	31.3	11.3	49.5***	25.9**	37.0***	6.6

* p < 0.05 **p < 0.01 ***p<0.001; All values are percentages

Logistic regression results

Insurance Status

The results of our multiple logistic regressions are summarized in **Tables 8 and 9.** After controlling for the sociodemographic and health status factors listed above, neither the basic nor the detailed measure of private insurance coverage affected SUD treatment rates in any setting. Public insurance coverage did not affect overall SUD treatment rates either. Public insurance coverage also had no effect on self-help group treatment. However, compared to adolescents with no insurance coverage, adolescents with public insurance coverage had more than three-fold higher odds of specialty treatment (OR 3.11, 95% CI [1.04, 9.31]).

Other Predisposing, Enabling, and Need Factors[3]

Adolescents with illicit drug dependence had greater than two-fold higher odds of any SUD treatment (OR 2.31, 95% CI [1.37, 3.91]), three times the odds of receiving specialty treatment (OR 3.39, 95% CI [1.65, 6.98]), and 2.5 times the odds of receiving treatment in a self-help group (OR 2.59, 95% CI [1.09, 6.16]) than adolescents without illicit drug abuse or dependence. Compared to adolescents without alcohol abuse or dependence, adolescents with alcohol dependence had 85 percent higher odds of specialty treatment (OR 1.85, 95% CI [1.11, 3.11]) and three-fold higher odds of treatment in a self-help group (OR 3.18, 95% CI [1.66, 6.08]). Compared to adolescents reporting good, very good, or excellent health, those who reported fair or poor health status had 90 percent higher overall odds of treatment (OR 1.90, 95% CI [1.02, 3.54]) and 154 percent higher odds higher odds of treatment in a self-help group (OR 2.47, 95% CI [1.06, 5.77]).

[3] The reported odds ratios (ORs) and 95 percent confidence intervals (95% CIs) for these variables are from the detailed insurance models. The significance of results was always consistent between the basic and detailed insurance models.

Race/ethnicity did not have a significant effect on the odds that an adolescent received SUD treatment except that Non-Hispanic Black/African-American individuals had lower odds of receiving specialty treatment than other racial/ethnic groups (OR 0.29, 95% CI [0.11, 0.76]).

Males had significantly higher overall odds of receiving SUD treatment than females (OR 1.61, 95% CI [1.08, 2.40]) although they had similar odds of receiving treatment in both a self-help group and in a specialty setting.

Table 8: Predictors of Any SUD Treatment

	N=2204			
	Basic Insurance Model		Detailed Insurance Model	
Variable	**OR**	**(95% CI)**	**OR**	**(95% CI)**
Insurance Status				
Private Insurance (all)	1.40	(0.63, 3.11)		
PI SUD Tx Covered			1.39	(0.61, 3.20)
PI SUD Tx Not Covered			1.68	(0.61, 4.65)
PI SUD Tx Coverage Unknown			1.32	(0.56, 3.09)
Public Insurance	2.03	(0.89, 4.59)	2.03	(0.89, 4.59)
Substance Use Disorder				
Alcohol Abuse	0.84	(0.47, 1.48)	0.84	(0.47, 1.48)
Alcohol Dependence	1.47	(0.95, 2.27)	1.47	(0.95, 2.27)
Illicit Drug Abuse	1.13	(0.58, 2.19)	1.14	(0.59, 2.20)
Illicit Drug Dependence	2.30**	(1.35, 3.90)	2.31**	(1.37, 3.91)
Self-Rated Health Fair/Poor	1.91*	(1.03, 3.54)	1.90*	(1.02, 3.54)
Age	1.02	(0.86, 1.20)	1.02	(0.86, 1.20)
Male	1.61*	(1.08, 2.40)	1.61*	(1.08, 2.40)
Lives with two parents	0.78	(0.49, 1.22)	0.77	(0.49, 1.22)
Race				
Non-Hispanic Black/A-A	0.55	(0.24, 1.28)	0.55	(0.24, 1.27)
Hispanic	0.75	(0.40, 1.41)	0.75	(0.40, 1.41)
Non-Hispanic Other Race	0.57	(0.30, 1.11)	0.56	(0.29, 1.10)
Income				
Income 20-50k	1.21	(0.86, 1.70)	1.21	(0.86, 1.70)
Income 50-75k	1.00	(0.48, 2.09)	1.00	(0.48, 2.08)
Income >75k	1.49	(0.67, 3.31)	1.49	(0.67, 3.33)

* p < 0.05 **p < 0.01 ***p<0.001; OR= Odds Ratio, CI= confidence interval; PI= Private Insurance, Tx= Treatment

Table 9: Predictors of Specialty and Self-Help Treatment for SUDs

	N=2204							
	Specialty Treatment Basic Insurance Model		Specialty Treatment Detailed Insurance Model		Self-Help Treatment Basic Insurance Model		Self-Help Treatment Detailed Insurance Model	
Variable	**OR**	**(95% CI)**	**OR**	**(95% CI)**	**OR**	**(95% CI)**	**OR**	**(95% CI)**
Insurance Status								
Private Insurance (all)	1.97	(0.68, 5.71)			1.01	(0.32, 3.15)		
PI SUD Tx Covered			2.04	(0.71, 5.89)			0.82	(0.25, 2.65)
PI SUD Tx Not Covered			2.11	(0.58, 8.02)			0.99	(0.23, 4.21)
PI SUD Tx Coverage Unknown			1.83	(0.54, 6.23)			1.30	(0.37, 4.55)
Public Insurance	3.11*	(1.04, 9.31)	3.11*	(1.04, 9.30)	2.50	(0.77, 8.10)	2.49	(0.77, 8.12)
Substance Use Disorder								
Alcohol Abuse	0.98	(0.44, 2.15)	0.97	(0.44, 2.15)	1.28	(0.56, 2.93)	1.29	(0.56, 2.97)
Alcohol Dependence	1.86*	(1.11, 3.12)	1.85*	(1.11, 3.11)	3.15**	(1.65, 6.01)	3.18**	(1.66, 6.08)
Illicit Drug Abuse	1.76	(0.72, 4.32)	1.76	(0.71, 4.36)	1.96	(0.71, 5.47)	1.96	(0.69, 5.57)
Illicit Drug Dependence	3.38**	(1.65, 6.92)	3.39*	(1.65, 6.98)	2.59*	(1.11, 6.04)	2.59*	(1.09, 6.16)
Self-Rated Health Fair/Poor	1.49	(0.69, 3.22)	1.48	(0.68, 3.24)	2.41*	(1.03, 5.47)	2.47*	(1.06, 5.77)
Age	1.02	(0.82, 1.27)	1.02	(0.82, 1.27)	1.22	(0.92, 1.62)	1.22	(0.92, 1.61)
Male	1.15	(0.71, 1.87)	1.14	(0.70, 1.86)	1.03	(0.59, 1.82)	1.04	(0.59, 1.82)
Lives with two parents	0.68	(0.38, 1.22)	0.68	(0.38, 1.22)	0.59	(0.32, 1.06)	0.60	(0.33, 1.09)
Race								
Non-Hispanic Black/A-A	0.29*	(0.11, 0.76)	0.29*	(0.11, 0.76)	0.65	(0.20, 2.10)	0.68	(0.21, 2.18)
Hispanic	0.89	(0.40, 1.97)	0.89	(0.39, 1.99)	0.59	(0.19, 1.85)	0.59	(0.19, 1.89)
Non-Hispanic Other Race	0.80	(0.32, 2.01)	0.79	(0.31, 2.01)	0.86	(0.32, 2.36)	0.87	(0.32, 2.37)
Income								
Income 20-50k	1.18	(0.77, 1.80)	1.17	(0.76, 1.81)	1.31	(0.73, 2.32)	1.31	(0.74, 2.33)
Income 50-75k	0.82	(0.29, 2.32)	0.82	(0.29, 2.29)	1.13	(0.35, 3.64)	1.14	(0.36, 3.59)
Income >75k	1.51	(0.55, 4.15)	1.50	(0.55, 4.08)	1.89	(0.52, 6.84)	1.95	(0.55, 6.87)

* $p < 0.05$ ** $p < 0.01$ *** $p<0.001$; OR= Odds Ratio, CI= confidence interval; PI= Private Insurance, Tx= Treatment

Chapter 5 – Discussion

Conclusions

Treatment for MDE and SUD

Overall treatment rates for MDE and especially for SUD in this sample of severely impaired adolescents were extremely low. Only 47.7 percent of adolescents received any form of treatment for MDE, and only 10.2 percent received any treatment for SUD. Only 7.6 percent of adolescents received treatment for both MDE and SUD. Nearly half (49.7 percent) received no treatment at all.

The low rate of SUD treatment for this population of highly impaired adolescents is especially remarkable when one considers the treatment rates for MDE and SUD in adolescents in general. While this study found that adolescents with co-occurring SUD appeared to have a higher treatment rate for MDE than had been documented for adolescents with SUD in general (47.7 percent versus 37.8 percent), adolescents with co-occurring MDE had an SUD treatment rate more similar to that for adolescents with SUD in general (10.2 percent versus 7.6 percent) (SAMHSA 2010b).

Finally, it is perhaps most striking that only 15.9 percent of adolescents who had been treated for MDE received any form of SUD treatment. This highlights a huge missed opportunity to screen and treat adolescents who are already presenting to formal treatment settings. This failing may result, in part, from limited coordination between mental health and substance use treatment providers and/or the generally limited availability of substance use treatment. If all of the adolescents in this sample who received treatment for MDE had been screened for SUD and either immediately treated or referred to an accessible substance use treatment provider, one would expect to observe a significantly higher SUD treatment rate.

Screening, Brief Intervention and Referral to Treatment (SBIRT) programs, sponsored by SAMHSA, are designed to address the problem of the absence of screening for

SUD (and the associated lack of treatment referrals) in the general medical sector. The programs also provide secondary prevention of SUD by identifying and treating people with nondependent substance use early (Clay 2009; Madras et al. 2009). SBIRT programs work by automatically screening all patients who enter an emergency room, primary health clinic, campus health centers, or other health care venue, and have been shown to be effective in reducing rates of heavy alcohol abuse by 38.1 percent and of drug use by 68 percent at six months post-intervention (Madras et al. 2009). In this way, SBIRT programs represent a promising solution to the problem of the under-treatment of SUD that should be tested in specific mental health treatment settings.

However, it must be noted that referral to treatment alone is not sufficient to improve treatment rates for substance use. In the case that an adolescent gets screened for substance use in a SBIRT or other program, off-site SUD treatment referrals require that he/she overcome distance and travel limitations, enroll in a new agency, and become comfortable with a new staff such that his/her motivation to complete a course of treatment will be preserved (CSAT 2005). Because adolescents are commonly dependent on their parents for transportation (as well as for financial support), the negative effect of these barriers to treatment may be magnified. Another goal articulated by leaders at SAMHSA's Centers for Substance Abuse Treatment (CSAT) is for mental health and substance use treatment to become more integrated, with independent mental health and substance use treatment facilities increasing their individual capacities to care for co-occurring disorders on-site (CSAT 2005).

Research Question 1 – Insurance coverage and Treatment for MDE

This study partially supported the authors' hypothesis that public insurance coverage would improve MDE treatment rates for adolescents with co-occurring MDE and SUD. Public insurance significantly improved adolescents' odds of any MDE treatment and treatment by a mental health professional, although it did not affect the odds of receiving treatment from a medical professional. The significant positive effect of public insurance on MDE treatment access is consistent with several studies previously cited (Cummings & Druss 2011; Kataoka, Zhang & Wells 2002; Burns et al. 1997).

This study also partially supported the authors' hypothesis that private insurance coverage would improve MDE treatment rates for adolescents with co-occurring MDE and SUD. Although there was no association between private insurance and MDE treatment when using the aggregate measure of private insurance, the pattern of findings differed when the more detailed measure accounting for mental health treatment coverage was examined. Private insurance that included coverage for mental health treatment was positively associated with any treatment for MDE and treatment for MDE by a mental health professional. Thus, our study highlights the value of using more precise measures of private insurance coverage when examining its relationship with mental health treatment.

Research Question 2 – Insurance coverage and treatment for SUD

This study also partially supported the authors' hypothesis that public insurance coverage would improve SUD treatment rates for adolescents with co-occurring MDE and SUD. Public insurance coverage was positively associated with the receipt of specialty treatment for SUD. Public insurance was not, however, significantly associated with the overall SUD treatment rates or treatment rates in self-help group settings. As discussed in

Chapter 2, the literature on the effect of public insurance on SUD treatment in adolescents is small and its conclusions are inconsistent. However, this finding with respect to specialty treatment use is consistent with the result of Cummings, Wen, and Druss (2011) for adolescent treatment in a medical setting. This result is encouraging because it suggests that treatment rates for SUD in specialty settings may be improved by public insurance coverage expansions that are the product of national legislation in the ACA.

However, this study does not support the authors' hypothesis that private insurance coverage would improve treatment rates for adolescents with co-occurring MDE and SUD. Private insurance was not significant in any model regardless of whether the aggregate or more detailed measure accounting for SUD coverage was implemented. This finding suggests that expansions in private insurance coverage for SUD treatment under the MHPAEA may have a limited effect on the rates of SUD treatment among adolescents with co-occurring disorders.

Limitations

First, because the NSDUH is a cross-sectional survey, causality in these associations cannot be determined. Second, there are many sociobehavioral phenomena that the NSDUH does not measure, which may be associated with the receipt of MDE or SUD treatment among adolescents. Cultural stigma surrounding mental illness and SUD is known to discourage individuals from seeking treatment (Keyes 2010; Leaf, Bruce, & Tischler 1986; Rüsch, Angermeyer & Corrigan 2005; Byrne 1997). Stigma against SUD in adolescents and adults is stronger than that against mental illnesses, potentially contributing to the comparatively low SUD treatment rates observed in this study (Corrigan et al. 2005). In addition, the public-use NSDUH data files exclude geographic identifiers of subjects that could be used to determine the adolescent's physical proximity to treatment. As noted above,

adolescents may rely on their parents for transportation and/or financial support, and not controlling for their parents' attitudes about treatment or awareness of their child's illegal activity (in the case of substance use) limits this analysis.

The NSDUH's construct validity may be limited because its data are based on self-reports. Use of illicit substances and feelings of depression are thought to be underreported, although the magnitude of underreporting is poorly defined (Mensch & Kandel 1988). However, the NSDUH's estimates of illicit substance abuse and dependence have been clinically validated by RTI researchers (Jordan et al. 2008). The NSDUH also reliably assesses its key measures of substance use and mental illness (Kennet & Gfroerer 2005).

Recommendations for Future Research

Future research should analyze what impact, if any, the MHPAEA has on treatment access for adolescents with private insurance coverage. Although the symbolic significance of the MHPAEA's passage cannot be underestimated, our study findings suggest that improvements in MHSA coverage may not result in meaningful improvements in needed treatment for SUD, even among high risk populations (SAMHSA 2011). The effect of the ACA on treatment rates for adolescents should also be analyzed given that the ACA expands public insurance coverage and changes MHSA benefit requirements for some Medicaid plans. Furthermore, additional research should also address the effectiveness of referral programs for SUD treatment and the relative success of integrated treatment models.

Chapter 6 - Conclusion

Among adolescents with co-occurring MDE and SUD, this study found that both private insurance that covered mental health treatment and public insurance coverage improved adolescents' odds of treatment for MDE. Unfortunately, no similarly robust effect of insurance was detected on SUD treatment. Publicly insured adolescents were more likely to receive specialty treatment, but private insurance had no effect on SUD treatment.

This study contributes to the literature in several ways. It is the first to specifically analyze the predictors of SUD and MDE treatment in adolescents with co-occurring MDE and SUD. It is also the first to compare treatment rates between private insurance plans that do and do not cover mental health, alcohol use, or illicit drug use treatment, highlighting the importance of accounting for measurement error inherent in a pooled measure of private insurance. When distinct categories of private insurance coverage were created based on whether the plan also included coverage for mental health treatment, we found that private insurance that covered mental health treatment was associated with increased rates of overall MDE treatment and treatment by a mental health professional specifically. With respect to national healthcare policy, this study offers a hopeful endorsement of the potential of both the MHPAEA of 2008 and the ACA of 2010 to improve adolescent treatment rates of MDE among those with co-occurring SUD. It also emphasizes the necessity of additional research into the interaction of adolescents with the substance use treatment sector. The critically low SUD treatment rate of this vulnerable population, nearly half of whom who are already receiving treatment for depression, represents a missed opportunity that must be remedied.

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