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Clinical Characteristics of Treatment Seeking Adolescents with Opioid versus Cannabis/Alcohol Use Disorders

Geetha A. Subramaniam,
Department of Psychiatry, Johns Hopkins University, C/O Mountain Manor Treatment Center, 3800 Frederick Ave, Baltimore, MD 21229, Phone: 410-233-1400; Fax: 410-233-1666; E-mail: gsubram@jhmi.edu

Maxine A. Stitzer,
Johns Hopkins University, Clinical Trials Network, 5510 Nathan Shock Dr., Ste 3040, Baltimore, MD 21224

George Woody,
Treatment Research Institute, 600 Public Ledger Building, 150 South Independence Mall, Philadelphia, PA 19106

Marc J. Fishman, and
Department of Psychiatry, Johns Hopkins University; Mountain Manor Treatment Center, 3800 Frederick Ave, Baltimore, MD 21229

Ken Kolodner
3806 Fenchurch Rd, Baltimore, MD 21218

Abstract

Objectives—To assess the clinical characteristics of adolescents with DSM-IV opioid use disorder (OUD) and compare them to adolescents with cannabis/alcohol use disorders.

Method—94 adolescents (ages 14–18 years) with a current OUD and 74 adolescents with a current non-OUD cannabis/alcohol use disorders were recruited from admissions, predominantly residential, to a substance abuse treatment program in Baltimore, Maryland. Participants were assessed cross-sectionally using standardized interviews and self-reports. Chi-square, t-tests and ANCOVA (adjusting for age, gender and treatment setting, race and residence)were performed to determine group differences on demographic, substance use, psychiatric and HIV-risk behaviors; logistic regression analyses, both unadjusted and adjusted for the above five factors were conducted to assess the strength of associations.

Results—The OUD group was more likely to be Caucasian, to have dropped out of school and to live in the suburbs (trend). They also had greater substance use severity with higher proportion of current sedative and multiple SUDs. There were generally no differences in rates of criminal behaviors. Both groups had high rates of current psychiatric disorders (83% vs. 78%, n.s.) but the OUD adolescents reported higher depressive symptoms, mostly in the moderate range. Injection drug use (IDU) and needle sharing was almost exclusive to the OUD group, while both groups reported similar high rates of risky sexual behaviors.

Correspondence to: Geetha A. Subramaniam.

Conclusions—While there were similarities between the two groups, OUD adolescents evidenced greater impairment in academic, substance use, depressive symptom and IDU-related HIV-risk areas. Findings suggest poorer long-term prognosis and highlight the need for specialized interventions for treatment seeking OUD adolescents.

Keywords

opioid dependence; heroin use; clinical characteristics; adolescent substance abuse

1. Introduction

Opioid use among adolescents has risen dramatically in the past decade. Past-year heroin use among 12th graders in the decade from1995–2005 averaged 1%, while past-year non-medical use of prescription opioids nearly doubled from 4.7% to 9%, during the same period.(Johnston et al., 2006) Similarly, the National Survey on Drug Use and Health (NSDUH) data from 2002–05 showed that 7.4% of U.S. adolescents aged 12–17years reported past year non-medical use of prescription opioids, second only to the age 18–25 year group(Substance Abuse and Mental Health Services Administration (SAMHSA) Office of Applied Studies (OAS), April 6, 2007). Correspondingly, treatment admissions for substance use disorders (SUD) among adolescents who identified opioids as the primary problem increased 196% from 1995–2005 (Substance Abuse and Mental Health Services Administration (SAMHSA) Office of Applied Studies (OAS), 2006 October 3). Despite rising trends and associated health risks, including HIV and HCV infection from injection drug use(Center for Disease Control and Prevention (CDC), 2002 September), the literature is sparse on the characteristics and treatment needs of adolescents presenting with this serious form of drug use.

Four studies (Clemmey et al., 2004; Gordon et al., 2004; Hopfer et al., 2000; Marsch et al., 2005) describing adolescents with heroin use/opioid dependence entering treatment during the past decade (1996–2006) and data extracted from the Treatment Episode Data Set (Office of Applied Studies, 2007) [12–17 year olds admitted to US publicly funded treatment programs for a primary problem with heroin/opioids from 2004–2005, n=4959] analyzed by our team, forms the basis of our knowledge of the recent opioid epidemic among youth. Several findings were consistent across these studies, despite differing methods and geographic locations: the mean age of adolescents with opioid use/dependence was16–17.5 years; the proportion of females was higher than comparison populations using other substances; they were predominantly Caucasian; most were polysubstance users; and injection drug use was common, ranging from 35–64%. TEDS data suggested that very few 12–17 year-old opioid users (10%) tend to complete 12 or > years of school suggesting low school engagement (Substance Abuse and Mental Health Services Administration (SAMHSA) Office of Applied Studies , 2007). Psychiatric comorbidity was examined in only two studies: 41% of opioid-dependent adolescent patients were found to have a psychiatric disorder, the most common diagnosis being a depressive disorder (18–21%) in residential and outpatient treatment samples (Marsch et al., 2005; Gordon et al., 2004).

While these findings are informative, most studies had small sample sizes, lacked breadth in assessments and did not use standardized diagnostic interviews. Only two studies used a comparison group in an attempt to put the opioid users into the broader perspective of adolescent substance use, but both focused only on heroin *use* without examination of the diagnostic criteria for an opioid use disorder (Clemmey et al., 2004; Hopfer et al., 2000). To date, no single study has provided a comprehensive and systematic characterization of treatment-seeking adolescents with opioid use disorder (OUD). Understanding how adolescents with OUD differ from those having more common SUDs (e.g. cannabis use disorder) may better inform development of tailored treatments for these youth.

With this purpose in mind, we conducted a cross-sectional study to characterize treatment-seeking adolescents with OUD on a wide array of characteristics: demographic, social, substance use, psychiatric and HIV-risk behaviors; and compared them to adolescents entering treatment with cannabis and/or alcohol use disorders. We anticipated that adolescents with OUD would present with greater severity of co-occurring problems in several areas due to the health, social and financial risks associated with the rapid development of physiological dependence that often accompanies abuse of opioid drugs and injection drug use (IDU) (Center for Disease Control and Prevention (CDC), 2002 September; Inciardi, 1979; Rhodes et al., 2000 December).

2. Methods

2.1. Study Site

This study was conducted at a JCAHO-accredited adolescent SUD treatment facility in Baltimore, Maryland providing a continuum of residential and outpatient services for adolescents (13–18 years) and young adults (18–21 years), as described elsewhere in more detail.(Fishman et al., 2003) Adolescents/young adults with OUD typically enter the residential level of care and constitute approximately 10% of the 500–600 annual residential admissions. However, access to outpatients with OUD was enhanced between 2003–2005, when the NIDA Clinical Trials Network (CTN) study of buprenorphine treatment for adolescents/young adults was conducted at this site.

2.2. Recruitment

Patients entering residential treatment were referred by self/parents, social agencies, or the juvenile justice system. The outpatient CTN buprenorphine study recruited from community advertising and clinic referrals and contributed 19% (n=20) of OUD participants to the study reported here. All treatment admissions to the study site were pre-screened for study eligibility and written assent (those under 18 years) and/or written consent (18 year-olds and legal guardians of minors) was obtained within 1 week of treatment entry. The protocol and all study materials were approved by Western Institutional Review Board (WIRB), a Johns Hopkins IRB designee.

2.3. Study Eligibility

Opioid users were included if they were 14–18 years of age; met DSM-IV criteria for opioid abuse or dependence; and had any recent substance use (defined as last use < 2 weeks or stay in a controlled environment < 2 weeks, prior to study entry). Patients were included in the comparison group if they met DSM-IV criteria for cannabis and/or alcohol abuse/dependence (*and* no OUD) and met the matching criteria described below.

2.3.1. Comparison Group Matching Procedure—For every OUD participant enrolled, subsequent admissions were pre-screened to identify a comparison participant who matched with a current OUD participant on the following criteria: age (14–16/17–18), gender (M/F), and treatment setting (residential/outpatient). Cocaine use in the past 30 days (yes/no) was initially the 4th matching criterion, which was abandoned after 100 matched participants due to low rates of cocaine use in the potential comparison participants.

2.4. Participants

183 adolescents were consented for participation from 1820 treatment admissions eligible for screening between 12/03 and 05/06. Ninety percent (n=1638) of those pre-screened were not eligible for participation for one of the following reasons: 25% did not match with a OUD group participant; 24% could not be consented within the eligibility period primarily due to

staff unavailability; 23% reported no recent substance use (i.e. < 2 weeks); 12% were eligible but failed to provide consent (e.g. guardian unavailable/declined consent, participant did not keep appointment); and 5% were readmissions already enrolled in the study.

Of the 183 consented, 166 (OUD = 94, non-OUD comparison = 72) completed at least one diagnostic interview (4 missing CIDI; 16 missing DICA) and were retained for analyses; the 17 excluded participants did not differ by age, gender, race or treatment setting from those who were retained for analyses.

2.5. Study Instruments

All instruments chosen for the study have good psychometric properties and had been used in prior adolescent studies. A combination of diagnoses, total/composite scores and responses to individual items was used to provide information on patient characteristics. The assessment battery took approximately 2 ½ – 3 ½ hours and was administered over 2 or 3 sessions; participants received a $25 merchandise gift card for completing study assessments.

2.5.1. Demographic Assessment—The demographic assessment provided information on participant-matching criteria and other social characteristics: race, place of residence, guardianship status, court order for treatment, probation status. It also provided information on duration of abstinence, ages of onset of regular use of substances, and psychotropic medications at study entry. Self-reports of substance use were not validated by the use of urine toxicology results.

2.5.2. Composite International Diagnostic Interview (CIDI)—The substance abuse module (SAM) of this structured interview was used to obtain current DSM-IV diagnoses of SUD (i.e. substance dependence /abuse) for 9 substance categories: opioids, cannabis, alcohol, cocaine, sedative, other stimulants, PCP, inhalants, and any other substance.(Cottler et al., 1989) It also provided ages of onset for each of the DSM SUD diagnoses and was administered by trained research staff.

2.5.3. Diagnostic Instrument for Children and Adolescents-IV (DICA-IV)—This structured psychiatric interview for children/adolescents (Reich, 2000; Welner et al., 1987) provided information on several DSM-IV Axis-I diagnoses and their ages of onset. We selected seven psychiatric disorders commonly reported in the adolescent SUD literature (Hovens et al., 1994; Kandel et al., 1997; Stowell and Estroff, 1992) for assessment: ADHD, Major Depressive Episode (MDE), Manic Episode, Generalized Anxiety Disorder (GAD), Post Traumatic Stress Disorder (PTSD), Oppositional Defiant Disorder (ODD) and Conduct Disorder (CD). In addition, the psychosocial section provided limited information on academic functioning and family history, which were not available from other instruments. The first author (GS) administered 70% of DICA interviews; the others were administered by two psychiatrists who were trained by the first author (GS) to 100% agreement on observed interviews prior to beginning the study.

2.5.4. Beck Depression Inventory (BDI)—This 21-item self-report measure assessed depressive symptoms in the past 7 days (Beck et al., 1998). Each item is scored from 0–3 with a maximum score of 63. Total, cognitive and somatic subscale scores were examined (Steer et al., 1999).

2.5.5. Risk Behavior Survey (RBS)—This interview (Needle et al., 1995), administered by trained research staff, provided information on past 30-day HIV-risk behaviors from injection drug use (IDU) and sexual behavior. The past 30-day frequency of substance use

questions was expanded to include marijuana and alcohol, in addition to the standard questions on heroin/other opioids and cocaine.

2.5.6. General Crime Scale—This component of the legal section of the Global Assessment of Individual Need (Dennis et al., 2003) was self-administered. Information on past year drug-related and other illegal activities derived both from composite scores and responses to selected individual items.

2.6. Data Analyses

To compare group differences, data were analyzed using Pearson chi-square tests for categorical characteristics and independent t-tests for characteristics with continuous data using SPSS version 13® (SPSS, 2004). In order to assess the relative strength of each correlate, we ran separate binary logistic regression analyses. Results are presented as *crude* odds ratios (OR) with 95% confidence intervals (CI). Each of these regressions was re-run controlling for the 3 matching criteria (age, gender and level of care), and two other demographic factors that were significantly different [race (Caucasian/other) and Baltimore City residence (yes/no)]. These results are presented as *adjusted* OR with 95% CI. These control factors were chosen to enhance our comparison matching procedures as we did not achieve a one-one match and to ensure that group differences were not likely due to differences on these demographic factors as they have been shown to be significantly associated with drug use patterns (Catalano et al., 1990).

For continuous data (such as age of onset of SUD or psychiatric disorders), groups were compared using t-tests. Means and standard errors are presented for each outcome. For several of these variables, the distributions deviated from normality (e.g. a few variables displayed flat distributions and a few contained a few slight outliers). Consequently, parametric results were checked by using the Mann-Whitney U. P-values obtained using both methods were almost identical. Thus, only parametric results are presented. Using analysis of covariance, we again controlled for the three matching and two demographic factors that were significantly related to OUD status. Adjusted means and standard errors are presented for each of these outcomes.

Two of the outcomes (the number of psychiatric diagnosis and the number of substance use disorders) are “count” variables. However, neither of these variables was distributed as a typical Poisson, although the number of substance use disorders came closest. We first ran Poisson regression models (unadjusted and adjusted) and then treated these variables in the same manner as the other continuous variables and ran t-tests and ANCOVAs. The results were extremely similar using all methods. To maintain simplicity in the presentation, means and standard errors and adjusted means and standard errors are provided.

There are several variables with very small samples (less than 40 subjects). Due to the small sample and sparseness in some of the covariates, no adjusted analyses are presented for these variables.

For our sample size of 94 OUD and 72 non-OUD participants, using a range of proportions (from 10% to 50%), we determined that a minimum OR of 2.00 to 3.25 or 0.3–0.5 (when OR are reported as < 1) was needed to achieve statistical significance at $p = 0.05$ (95% CI) with power set at .80.

3. Results

3.1. Demographic/Social Characteristics

Table-1 shows that the OUD and non-OUD comparison groups were similar on several characteristics in addition to the matching criteria. However, the OUD group was more likely

to be Caucasian, to have dropped out of school, and not to have received special education. The OUD group was also more likely to reside outside Baltimore City and have parents who were separated or divorced, although differences lost significance in the adjusted analyses. OUD group was no different from the comparison group on rates of reporting both parents as guardians (19% vs. 23%, p= 0.37)

3.2. Substance Use/Diagnoses and Drug-Related Criminal Behaviors

Per group definition 100% of the OUD group met criteria for DSM-based OUD diagnoses; 88% of this group met criteria for Opioid dependence. As shown in Table-2, patterns of current DSM SUD diagnoses differed markedly between the two groups. Compared to non-OUD, the OUD group was more likely to have sedative and cocaine (unadjusted analysis only) use disorders and less likely to have a cannabis use disorder; alcohol use disorder was present at similar rates in both groups. The OUD group was more likely to have multiple SUD (3 or >) diagnoses but only when OUD was included in the total count of SUDs.

3.2.1. Recency of Use—Consistent with their diagnosis, the OUD group was more likely to have used opioids and cocaine (unadjusted analysis only), while the comparison group was more likely to have used marijuana and alcohol in the 30 days prior to interview.

3.2.2. Onset of Use—Examining the data for those meeting criteria for each SUD, the mean age at which participants reported first regular use of each of the substances and age of onset of each SUD diagnosis (except for cocaine use disorder) did not differ between the two groups. For OUD and non-OUD groups combined, the age of onset of regular marijuana use was approximately 13 years, alcohol 13.5 years, any opioid 15.1 years and cocaine 16 years; the two groups did not differ on age of onset of regular use (results not shown in table). Both groups combined, the onset of SUD diagnosis was approximately 14 years for cannabis and alcohol (about 1 year after onset of regular use), 15–16 years of age for opioids, cocaine and sedatives (within months after onset of regular use.

3.2.3. Criminal Behaviors (results not shown in table)—The groups did not differ on composite scores for property, interpersonal or drug-related crimes committed in the past year. Nevertheless, the OUD group was more likely to have forged checks/documents (20% vs. 7%, p = 0.018) and reported any kind of stealing (87% vs. 71%, p=0.013). They were not different on other commonly reported criminal behaviors such as driving under the influence of any substance (DUI, 63% vs. 51%), selling drugs (60% vs. 57%), and trading sex for drugs (8% vs. 6%). Probation status rates were no different for the two groups (OUD 35% vs. Comparison 44%, p= 0.17)

3.3. Psychiatric History/Diagnoses

Both the OUD and the comparison groups had high rates of any DSM-IV psychiatric disorders (83% vs. 78%, respectively, p=0.313) and virtually identical profiles of psychiatric diagnoses as seen in Table-3. Over 50% had CD, 40% MDE or GAD and approximately a third had ADHD while PTSD, Mania and ODD had lower prevalence. Mean ages of onset of these disorders (ADHD not included as the diagnoses requires onset before age 7) were also identical for both groups and ranged from 10 to14 years.

3.3.1. BDI Results—While the rates of MDE were not different, the OUD groups reported higher mean total scores on the BDI (17.3 vs. 14.2), with differences approaching significance (p=0.06). Correspondingly, a greater proportion of OUD adolescents reported depressive symptoms in the moderately severe range (i.e. >16, 48% vs. 33%, p=0.04 but the differences lost significance in the adjusted analyses.

3.4. HIV/Hepatitis C-Risk Characteristics

As shown in Table - 4, past 30-day IDU (41%) was almost exclusively present among OUD adolescents. Among OUD needle users, 49% reported sharing needles or "works" in the past 30 days (not shown in table). Over 3/4th of both groups were sexually active in the past month. There were no group differences on rates of multiple sexual partners or reports of always engaging in unprotected sexual activity. The OUD group was less likely to use protection at all times, but only in the unadjusted analyses.

4. Discussion/Conclusions

This study is unique in its in-depth examination of adolescents with opioid dependence/abuse on a wide range of characteristics: demographic, social, substance use, psychiatric and HIV/HCV-risk using standardized assessments; and in its use of a marijuana/alcohol use disorder comparison group matched for age, gender and treatment setting. Overall, the two groups had similar and multiple comorbidities; but the OUD youth were distinguished by being mostly Caucasian, having dropped out of school, living outside Baltimore city (approaching significance), having greater substance use severity and injection-related HIV/HCV-risk; the latter two suggest a more serious manifestation of a SUD and signal poor long-term prognosis for these OUD youth.

Some of these findings are consistent in the adolescent treatment literature from the past decade (Clemmey et al., 2004; Gordon et al., 2004; Marsch et al., 2005; Substance Abuse and Mental Health Services Administration (SAMHSA) Office of Applied Studies (OAS), 2007) including predominance of Caucasian race, and suburban residence (Gordon et al., 2004). Greater opioid use among Caucasian teenagers has also been reported in an analysis of the community-based Monitoring the Future Study (McCabe et al., 2005) supporting a unique vulnerability for this racial group. These characteristics raise issues of drug access, economic means, social networks and perhaps lower opioid-risk perception among suburban Caucasian youth that are worthy of exploration in future studies. An alarming finding was the lower rate of current school enrollment among OUD youth, a finding consistent with lower educational achievement among OUD young adults (Gandhi et al., 2006), and our analyses of TEDS adolescent data (Office of Applied Studies, 2007). This is a serious circumstance, independently associated with substantial lifelong impediments including poverty (Iceland, 2003) and increased criminal justice involvement (Harlow, 2003 January). While the reasons for lower academic engagement remain unclear, we speculate that not receiving special educational services addressing their early onset behavioral problems may have influenced this outcome. Further research may help clarify whether OUD youth are more likely to drop out of school either due to the effect of opioids or the need to support their expensive opioid habit by working or engaging in certain criminal behaviors.

Profiles of substance use were markedly different across the groups, with OUD adolescents showing greater substance severity, even after controlling for residential level of care, which is associated with higher substance severity (Fishman et al., 2003). A greater proportion of the treatment-seeking OUD youth had sedative, cocaine (approaching significance) and multiple SUDs, while more of the comparison group, as expected, had cannabis use disorder. The impact of multiple SUDs is likely to be detrimental; cocaine use signals a path of adverse health, criminal and social outcomes (Leri et al., 2003); concurrent sedative use (mainly benzodiazepines) has been linked to reports of death from overdose (Darke et al., 2002; Zanis and Woody, 1998) and multiple-substanceabusing youth generally have poor treatment outcomes (Ciraulo et al., 2003). These findings also reinforce the common clinical observation that setting goals for total abstinence can be difficult when multiple substances are being abused.

Our data did not support our hypothesis that OUD youth would demonstrate higher rates of criminal activity. The drug-related criminal behaviors were equally severe for both the OUD and non-OUD samples: over 1/3rd reported being on probation and virtually all engaged in criminal activities. These similarities are potentially explained by the predominantly residential sample with juvenile justice involvement. However, the possible higher socioeconomic status of suburban OUD youth and better access to prescription opioids from medicine cabinets of families and neighbors (data not collected in this study); and higher rates of stealing and forging among them, may offer some explanation to their means of support their opioid habit. Also, almost half of both groups reported past-year drug dealing or driving under the influence of any substance, behaviors that increase their risk exposure and pose a risk to their communities.

High rates of Axis-I psychiatric disorders found in the OUD and non-OUD samples, (83% vs. 78%) were similar to other reports about treatment samples of adolescents with non-opioid SUDs (Hovens et al., 1994; Kandel et al., 1997; Stowell and Estroff, 1992). The exception is the low (41%) rate reported by Gordon et al. (Gordon et al., 2004), a finding most likely influenced by the fact that not all patients received a psychiatric evaluation. However, our findings are derived from a predominantly residential treatment sample for whom admission criteria may include problematic coexisting emotional and behavioral conditions (Mee-Lee et al., 2001) and thus do not necessarily reflect prevalence of psychiatric disorders in the outpatient treatment populations of adolescents with SUDs. Relative prevalence among specific psychiatric disorders was similar to previous reports with highest rates for conduct disorder (50%), followed by MDE, GAD, ADHD and PTSD (Bukstein et al., 1992; Riggs et al., 1995). Since having co-occurring psychiatric disorders has been shown to negatively impact outcomes among adolescents with SUD (Grella et al., 2001), these data further highlight the need for routine mental health assessments and integrated psychiatric care with SUD treatment. The high rates of depressive and anxiety disorders in the OUD youth, also seen in opioid dependent adults (Brooner et al., 1997; Rounsaville et al., 1982; Teesson et al., 2005). While the rates of MDE diagnoses were not different, the OUD youth had significantly higher depressive symptoms consistent with previous studies (Clemmey et al., 2004; Subramaniam et al., 2007), with half scoring in the moderately depressed range. This may serve as a marker for poorer prognosis as shown in the authors' previous work.(Subrmaniam et al., 2007)

The risk for HIV/HCV infection (Center for Disease Control and Prevention (CDC), 2007 May 14) was almost exclusively present among OUD adolescents; 40% reported recent IDU and half of them reported sharing needles. While risky sexual behaviors were high in both groups, they take on greater significance among OUD youth who may contact HIV/HCV through IDU and subsequently serve as vectors for potential sexual transmission to their partners.

Our data on onset of SUD diagnoses versus psychiatric disorders provides information on the developmental time course of these disorders, for both groups. In general, onset of psychiatric disorders at ages 10–14 years preceded the onset of OUD and other SUD diagnoses (range: age 14–16 years). This lends support to the concept that psychiatric disorders are risk factors for the development of SUD among adolescents (Fergusson et al., 2007; Kessler et al., 2005) Our data confirmed the typical pattern of progression of substance initiation, from marijuana or alcohol to cocaine and/or opioids (Kandel, 1975). The progression to having a SUD diagnoses from time of regular use was about a year for alcohol and marijuana. However, in the case of cocaine and opioids, this progression was within a year. These findings suggest prevention efforts may best target those experimenting with cocaine or opioid cautioning against their regular use which leads rapidly to abuse/dependence.

4.1. Limitations

This study recruited from a single treatment site and may not generalize to other adolescent populations. However, as previously mentioned, there were notable similarities between this

study sample and the larger national TEDS adolescent sample; this increases confidence that our sample is representative rather than aberrant. The use of a predominantly residential sample may also skew results toward adolescents with higher severity characteristics. However, matching the comparison sample on this variable means that differences observed should be valid and robust. It is also conceivable that group differences were missed due to sample size. The validity of information could have been enhanced if we had interviewed legal guardians/parents, particularly in the determination of psychiatric disorders, even though well-trained psychiatrists made diagnoses using a standardized diagnostic interview. Similarly, the absence of confirmatory drug screens may have limited the validity of self-reports on substance use, even though adolescent self-reports of substance use have been shown to be valid and reliable (Lennox et al., 2006). Finally, the cross-sectional design did not permit inferences on causality.

4.2. Implications and Future Directions

This study further characterizes the complex and high severity comorbidities of OUD youth. The OUD sample was fairly heterogeneous with several subtypes that emerged (e.g. male vs. female; heroin vs. prescription opioid users; community treatment vs. study referred; court-ordered vs. self-referred; those with opioid dependence vs. abuse). This warrants further research with larger samples to determine how these characteristics are inter-related and how demographic and psychosocial profiles compare across youth with drug use patterns that do not involve opioids. Another important step is to determine the influence of these characteristics on treatment retention and outcomes. While evidence is emerging for the efficacy for agonist treatments for opioid dependent adolescents (Marsch et al., 2005), future trials are needed to target comorbidities such as academic disengagement, multiple substance use and risks from overdose, HIV/HCV infections and psychiatric disorders.

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Table 1

Demographic and Social Characteristics in OUD and non-OUD Samples:

	OUD (n=94)		Non-OUD (n=72)				
	n	%	n	%	X^2	Crude OR (C.I.)	Adjusted O.R. (C.I.)[a]
Female[†]	42	45	25	35	1.68	1.52(0.81–2.86)	1.27(0.61–2.64)
18 year olds[†]	31	33	24	33	0.00	0.98(0.51–1.89)	1.22(0.56–2.65)
Residential Setting[†]	65	69	55	76	1.07	0.69(0.35–1.39)	0.45(0.19–1.07)
Caucasian Race	84	89	36	51	30.48	**8.17(3.66–18.25)*****	**8.68(3.50–21.53)*****
Baltimore City Residence	26	30	35	50	6.88	**0.42(0.22–0.81)****	0.50(0.23–1.10)
Currently in School	35	38	42	60	7.69	**0.41 (0.22–0.77)****	**0.36(0.16–0.81)***
Court Ordered to Treatment	17	18	19	27	1.79	0.60(0.29–1.27)	0.83(0.34–2.05)
Member at home drinks or uses drugs	38	51	30	47	0.20	1.16(0.60–2.27)	1.01(0.45–2.25)
Parents Separated/Divorced	52	69	34	53	3.85	**2.00(1.00–3.99)**$^{\wedge}$	1.87(0.70–4.96)
Ever in Special Education	21	22	25	35	3.33	0.53(0.27–1.05)	**0.36(0.15–0.86)***

OUD=opioid use disorder, X^2 = chi-square value, O.R.= odds ratio, C.I.= 95% confiderce interval

[†]represents matching criteria for the selection of comparison group (non-OUD)

*p<0.05

**p< 0.01

***p< 0.001

$^{\wedge}$p=0.051

[a]adjusted for age, gender, race, treatment setting, place of residence

Table 2

Substance Use/Diagnoses in OUD and non-OUD Samples:

	OUD (n=94)		Non-OUD (n =72)				
	n	**%**	**n**	**%**	**X^2**	**Crude OR (C.I.)**	**Adjusted O.R. (CI.)[a]**
% Past Year DSM-IV SUD Diagnosis							
Opioid	94	100	72	0	N/A	-	-
Cocaine	49	53	20	29	9.49	**2.79(1.44–5.41)****	1.79(0.80–4.00)
Cannabis	54	57	**66**	92	23.83	**0.12(0.05–0.31)*****	**0.13(0.05–0.38)*****
Alcohol	50	53	44	61	1.04	0.72(0.39–1.35)	0.68(0.32–1.48)
Sedatives	34	**36**	**5**	7	17.92	**7.16(2.62–19.56)*****	**7.72(2.48–24.00)*****
Stimulants	11	12	**3**	4	2.88	2.99(0.80–11.54)	3.32 (0.76–14.42)
Multiple SUDs (3 or >)	63	**67**	23	33	18.35	**4.13(2.13–8.03)*****	**3.67(1.64–8.20)****
Multiple non-opioid SUDs (2 or >)	58	**62**	45	65	0.18	0.87(0.45–1.66)	0.70(0.32–1.55)

	n	**Unadj. mean**	**se**	**n**	**Unadj. mean**	**se**	**t value**	**df (1)**	**Adj. mean[a]**	**se**	**Adj. mean[a]**	**se**	**F value**	**df(6)**
Mean # Past Year DSM-IV SUD Diagnoses	92	3.5	0.2	69	2.2	0.2	**5.37*****	159	2.9	0.2	1.8	0.2	16.49***	146

	n	**%**	**n**	**%**	**X^2**	**Crude OR (C.I.)**	**Adjusted O.R. (C.I.)**
% Anv Past 30 Dav Substance Use							
Heroin	53	**56**	**2**	3	50.91	**43.31(10.01–187.28)*****	**39.85(8.46–187.71)*****
Other Opioid	52	**56**	10	14	29.96	**7.74(3.53–16.95)*****	**7.68(3.10–19.04)*****
Any Opioid	84	89	12	17	87.29	**41.30(16.74–101.87)*****	**42.36(14.81–121.14)*****
Cocaine	43	47	16	**23**	10.17	**3.02(1.51–6.02)*****	1.65(0.75–3.65)
Marijuana	70	76	**68**	**96**	11.96	**0.14(0.04–0.49)*****	**0.25(0.07–0.94)***

	OUD (n=94)			Non-OUD (n =72)										
	n	**%**		**n**	**%**		**X^2**		**Crude OR (C.I.)**	**Adjusted O.R. (CI.)[a]**				
Alcohol	52	57		53	**75**		5.36		**0.45(0.23–0.89)***	**0.43(0.19–0.96)***				
	n	**mean**	**se**	**n**	**mean**	**se**	**t value**	**df(1)**	**Adj. mean[a]**	**se**	**Adj. mean[a]**	**se**	**F value**	**df(6)**
Mean Age of Onset DSM SUD[b]														
Opioid	94	15.3	0.1	**0**	N/A	N/A	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/ A**	N/A	N/A
Cocaine	42	**15.7**	**0.2**	**20**	16.3	0.2	**–2.00***	**67**	15.8	**0.2**	16.3	0.3	**9.67****	61
Cannabis	53	13.9	0.3	63	14.4	0.3	**–1.1**	115	13.8	0.4	**14.2**	0.3	0.67	104
Alcohol	52	14.4	0.3	43	14.4	0.3	0.12	**91**	14.5	0.4	14.6	0.4	0.1	81

OUD=opioid use disorder, X^2 = chi-square value, O.R.= odds ratio, C.l.= 95% confidence interval, se= standard error, df=degrees of freedom, N/A = not applicable; adj=adjusted

* p<0.05

** p< 0.01

*** p< 0.001

[a] adjusted for age, gender, race, treatment setting, place of residence

[b] mean age of onset of each SUD for those with a past year DSM-IV SUD Diagnosis

[c] mean age of onset of regular use of each substance for those with a current SUD diagnosis for that substance

Table 3

Psychiatric History/Diagnoses in OUD and non-OUD Samples

	OUD (n=94)			Non-OUD (n=72)										
	n	**%**		**n**	**%**		**X^2**		**Crude OR (C.I.)**	**Adjusted O.R. (CI.)[a]**				
% Admitted on any psychotropic Meds	33	35		27	**38**		**0.1**		0.90(0.48–1.71)	0.68(0.31–1.47)				
% suicide attempt in the past	18	22		11	**17**		0.57		1.38(0.60–3.17)	0.78(0.28–2.15)				
% Current DSM-IV Axis-I Psychiatric Diagnosis														
Conduct Disorder	44	53		33	**52**		0.03		1.06(0.55–2.04)	1.14(0.53–2.48)				
Major Depressive Episode	33	40		20	**31**		1.14		1.45(0.73–2.89)	1.39(0.62–3.14)				
Generalized Anxiety Disorder	33	40		19	**30**		**1.6**		1.56(0.78–3.13)	1.3(0.54–3.15)				
ADHD	27	33		25	**39**		0.68		0.75(0.38–1.49)	0.80(0.36–1.81)				
PTSD	21	26		23	**36**		1.82		0.61(0.30–1.25)	0.44(0.18–1.07)				
Manic/Hypomanic Episode	15	18		14	22		0.33		0.79(0.35–1.78)	0.61(0.23–1.62)				
ODD	12	15		14	22		1.37		0.60(0.26–1.42)	0.57(0.21–1.52)				
	n	**Unadj. mean**	**se**	**n**	**Unadj. mean**	**se**	**t value**	**df (1)**	**Adj. mean***	**se**	**Adj. mean***	**se**	**F value**	**df (6)**
Mean # Axis-I Psychiatric Diagnoses	83	2.2	0.2	64	**2.3**	**0.2**	−0.25	145	**2.5**	**0.2**	**2.7**	**0.2**	0.41	133
Age of Onset Of DSM-IV Psychiatric Diagnosis Symptoms [b]														
Conduct Disorder	40	10.8	0.5	32	**9.8**	**0.5**	1.46	**70**	11.1	**0.6**	**9.7**	**0.5**	3.06	62
Major Depressive Episode	27	13.1	0.6	23	11.6	**0.5**	1.81	**48**	12.9	**0.7**	**12**	**0.7**	1.13	59
Generalized Anxiety Disorder	28	11.8	0.6	33	12.2	**0.7**	**−0.4**	**45**	11.1	**0.9**	11.6	**0.8**	0.25	38
Age at Significant Trauma	29	13.9	0.7	18	12.8	**0.6**	1.12	**43**	**13**	**0.8**	12.5	**0.6**	0.29	37
Manic/Hypomanic episode[c]	12	11.1	0.9	14	12.2	**0.9**	−0.93	**24**						
ODD[c]	12	10.3	0.5	14	10.3	0.5	0.04	24						

OUD=opioid use disorder, X^2 = chi-square value, O.R.= odds ratio, C.I.= 95% confidence interval, se= standard error, df =degrees of freedom; adj = adjusted

*p<0.05

[a]adjusted for age, gender, race, treatment setting, place of residence

[b]mean age of onset for those with a current DSM-IV Psychiatric Diagnosis

[c]no adjusted means were computed due to the small sample size

Table 4

Sexual and Injection Drug Use (IDU) Related HIV-Risk Behaviors in OUD and non-OUD Samples

	OUD (n=94)		Non-OUD (n=72)				
	n	**%**	**n**	**%**	**X^2**	**Crude OR (C.I.)**	**Adjusted O.R. (C.I.)[a]**
Past 30 Day Sexual 1 HIV-Risk Behaviors							
Sexually Active	71	76	58	81	0.42	0.78(0.37–1.66)	0.99(0.40–2.43)
Always unprotected sex	29	41	17	29	1.85	1.67(0.80–3.48)	0.99(0.41–2.36)
Never unprotected sex	6	9	15	26	7.1	**0.27(0.1–0.74)****	0.43(0.12–1.52)
2 or > sexual partners	27	38	20	35	0.17	1.17(0.57–2.40)	2.22(0.85–5.81)
Any Lifetime IDU	45	49	2	3	39.27	**31.12(7.19–134.69)*****	**32.98(6.74–161.33)*****
% Past 30 day IDU							
Any IDU	38	41	1	1	35.03	**49.06(6.53–368.52)*****	**63.37(7.27–552.66)*****
Heroin	36	39	1	1	31.21	**42.95(5.71–323.08)*****	**59.96(6.76–531.57)*****
Cocaine	15	17	0	0	N/A	**N/A**	
Other Opioid	4	4	0	0	N/A	**N/A**	

OUD=opioid use disorder, X^2 = chi-square value, O.R.= odds ratio, C.I.=confidence interval

*p<0.05

**p< 0.01

***p< 0.001

[a]adjusted for age, gender, race, treatment setting, place of residence