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Title: Use of Prescription Drugs and Future Delinquency among Adolescent Offenders

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### Abstract

Non-medical use of prescription drugs (NMUPD) by adolescents is a significant public health concern. The present study investigated whether NMUPD is associated with future delinquency using baseline, 6-month, and 12-month follow-up data of 1,349 adolescent offenders from the Pathways to Desistance project. Results indicated baseline differences across three NMUPD use groups on demographic factors, violence exposure, mental health diagnoses, other drug use, and previous delinquency, suggesting that severity of NMUPD is important to consider. Further, NMUPD significantly predicted drug-related, non-aggressive, and aggressive delinquency 12 months later even after considering other known correlates of delinquency. Analyses suggest that NMUPD contributes to future delinquency in part because NMUPD users are exposed to violence, have enduring mental health and drug use problems, and have delinquency histories. These findings suggest that NMUPD is an important component of future delinquency for adolescent offenders but it should be considered within the context of other known risk factors.

*Keywords:* prescription drugs, adolescence, offenders, substance abuse, delinquency

## **1. Introduction**

Over the last two decades opioids and other psychotherapeutic medications, such as tranquilizers, stimulants, and sedatives have been prescribed in greater frequency in the United States, especially to adolescents and young adults (Fortuna, Robbins, Caiola, Joynt, & Halterman, 2010; Thomas, Conrad, Casler, & Goodman, 2006). Coupled with a corresponding increase in the non-medical use and abuse of those drugs, this has been topic of controversy and reason for great concern (Ford, 2008; Manchikanti & Singh, 2008; Novak, Calvin, Glasheen, & Edlund, 2011; Thomas et al., 2006; Young, Glover, & Havens, 2012).

The National Survey on Drug Use and Health (NSDUH) defines non-medical use of prescription drugs (NMUPD) as use of at least one psychotherapeutic drug from four categories of prescription-type drugs (i.e., opioids, tranquilizers, stimulants, and sedatives) “without a prescription of the individual's own or simply for the experience or feeling the drugs caused” (Substance Abuse and Mental Health Services Administration (SAMHSA), 2013b). National estimates of substance use in the general population show that the use of non-medical prescription drugs has become more prevalent than the use of other illicit drugs with the exception of marijuana; 2.4 million Americans engaged in NMUPD for the first time within the past year in 2012, an average of 6,700 initiates per day (SAMHSA, 2013b). This is a significant public health concern: prescription opioid abuse alone was estimated to cost the U.S. \$55.7 billion in 2007 (Birnbaum et al., 2011).

### **1.1. Adolescent Substance Use, Delinquency and NMUPD**

As with other forms of substance use, findings indicate that adolescents and young adults are at the greatest risk of NMUPD relative to other age groups (Novak, Calvin, Glasheen, & Edlund, 2011; SAMHSA, 2006, 2013b), and numerous studies have explored NMUPD among adolescents (Ford, 2008; Johnston, O'Malley, Bachman, & Schulenberg, 2011; Young et al.,

2012). NMUPD was the second most popular illicit drug for adolescents after marijuana in a nationally representative community sample, with a peak of 4.0 % past month users among 16 and 17 year olds in the 2013 NSDUH. This finding extended to 12 to 13 year olds: NMUPD was the most prevalent illicit drug used, with 1.7 % reporting past month use (SAMHSA, 2013b). In 2009, the NSDUH showed that among all past year adolescent users about 16% met the criteria for abuse or dependence, indicating that problematic levels of abuse are developing far earlier in life course compared to other illicit drugs such as cocaine or heroin, where the median age of abuse and dependence is situated in the mid-20s (Novak et al., 2011).

Beyond abuse and dependence, studies investigating life experiences and mental health symptoms have found that trauma, a history of significant witnessed violence, post-traumatic stress disorder (PTSD), and major depressive disorder (MDD) were associated with adolescent NMUPD use (Catalano, White, Fleming, & Haggerty, 2011; McCauley et al., 2010; Schepis & Krishnan-Sarin, 2008). Further, NMUPD use has been linked with poor school performance and lower school bonding (Ford, 2009; Schepis & Krishnan-Sarin, 2008) and delinquency (Ford, 2008). Overall, NMUPD users are at an increased risk for emergency room visits (SAMHSA, 2013a) and death (Centers for Disease Control and Prevention (CDC), 2012; Paulozzi et al., 2012). Youth who engage in NMUPD are significantly more likely than their peers to use other illicit drugs and to combine prescription drugs with alcohol and other substances. These practices not only further increase the risk of involvement with the juvenile justice system, they also lead to increased risk for potentially dangerous drug interactions and their negative outcomes (Garnier et al., 2009; McCabe, Teter, & Boyd, 2006).

Clearly, NMUPD among juveniles is a large public health problem with significant consequences, yet studies investigating NMUPD in adolescent samples indicate that there is

considerable variation in both prevalence of NMUPD and demographic, behavioral, and social correlates (Boyd, Young, Grey, & McCabe, 2009; Young et al., 2012). For example, in general NMUPD has been lower among racially and ethnically non-White adolescents compared to their White counterparts (McCabe, West, Teter, & Boyd, 2012; McCauley et al., 2010; SAMHSA, 2013b). Overall prevalence rates and trends in high risk samples of adolescents are missing from the literature.

Adolescents are more likely than young adults to use multiple drugs, and a plethora of evidence suggests that there is a substantial overlap in NMUPD and the use of marijuana and other illicit drugs (Boyd, Young, Grey, & McCabe, 2009; Catalano et al., 2011; Ford, 2008; McCabe et al., 2012; Schepis & Krishnan-Sarin, 2008; SAMHSA, 2013b; Wu, Schlenger, & Galvin, 2006; Young et al., 2012). Several researchers have thus suggested that NMUPD might simply be another form of illicit substance use, and that negative consequences of NMUPD might overlap with symptoms of polydrug use (Catalano et al., 2011; Ford, 2008; Young et al., 2012). Possible explanations of the relationship between illicit substance use, alcohol, and NMUPD is that an adolescent who already is abusing substances might share some of the risk factors associated with NMUPD; he or she might already know where and how to access prescription drugs and receive less parental monitoring compared to non-using peers. Additionally, adolescents who binge drink, abuse alcohol, or use other illicit drugs may engage in NMUPD for similar affective reasons – either an attempt to numb affect or experience excitement (McCauley et al., 2010). There is some support for this hypothesis in data linking NMUPD to delinquency, with one study of students finding that NMUPD motivated by thrill-seeking, but not motivated by self-treatment, was connected to both other illicit drug use and delinquency (Boyd et al., 2009).

A wealth of research documents the association between illicit drug use and increased risk of general and aggressive delinquency among adolescents (Adams et al., 2013; Barnes, Welte, & Hoffman, 2002; Doran, Luczak, Bekman, Koutsenok, & Brown, 2012; Ford, 2008; Mason & Windle, 2002). Substance use has been associated with continuity in offending, decreased likelihood of desistance, and increased risk of reoffending; it also distinguished high level chronic offenders from less severe offender groups (Mulvey, Schubert, & Chassin, 2010; Schubert, Mulvey, & Glasheen, 2011). While comparatively more limited than the general literature, there is some evidence that links NMUPD specifically with delinquency in adolescents (Adams et al., 2013; Boyd et al., 2009; Catalano et al., 2011; Sung, Richter, Vaughan, Johnson, & Thom, 2005). One of the few studies focusing on NMUPD and delinquency is Ford's (2008) analysis of the connection between NMUPD and delinquency in the community sample of the 2005 NSDUH. In this study, results indicated that NMUPD overall, as well as specific categories of drugs (i.e., opioids, tranquilizers stimulants, and sedatives), were significantly associated with self-reported general delinquency in adolescents. Further, overall NMUPD and the non-medical use of opioids were associated with increased likelihood of arrest among 12 to 17 year old adolescents. The study found that in this sample, the use of other illicit drugs (not including marijuana) was more strongly associated with self-reported general delinquency and arrest than NMUPD. However, severity of drug use and use of marijuana were not included in the analyses and differential relationships of NMUPD to aggressive versus non-aggressive or drug-related delinquency were not investigated.

Evidence regarding differential relationships of illicit drug use, alcohol use, and different types of delinquency is comparatively more equivocal than the relationship to general delinquency. Data from the most recent NSDUH shows that youths aged 12 to 17 who had

engaged in fighting or other delinquent behaviors in the past year were more likely than other youths to have used illicit drugs in the past month (SAMHSA, 2013b). These findings suggest that among adolescents in the community, illicit drug use compared with NMUPD is more directly associated with non-violent property-related crime. In contrast however, a wealth of research has shown that substance use confers an increased risk for aggression (versus general delinquency), with early use a particularly strong predictor of violent behavior (Doran et al., 2012; Hawkins et al., 2000; Martel et al., 2009). Relationships between NMUPD and different delinquent behaviors have not yet been assessed, even though there is some evidence of potential differences in the association of NMUPD and different forms of delinquency. One longitudinal study found that the non-medical use of prescription opioids among adolescents was associated with violent behavior, but explained little variance in property crime (Catalano et al., 2011), and, as stated above, a study with high-school students found that only NMUPD motivated by sensation seeking, and not self-treatment, was associated with delinquency (Boyd et al., 2009). However, in a sample of justice system-involved, high-risk youth, substance use was equally related to drug-related, interpersonal, and property delinquency with stability over time (D'Amico, Edelen, Miles, & Morral, 2008).

## **1.2. Substance Use and NMUPD among Juvenile Offenders**

The increased prevalence of mental health problems and substance use disorders together with an elevated rate of substance use among juvenile offenders in the juvenile justice system is a well-known issue (Chassin, 2008; Shook, Vaughn, Goodkind, & Johnson, 2011; Vaughn, Freedenthal, Jenson, & Howard, 2007; Vaughn, Howard, Foster, Dayton, & Zelner, 2005). As mentioned above, substance use disorders are linked to continued offending and violence in community and offender samples of adolescents (Adams et al., 2013; Chassin, 2008; Mulvey et



al., 2004a). Among juvenile offenders, the presence of a substance use disorder is consistently associated with more re-arrests, more self-reported antisocial activity, more drug-related, interpersonal, and property delinquency, and less engagement in gainful activity, both cross-sectionally and over time (D'Amico et al., 2008; Mulvey et al., 2004a; Schubert et al., 2011).

Our knowledge of prevalence and correlates of NMUPD among this high-risk population is limited to a few studies examining correlates of mostly binary lifetime NMUPD in currently incarcerated samples. One of the few studies taking into account the severity of drug use in this population examined patterns of illicit drug use and mental health concerns among a state population of 723 incarcerated juvenile offenders and found that level of lifetime poly-substance use and severity of problems stemming from alcohol and drug use were associated with severity of mental health symptoms, including past traumatic experiences (Vaughn et al., 2007). Links between drug use and delinquency or NMUPD specifically were not assessed. The only study examining the correlates of NMUPD in a sample of confined adolescents was conducted with the population of one urban detention center in Ohio (Alemagno, Stephens, Shaffer-King, & Teasdale, 2009). It showed that overall 10% of incarcerated male youth reported lifetime NMUPD. Arrestees reporting NMUPD had higher levels of overall other illicit drug use, more alcohol problems, reported more trauma and problems with anger management, as well as more risky sexual behaviors. However, frequency or recency of NMUPD use as well as any relation to non-aggressive or drug-related delinquency was not reported. Finally, there was one study with 227 incarcerated juveniles comparing youthful offenders who sold drugs with those who did not sell drugs on substance use and other behaviors (Shook et al., 2011). Results suggested that juveniles engaging in either selling marijuana or hard drugs were using marijuana use, other illicit drugs, and NMUPD at substantially elevated rates, suggesting a significant overlap

between own substance use and dealing of drugs. In summary, there is sparse knowledge about NMUPD use specifically among adolescent offenders. Given the high prevalence of substance use, mental health issues and thrill-seeking behaviors in offenders, they are at increased risk for the NMUPD. Given national trends in NMUPD it seems especially important to understand the unique contribution of NMUPD to future patterns of delinquency and other substance use.

Investigating whether NMUPD uniquely contributes to patterns of recidivism has potentially important implications for treatment of substance use problems and targeted prevention efforts in this population.

### **1.3. Current Study**

The present study contributes to the literature in several ways. Serious adolescent offenders are a group with an especially elevated risk of engaging in both substance use and continued delinquency. While there is some evidence that NMUPD is associated with delinquency in community samples, limited data on the characteristics of NMUPD users among serious adolescent offenders exists. Additionally, the existing knowledge about NMUPD use among offenders largely stems from incarcerated samples reporting on past behavior; there is a dearth of longitudinal research that investigates how NMUPD influences delinquency over time above and beyond known correlates of delinquency. The present study describes and compares serious juvenile offenders who have never engaged in NMUPD, engaged in NMUPD only experimentally or long ago, and recent frequent users. Further, the present study investigates the relationship between NMUPD and different forms of delinquency; there are no studies to date that investigate the influence of NMUPD on drug-related, non-aggressive, and aggressive delinquency separately. Finally, the present study investigates these relationships longitudinally and investigates NMUPD influences on different types of future delinquency above and beyond

other known correlates of delinquency, closing a substantial gap in knowledge, and providing data that can inform prevention and treatment of this high-risk group of adolescent offenders.

Thus, the purposes of the current study were to investigate two research questions: (1) What is the profile of NMUPD among serious juvenile offenders? and (2) What is the unique contribution of NMUPD in predicting future drug-related, non-aggressive, and aggressive delinquency among serious adolescent offenders beyond known correlates of delinquency?

## **2. Materials and methods**

### **2.1. Participants**

The present article is a secondary data analysis from the Pathways to Desistance project, a multisite, longitudinal study of serious juvenile offenders (Mulvey et al., 2004b). Beginning in 2000, project staff recruited 1,354 adolescents aged 14 through 17 who were adjudicated delinquent, or found guilty of a serious (overwhelmingly felony-level) offense, at their current court appearance in Philadelphia, PA ( $N = 654$ ) and Phoenix, AZ ( $N = 700$ ). The number of males adjudicated for a drug offense was capped at 15% of the sample so as to avoid overrepresentation of drug offenders. All females and all youth transferred to the adult system who met the enrollment criteria also were recruited to participate.

Immediately after enrollment, researchers conducted a structured 4-hour baseline interview with each adolescent. The interview included a thorough assessment of the youth's social background, developmental history, psychological functioning, psychosocial maturity, attitudes about illegal behavior, intelligence, school achievement and engagement, work experience, mental health, current and previous substance use and abuse, family and peer relationships, use of social services, and antisocial behavior. After the baseline interview, researchers interviewed participants every six months for the three years and annually thereafter.

At each follow-up interview, researchers gathered information on the adolescent's self-reported behavior and experiences during the prior 6 months, including any illegal activity, drug or alcohol use, and involvement with treatment or other services. In addition, the follow-up interviews collected data on changes in life situations (e.g., living arrangements and employment), developmental factors (e.g., likelihood of thinking about and planning for the future and relationships with parents), and functional capacities (e.g., mental health symptoms). The current study uses data from the baseline, 6-month follow-up and 12-month follow-up interviews only (retention rates = 93% of the full sample). Additional details regarding the study rationale can be found in Mulvey and colleagues (2004), and additional details regarding the study design, sample, and methodology are in Schubert and colleagues (2004).

Five participants were missing data on NMUPD and therefore were not included in our analyses ( $N = 1,349$ ). The majority of the selected sample was male (86%,  $n = 1,165$ ). The race/ethnicity of the sample was 41% Black, 34% Hispanic, 20% White, and 5% other. The participants' average age was 16.04 years ( $SD = 1.14$  years). The most common family structure was a youth with their biological mother who was single and never married (21%), followed by biological mother and step-father (18%), biological mother who was single and divorced or separated (16%), two biological parents (15%), other adult relative (12%), no adult in home (5%), and other (13%).

## **2.2. Measures**

**2.2.1. Demographics.** A single item represented race/ethnicity (i.e., White, Black, Hispanic, Other), and a single item assessed gender (1 = male, 2 = female); age in years was a continuous variable.

Socioeconomic status (SES) was based on both parental education and occupation. Reported parental occupation and education were coded using a seven-point scale ranging from 1 (higher executives, proprietors, major professionals; professional degree) to 7 (unskilled employees; less than seven years of school) based on Hollingshead's index of social position (see Hollingshead, 1957). Then, a parental Index of Social Position (ISP) which is based on the formula  $((\text{Occupation score} \times 7) + (\text{Education score} \times 4))$  was computed (see Hollingshead, 1970). When both the occupation and education for the parent was unknown, the individual parent ISP score was not computed. If only one of the two components was known, the missing information was derived using the available data. The mean of the mother and father occupation and education was taken when data for both parents were available.

Proportion of time spent in facilities with no community access was also assessed at the 6-month and 12-month follow-up interviews. This value was a proportion indicating the total days during the recall period that the participant was reported to be in a facility with no community access. The average of the proportion from the two time points was used in the current study.

**2.2.2. Violence exposure.** The Exposure to Violence Inventory (ETV; Selner-O'Hagan, Kindlon, Buka, Raudenbush, & Earls, 1998) was modified for this study to assess the frequency of exposure to violent events. Items document the types of violence the adolescent both experienced (i.e., Victim - 6 items, e.g., "Have you ever been chased where you thought you might be seriously hurt?") and observed (i.e., Witnessed - 7 items, e.g., "Have you ever seen someone else being raped, an attempt made to rape someone or any other type of sexual attack?"). A total score was created that summed the victim and witness items that were endorsed. Higher scores indicate greater exposure to violence.

**2.2.3. Mental health.** The Composite International Diagnostic Interview (CIDI; World Health Organization, 1990) is a comprehensive, fully structured interview used to assess mental disorders. By means of computerized algorithms, the CIDI provides both lifetime ("Ever") and current ("Past year" and "Past 30 days") diagnosis as defined by the DSM-IV and ICD-10. The entire CIDI was not administered and the following six modules were selected for the purpose of the current study: major depressive disorder (MDD), posttraumatic stress disorder (PTSD), alcohol abuse, alcohol dependence, drug abuse, and drug dependence. During the interview, all participants were asked questions about selective symptoms of psychiatric disorders. Based on predetermined skip patterns, positive responses to these screening items were followed by more detailed questions to determine if the endorsed symptom is a psychiatric symptom and is not due to medication, drugs, alcohol, or to a physical illness or injury. If symptoms were endorsed and occurred in a pattern which suggested a diagnosis might be present, additional questions were asked to establish the onset and recency of the symptoms. Participants were either given a diagnosis or not for lifetime, past year, and past 30 days on all selected diagnoses. Additionally, a severity scale was calculated. For each disorder participants were coded either "0 – Never had diagnosis," "1 – Had diagnosis in lifetime," "2 – Had diagnosis in past year," or "3 – Had diagnosis in past 30 days." Higher scores indicated a more frequent diagnosis.

**2.2.4. Drug use.** A modified version of The Substance Use/Abuse Inventory, developed by Chassin, Rogosch, and Barrera (1991) for use in a study of children of alcoholics was used to assess adolescent's self-reported use of illegal drugs and alcohol over the course of his/her lifetime and in the past 6-months (e.g., "How often have you had alcohol to drink?"). The current study only used the Substance Use subscale to measure use of alcohol, marijuana, and other illicit drugs (i.e., cocaine, opioids, ecstasy, hallucinogens). Additionally, youth were asked

whether they have used sedatives (e.g., sleeping pills, barbiturates, seconal, valium, librium, xanax, qualludes, etc.) or stimulants (e.g., diet pills, benzadrine, methamphetamine) to get high, and if so how frequently (0 = *Not at all* to 9 = *Everyday*). These questions were used to assess NMUPD.

**2.2.5. Delinquency history.** A modified version of the Self-Report of Offending (SRO; Elliott, 1990; Huizinga, Esbensen, & Weiher, 1991) scale was used at each interview to measure the adolescent's account of his/her involvement in three drug-related delinquent acts (i.e., selling marijuana, selling other illegal drugs, driving while intoxicated or high), six non-aggressive delinquent acts (i.e., breaking in to steal, shoplifting, buying/receiving/selling stolen property, using checks or credit cards illegally, stealing a car or motorcycle, carjacking, being paid by someone for sex), and 11 different aggressive delinquent acts (i.e., destroying/damaging property, setting fires, forcing someone to have sex, killing someone, shooting at someone (bullet hit or did not hit), robbery with weapon, robbery without weapon, assault, fights, fights as part of gang activity). For each endorsed item at baseline, the follow-up question "How many times have you done this in the past year?" was asked. This item was used to identify whether the adolescent reported doing an act within the past six months. At the follow-up interviews the participants were again asked if they engaged in any of these activities since the last interview. A sum of the number of items endorsed was divided by the number of questions answered to produce a "general variety" proportion score (range 0 to 1) for each participant for drug-related, non-aggressive, and aggressive delinquency. This score assessed the number of different types of delinquent acts in which the participant engaged and was used in the current study as a severity index for delinquency. Higher scores indicate more varied, and hence severe, delinquency patterns.

### 2.3. Data analysis

Analyses were performed using SPSS Version 21 (IBM Corp., 2012). Three mutually exclusive groups were created to assess frequency and current NMUPD at baseline. The first group consisted of youth who reported no NMUPD (i.e., no NMUPD of either stimulants or sedatives); the second group comprised youth who had engaged in NMUPD but less than at least once a month in the past six months; youth in the third group reported NMUPD at least once a month in the past six months. Then, univariate tests of differences between the three groups on demographic, violence exposure, mental health, other drug use, and delinquency history variables were tested either with  $\chi^2$  (for categorical variables) or one-way analysis of variance (ANOVA; for continuous variables). In these analyses race/ethnicity was dichotomized (1 = White, 0 = all others).

Next, to assess future delinquency across the following 12 months from baseline, the average variety proportion score was calculated from the 6-month and 12-month follow-ups for each area of delinquency: drug-related, non-aggressive, and aggressive. The mean of the reported offending history proportion score was used to capture the variety of delinquency from baseline to 6-months and then from 6-months to 12-months.

Then, a series of six analyses of covariance (ANCOVAs) models predicting delinquency across 12 months were estimated separately for drug-related delinquency, non-aggressive delinquency, and aggressive delinquency. Each type of delinquency was studied separately as previous research has suggested that what predicts one type of delinquency may be different from what predicts other types of delinquency (Catalano et al., 2011). Also, each set of covariates was grouped and analyzed separately to determine the relative importance of NMUPD within each domain. The demographic model included race/ethnicity, sex, age, and SES as



covariates. Additionally, to account for the effect of institutional confinement on the adolescent's level of delinquency (Piquero et al., 2001), proportion of time with no community access was added as an additional covariate in the analyses. All of the following models included the demographic variables and a unique set of covariates known to also be involved in future delinquency; the covariates were not continually added from one model to the next. The second model added total violence exposure as a covariate to the demographic variables. The third model, the mental health model, added the severity scores for MDD, PTSD, alcohol abuse, alcohol dependency, drug abuse, and drug dependency as covariates to the demographic variables. The fourth model added the youth's lifetime use of alcohol, marijuana, and illicit drugs as covariates; while the fifth model added the youth's lifetime history of drug-related delinquency, non-aggressive delinquency, and aggressive delinquency to the demographic covariates. The sixth, and final model, included all the significant covariates from previous analyses in the model and the demographic variables. Planned contrast tests were then conducted to determine the specific group differences when the *F*-statistic was significant. All analyses utilizing continuous variables used Bonferonni correction to adjust for multiple comparisons.

### **3. Results**

#### **3.1. Missing Data Analysis**

A missing data analysis was conducted on all independent variables and the missing data was found to be missing completely at random (MCAR) according to Little's chi-square statistic (Little, 1988),  $\chi^2 = 425.53$ ,  $df = 405$ ,  $p = .23$ .

#### **3.2. Baseline Differences Based on NMUPD User Group**

Table 1 reports the findings from the  $\chi^2$  and ANOVA tests assessing baseline differences in demographics and known correlates of delinquency (i.e., violence exposure, mental health,

other drug use, delinquency history) across patterns of NMUPD. There were significant group differences on all measures except SES and proportion of time spent with no community access. Black participants were overrepresented in the “never used NMUPD” group, whereas Hispanics were overrepresented in the “used NMUPD at least once in a lifetime” group. Whites and Hispanics were equally overrepresented in the “current NMUPD user” category. Additionally, NMUPD users compared to non-users were significantly older, although there were no differences between NMUPD at least once in lifetime and current NMUPD users. Proportionally more females reported NMUPD use than non-use; this was particularly evident in the current NMUPD use category.

In reference to violence exposure, a linear trend was evident at baseline with more violence exposure being reported with more NMUPD. All three groups of NMUPD users were significantly different from one another on direct victimization and total violence exposure. For witnessed violence, youth who never used NMUPD witnessed less violence than both other groups of NMUPD users, who were not different from one another.

Similarly, there were baseline NMUPD group differences in all mental health categories. With one exception, these differences were linear: youth with no NMUPD had a lower proportion of lifetime, past year, and past 30 days mental health diagnoses compared with youth who had used prescription drugs non-medically but not recently; those youth in turn had a lower proportion of diagnoses than youth who were current NMUPD users. The one exception was for past 30 days alcohol dependency. In that case more mental health diagnoses were found in the used NMUPD at least once in lifetime as compared to current NMUPD users.

There also were significant differences at baseline between all three NMUPD groups in their lifetime and past 6-month use of alcohol, marijuana, and illicit drugs. The only exception

was lifetime marijuana use, where youth who never used NMUPD reported lower lifetime use than both other groups, who were not different from one another.

Finally, there were baseline differences between the three NMUPD groups on lifetime and past 6 month delinquency. As NMUPD use became more frequent and recent, lifetime and past 6 month drug-related, non-aggressive, and aggressive delinquent acts increased. The one exception was that for drug-related offenses in the past 6 months the differences were between current NMUPD users and the other two groups.

[INSERT TABLE 1 ABOUT HERE]

### **3.3. ANCOVAs for NMUPD Predicting Future Delinquency**

**3.3.1. Drug-related delinquency.** NMUPD group membership significantly predicted future drug-related delinquency in the demographic, violence exposure, other drug use, and delinquency history models. In each of these models, NMUPD group membership explained more variance in future drug-related delinquency than the covariates ( $\eta^2_p$  ranged from .03 to .01), except the delinquency history model. In the delinquency history model, previous drug-related delinquency was the strongest predictor ( $\eta^2_p = .014$ ). As seen in Table 2, for these models the *F* statistic was diminished, indicating that the association of NMUPD with future delinquency was partially explained by these covariates. Within the violence exposure model, violence exposure was a significant predictor, with more violence exposure predicting more drug-related delinquency. Additionally, in the other drug use model, lifetime alcohol use was a significant predictor; as alcohol use increased so did drug-related delinquency. In the mental health model, NMUPD was no longer significant, suggesting that NMUPD does not account for drug-related delinquency above and beyond mental health problems.

[INSERT TABLE 2 ABOUT HERE]

**3.3.2. Non-aggressive delinquency.** As seen in Table 3, NMUPD group membership significantly predicted future non-aggressive delinquency; demographic, violence exposure, mental health, other drug use, and delinquency history covariates also were significant in these models ( $\eta^2_p$  ranged from .03 to .01). In the violence exposure model, violence exposure significantly predicted and was positively associated with non-aggressive delinquency. In the mental health model, increased alcohol dependency severity also predicted more non-aggressive delinquency. In the other drug use model, being older, more lifetime alcohol use, and more lifetime illicit drug use were significant predictors of increased non-aggressive delinquency. However, in this model lifetime alcohol use ( $\eta^2_p = .012$ ) was a stronger predictor of delinquency than NMUPD ( $\eta^2_p = .011$ ). In the delinquency history model, being older, more past non-aggressive delinquency, and more past aggressive delinquency predicted increases in future non-aggressive delinquency.

[INSERT TABLE 3 ABOUT HERE]

**3.3.3. Aggressive delinquency.** NMUPD group membership significantly predicted future aggressive delinquency in the demographic, violence exposure, mental health, other drug use, and delinquency history models with medium to small effect sizes, and explained more variance than the covariates in these models ( $\eta^2_p$  ranged from .06 to .01), as seen in Table 4. As before, the association between NMUPD membership and aggressive delinquency was attenuated once covariates were added to the model. In all models, males and older youth were more likely to report aggressive delinquency. Additionally, in the violence exposure model, violence exposure was a significant predictor of aggressive delinquency ( $\eta^2_p = .118$ ), and stronger than NMUPD ( $\eta^2_p = .022$ ). Further in the mental health model, MDD severity, alcohol dependency severity, drug abuse severity, and drug dependency severity were additional

significant predictors of aggressive delinquency. In the other drug use model, lifetime alcohol use was a significant predictor ( $\eta^2_p = .031$ ), and stronger than NMUPD ( $\eta^2_p = .012$ ). In the delinquency history model, previous aggressive delinquency was the strongest predictor ( $\eta^2_p = .102$ ).

[INSERT TABLE 4 ABOUT HERE]

**3.3.4. Paired contrast tests.** Paired contrast tests revealed that there were significant group differences across all types of delinquency between youth who never engaged in NMUPD and current users when the *F* statistic was significant. Further, there were significant differences between youth who endorsed NMUPD at least once in their lifetime and current NMUPD users across all models with significant *F* statistics. Finally, in the demographic and mental health models with aggressive delinquency as the outcome, there was a significant group difference between adolescent offenders who never used NMUPD and those who used NMUPD at least once in their lifetime.

**3.3.5. Final Models.** As seen in Table 5, in all final models NMUPD was no longer significant after accounting for the significant covariates related to each type of delinquency. A history of more previous drug-related delinquency was the only significant predictor of future drug-related delinquency after accounting for all other significant covariates. Being older and involved in more non-aggressive delinquency were significant predictors of future non-aggressive delinquency, with age as the strongest predictor ( $\eta^2_p = .006$ ). Finally, being male and older, and experiencing more violence exposure, lifetime alcohol use, and previous aggressive delinquency were significant predictors of future aggressive delinquency. The strongest predictor was previous aggressive delinquency ( $\eta^2_p = .072$ ).

[INSERT TABLE 5 ABOUT HERE]

#### **4. Discussion**

The purpose of the present study was to examine the characteristics of NMUPD users among serious adolescent offenders and to evaluate the unique contribution of their NMUPD patterns in predicting future drug-related, non-aggressive, and aggressive delinquency. The unique contribution of NMUPD use patterns in predicting future delinquency, over and above known correlates of delinquency such as demographic characteristics, violence exposure, mental health diagnoses, other drug use, and delinquency history was studied. Youth with varying histories of NMUPD use (those who never used, used but not recently or frequently, and used recently and frequently) differed at baseline on race/ethnicity, age, gender, both forms of violence exposure, lifetime and recent mental health diagnoses, use of other drugs, and previous delinquency history. Moreover, with the exception of the final set of models, NMUPD was a significant predictor for the three distinct types of delinquency studied.

##### **4.1. NMUPD among Serious Adolescent Offenders**

Our findings indicated that adolescent offenders who reported engaging in NMUPD either currently or at some point in their lives were mostly males, White or Hispanic, and tended to be older than adolescent offenders who reported never engaging in NMUPD. These findings are consistent with previous research in the general population indicating less reports of NMUPD among Black youth (McCabe et al., 2012; McCauley et al., 2010; SAMHSA, 2013b; Young et al., 2012) and younger adolescents (SAMHSA, 2013b; Young et al., 2012). Furthermore, Hispanics were overrepresented in the “used NMPUD at least once in a lifetime” group; this corresponds with recent findings among 7<sup>th</sup> and 12<sup>th</sup> graders in the general population where Hispanic youth were more likely than their Black and white peers to report lifetime NMUPD (King, Vidourek, & Merianos, 2013).

While we observed more males reporting NMUPD than females, it is hard to interpret these results since we also observed more males reporting never engaging in NMUPD. We believe that these findings reflect the overrepresentation of males in all NMUPD groups in our sample, rather than a gender effect on the use of NMUPD. That being said, and based on the known association between mental health problems, other drug use and NMUPD (Catalano et al., 2011; McCabe et al., 2012; McCauley et al., 2010), the reported higher rates of NMUPD among female adolescents in the general population (Califano, 2005; McCauley et al., 2010) and a higher reported frequency of mental health problems among female offenders over their male counterparts (Cauffman, 2008), we believe that female adolescent offenders may present more NMUPD use than male adolescent offenders. This may be especially true when considering that, in the overall sample, female adolescents met criteria for both mood/anxiety and substance use disorders in higher proportions than did males (Mulvey & Schubert, 2012).

In terms of violence exposure, adolescent offenders who engaged in NMUPD reported witnessing violence and experiencing more instances of direct victimization than adolescent offenders who have never engaged in NMUPD. Moreover, youth who reported current NMUPD had a higher proportion of lifetime, past year, and past 30 days mental health diagnoses when compared with both youth who had used prescription drugs non-medically at least once in their lifetime but not recently, and youth who had never engaged in NMUPD. These findings are consistent with previous reports of the linkages between NMUPD use among the general population and a history of violence exposure, PTSD, and MDD (Catalano, White, Fleming, & Haggerty, 2011; McCauley et al., 2010; Schepis & Krishnan-Sarin, 2008).

Lastly, a similar pattern was observed in the reports of delinquent history and use of alcohol, marijuana, and illicit drugs during their lifetime and past six months. Overall, higher

instances of delinquent history and other drug use were reported by current NMUPD users, followed by adolescent offenders who used NMUPD at least once in their lifetime, with offenders who had never engaged in NMUPD having the fewest reports of delinquent history and other drug use. Once again these findings are consistent with previously reported associations between other drug use and increased levels of NMUPD among the general population (Boyd et al., 2009; Catalano et al., 2011; Ford, 2008; McCabe et al., 2012; Schepis & Krishnan-Sarin, 2008; SAMHSA, 2013b; Wu et al., 2006; Young et al., 2012) and the strong associations between drug use and delinquency (Adams et al., 2013; Barnes, Welte, & Hoffman, 2002; Doran, Luczak, Bekman, Koutsenok, & Brown, 2012; Ford, 2008; Mason & Windle, 2002).

Overall, a general linear pattern was observed in the data. As adolescent offenders reported more NMUPD use they also reported more violence exposure, mental health disorders, other drug use, and delinquency history at baseline. These findings corroborate reported associations between NMUPD, history of trauma, and other drug use among adolescent offenders (Alemagno, Stephens, Shaffer-King, & Teasdale, 2009; Shook et al., 2011) and advance our understanding of the characteristics of NMUPD users among serious juvenile offenders, indicating that significant differences exist depending on the severity of NMUPD.

#### **4.2. NMUPD and Future Delinquency**

The findings in the present study support the contribution of NMUPD in predicting drug-related, non-aggressive, and aggressive delinquency among serious adolescent offenders beyond other known correlates of delinquency, with distinct differences for each type of delinquency. To start, when looking at each model individually we observed that overall NMUPD was a significant predictor of future drug-related delinquency. As we controlled for other variables in our analyses, NMUPD remained a significant predictor of future drug-related delinquency,



although the strength of the relationship was diminished. The exception to this pattern concerned the mental health model where NMUPD was no longer associated with drug-related delinquency after accounting for mental health problems. Furthermore, when demographics and all previously significant variables were included (i.e., total violence exposure, drug abuse severity, lifetime alcohol use, and drug-related delinquency history), NMUPD no longer was a significant predictor of future drug-related delinquency.

Next, a similar pattern to the one described above was observed when the role of NMUPD in predicting non-aggressive delinquency was examined. Once again we observed that NMUPD group membership significantly predicted future non-aggressive delinquency while controlling for demographic characteristics, violence exposure, mental health, other drug use, and delinquency history, with a diminishing pattern in the strength of the relationship as different variables were considered. Furthermore, when the demographic and previously significant variables were included (i.e., total violence exposure, alcohol dependency severity, lifetime alcohol use, lifetime illicit drug use, non-aggressive delinquency history, and aggressive delinquency history), NMUPD group membership no longer was a significant predictor of future non-aggressive delinquency. Specifically being older and having engaged in more non-aggressive delinquency in the past significantly predicted future non-aggressive delinquency.

Additionally, NMUPD group membership was a significant predictor of future aggressive delinquency in the demographic, violence exposure, mental health, other drug use, and delinquency history models, with indication of its variance explained by the addition of other variables just as with drug related delinquency and non-aggressive delinquency. When all demographics and previously significant variables (i.e., total violence exposure, MDD severity, alcohol dependency severity, drug abuse severity, drug dependency severity, lifetime alcohol

use, and aggressive delinquency history) were included in the final model, NMUPD group membership no longer was a significant predictor of future aggressive delinquency. These results suggest that youth who engage in aggressive delinquency may have a more complex history that explains future aggressive delinquency as compared to those youth who engage in drug-related or non-aggressive delinquency. When the significant predictors are examined in terms of importance previous aggressive delinquency explains most of the variance, followed by total violence exposure, age, sex, then lifetime alcohol use. Similar to other findings, there appears to be a stronger connection between violence exposure and self-reported aggressive delinquency as compared to other forms of delinquency (Lansford et al., 2007). Also, within this unique population older male youth appear to be at most risk, which is similar to general populations in previous research (SAMHSA, 2013b). Finally, lifetime alcohol use appears to be more important in aggressive delinquency as compared to other types of delinquency, as well as more important than NMUPD. This may be because alcohol is still one of the most easily accessible substances for adolescents to attain (National Center on Addiction and Substance Abuse at Columbia University (CASA), 2012). However, with the increasing availability of prescription drugs, and research which suggests that youth perceive taking prescription drugs recreationally to be more safe than using other illicit substances (Arria, Caldeira, Vincent, O'Grady, & Wish, 2008; Inciardi, Surratt, Kurtz, & Cicero, 2007; Mui, Sales, & Murphy, 2013), this finding may change in future years if proper interventions are not enacted.

It is noteworthy that previous history of a specific type of delinquency consistently was a significant predictor for its future occurrence; previous drug-related delinquency predicted future drug-related delinquency, previous non-aggressive delinquency predicted future non-aggressive delinquency, and previous aggressive delinquency predicted future aggressive delinquency. In all

except non-aggressive delinquency prior offending history was the strongest predictor of future delinquency. These findings correspond to prior reported associations between delinquency history and recidivism (Lipsey & Derzon, 1998; Stouthamer-Loeber et al., 2004) and again highlight the urgent need to develop pathways to desistance. Moreover, the importance of violence exposure, other drug use and mental health problems was evident. Specifically abuse and dependency on alcohol and drugs, as well as MDD severity need to be considered when conducting research and practice with adolescent offenders. Lastly, a history of violence exposure seemed to impact adolescent offenders across all types of offenses, highlighting the important role of contextual factors in prevention efforts. These findings emphasize the need to consider a variety of risk factors when examining delinquency. The findings also provide evidence that it is important to consider the pattern of delinquency, as different predictors emerged depending on which type of delinquency the adolescent offender reported. Also, it is important to consider which variables are being considered when investigating NMUPD as the importance of NMUPD differed depending on which covariates were included in the model. Without considering all of the significant variables researchers may not fully understand the relative important of NMUPD in future delinquency.

Finally, severity of NMUPD matters in predicting future types of offenses; as evidenced by our findings. There were significant group differences across all types of delinquency between adolescent offenders who engaged in current NMUPD and those who never engaged in NMUPD. In addition, there were significant differences between youth who engaged in current NMUPD and those who endorsed NMUPD at least once in their lifetime. These findings supported the unique contribution of NMUPD in predicting future delinquency among adolescent offenders, and point out the important task ahead in terms of prevention efforts. The

results also indicate the need to assess and intervene for multiple risk factors as there were a variety of predictors found to be important in resulting delinquency in this at-risk population.

#### **4.3. Limitations**

While the study had many strengths, it is important to note limitations that may have impacted the results. First, this study may not adequately represent gender differences between groups of NMUPD users among adolescent offenders, nor gender influence in predicting future offenses due to the overrepresentation of males in our sample. Further, males involved in drug-related offenses were capped, so the current sample may not be representative for all youth involved in drug-related delinquency. It is also possible that the predictors investigated were moderated by gender; this should be investigated in future studies. Additionally, due to restricted access to variables regarding violent offenses, we used the “aggressive offending scale” created by the authors of the parent study. This meant that some offenses with an arguably non-aggressive connotation, such as property damage, were included in the analyses. Concurrent alcohol and other drug use were also not controlled for in all models as the authors were interested in the unique prediction of NMUPD. However, given the previous literature on polydrug use and the results of this study, future research should continue to investigate how NMUPD interacts with alcohol and other drug use which may predict delinquency. Finally, this study relied solely on adolescent self-reports which raises concerns of shared method variance and socially desirable responding (Kazdin, 2003). Nevertheless, the results suggest different characteristics of NMUPD users among adolescent offenders and an important role of NMUPD severity in the prediction of future delinquency.

#### **4.4. Implications**

The present study significantly contributes to the understanding of NMUPD among adolescent offenders in several ways. As far as we know, this is the first study to specify the characteristics of NMUPD among adolescent offenders and to examine its relation with drug-related, non-aggressive, and aggressive delinquency separately. Thus, several important implications for prevention and intervention efforts follow from the present study. First, a better understanding of the differences among adolescent offenders who engage in NMUPD and those who do not is needed in order to determine best approaches for treatment and intervention. Consequently, practitioners and researchers interested in promoting pathways to desistance would benefit from a better understanding of the findings reported, and from the identification of potential moderating factors both at the protective and risk levels, which allow for the design and implementation of prevention and treatment efforts that address those factors susceptible of change. Likewise, as previously noted by others (Alemagno, Stephens, Shaffer-King, & Teasdale, 2009; King, Vidourek, & Merianos, 2013), it is also important to understand both individual and contextual factors associated to the increasing rate of NMUPD among the general population and among adolescent offenders to inform prevention efforts. For example, an individual's personality and preferred coping styles as well as parental drug or alcohol problems and an association with deviant peers, among others, may be influencing some of the associations here reported. Finally, education initiatives to promote awareness among adolescent offenders of the potential psychological and physical dangers that are associated with NMUPD use are needed. Previous research supports the use of educational strategies to reduce substance use among adolescents (Tolan, Szapocznik, & Sambrano, 2007) and these efforts also might be successfully replicated for adolescent offenders.

#### **4.5. Conclusion**

NMUPD is an increasing and significant public health problem that warrants the attention of policy makers, researchers, and practitioners. The concern regarding NMUPD for the general population and adolescent offenders is well founded, especially when taking into account that the use of NMUPD in the general population has become more prevalent than the use of other illicit drugs, with the exception of marijuana (Novak, Calvin, Glasheen, & Edlund, 2011; SAMHSA, 2013b). Adolescent offenders are a group with a particularly elevated risk of engaging in both substance use and continued delinquency, hence the urgent need to identify potential factors that may prevent desistance, such as NMUPD and the mechanism by which said factors operate.

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Table 1  
*NMUPD group differences in baseline demographic factors and correlates of delinquency (N = 1,349)*

Characteristic:	Group 2			Univariate Test of Difference
	Group 1 Never Used NMUPD (n = 944)	Used NMUPD in Lifetime (n = 258)	Group 3 Current NMUPD Users (n = 147)	
<b>Demographic Factors</b>				
Race/Ethnicity				$\chi^2(6) = 100.93^{***}$
White [% (n)]	14.6 (138)	30.6 (79)	38.8 (57)	
Black [% (n)]	48.5 (458)	27.9 (72)	17.7 (26)	
Hispanic [% (n)]	32.6 (308)	34.5 (89)	38.8 (57)	
Other [% (n)]	4.3 (40)	7.0 (18)	4.7 (7)	
Sex [% Male (n)]	88.6 (836)	83.3 (215)	77.6 (114)	$\chi^2(2) = 15.57^{***}$
Mean Age (SD) <sup>a,b</sup>	15.93 (1.15)	16.36 (1.12)	16.21 (1.01)	$F(2, 1346) = 17.04^{***}$
Mean SES (SD)	51.83 (12.63)	51.20 (11.87)	49.23 (10.71)	$F(2, 1338) = 2.89$
Proportion of time with no community access mean (SD)	0.45 (0.32)	0.50 (0.32)	0.45 (0.32)	$F(2, 1167) = 2.63$
<b>Violence Exposure</b>				
Witnessed Violence Mean (SD) <sup>a,b</sup>	3.51 (1.95)	4.27 (1.89)	4.63 (1.64)	$F(2,1346) = 32.61^{***}$
Directly Victimized Mean (SD) <sup>a,b,c</sup>	1.27 (1.34)	2.09 (1.45)	2.63 (1.48)	$F(2,1346) = 83.51^{***}$
Total Score Mean (SD) <sup>a,b,c</sup>	4.78 (2.85)	6.36 (2.92)	7.25 (2.77)	$F(2,1346) = 67.60^{***}$



Characteristic:	Group 1 Never Used NMUPD ( <i>n</i> = 944)	Group 2 Used NMUPD in Lifetime ( <i>n</i> = 258)	Group 3 Current NMUPD Users ( <i>n</i> = 147)	Univariate Test of Difference
<b>Mental Health</b>				
<b>Lifetime</b>				
Major depressive disorder				
[% Yes ( <i>n</i> )]	5.2 (48)	9.4 (24)	17.6 (25)	$\chi^2(2) = 30.22^{***}$
PTSD [% Yes ( <i>n</i> )]	4.3 (40)	9.8 (25)	14.8 (21)	$\chi^2(2) = 28.11^{***}$
Alcohol abuse [% Yes ( <i>n</i> )]	8.3 (76)	14.9 (37)	25.0 (35)	$\chi^2(2) = 37.21^{***}$
Alcohol dependency				
[% Yes ( <i>n</i> )]	4.2 (38)	21.0 (52)	30.0 (42)	$\chi^2(2) = 128.07^{***}$
Drug abuse [% Yes ( <i>n</i> )]	21.3 (194)	34.3 (85)	45.7 (64)	$\chi^2(2) = 47.15^{***}$
Drug dependency [% Yes ( <i>n</i> )]	7.6 (69)	30.6 (76)	42.1 (59)	$\chi^2(2) = 161.47^{***}$
<b>Past Year</b>				
Major depressive disorder				
[% Yes ( <i>n</i> )]	3.7 (34)	8.2 (21)	10.6 (15)	$\chi^2(2) = 17.30^{***}$
PTSD [% Yes ( <i>n</i> )]	2.5 (23)	5.1 (13)	11.3 (16)	$\chi^2(2) = 26.47^{***}$
Alcohol abuse [% Yes ( <i>n</i> )]	6.4 (58)	8.1 (20)	20.0 (28)	$\chi^2(2) = 30.16^{***}$
Alcohol dependency				
[% Yes ( <i>n</i> )]	3.1 (28)	14.1 (35)	24.3 (34)	$\chi^2(2) = 98.75^{***}$
Drug abuse [% Yes ( <i>n</i> )]	15.6 (142)	21.4 (53)	39.3 (55)	$\chi^2(2) = 44.85^{***}$
Drug dependency [% Yes ( <i>n</i> )]	6.0 (55)	21.4 (53)	40.7 (57)	$\chi^2(2) = 152.58^{***}$

Characteristic:	Group 1	Group 2	Group 3	Univariate Test of Difference
	Never Used NMUPD ( <i>n</i> = 944)	Used NMUPD in Lifetime ( <i>n</i> = 258)	Current NMUPD Users ( <i>n</i> = 147)	
<b>Past 30 Days</b>				
Major depressive disorder				
[% Yes ( <i>n</i> )]	1.0 (14)	2.7 (7)	2.8 (4)	$\chi^2(2) = 6.10^*$
PTSD [% Yes ( <i>n</i> )]	1.6 (15)	3.9 (10)	5.6 (8)	$\chi^2(2) = 10.89^{**}$
Alcohol abuse [% Yes ( <i>n</i> )]	0.3 (3)	1.2 (3)	2.9 (4)	$\chi^2(2) = 10.94^{**}$
Alcohol dependency [% Yes ( <i>n</i> )]	0.2 (2)	0.8 (2)	0.5 (7)	$\chi^2(2) = 8.80^*$
Drug abuse [% Yes ( <i>n</i> )]	1.9 (17)	2.4 (6)	7.1 (10)	$\chi^2(2) = 13.69^{**}$
Drug dependency [% Yes ( <i>n</i> )]	0.5 (5)	1.6 (4)	9.3 (13)	$\chi^2(2) = 55.71^{***}$
<b>Other Drug Use</b>				
<b>Lifetime</b>				
Alcohol use mean ( <i>SD</i> ) <sup>a,b,c</sup>	3.76 (2.55)	5.81 (2.48)	6.50 (2.50)	$F(2, 1346) = 120.67^{***}$
Marijuana use mean ( <i>SD</i> ) <sup>a,b</sup>	5.60 (3.35)	8.08 (2.01)	8.76 (0.98)	$F(2, 1346) = 122.56^{***}$
Illicit drug use mean ( <i>SD</i> ) <sup>a,b,c</sup>	0.74 (2.21)	5.19 (5.46)	9.50 (7.29)	$F(2,1346) = 403.26^{***}$
<b>Past 6 Months</b>				
Alcohol use mean ( <i>SD</i> ) <sup>a,b,c</sup>	2.47 (2.17)	3.31 (2.56)	4.86 (2.74)	$F(2,1345) = 120.67^{***}$
Marijuana use mean ( <i>SD</i> ) <sup>a,b,c</sup>	3.59 (3.23)	4.48 (3.44)	7.48 (2.46)	$F(2,1345) = 95.42^{***}$
Illicit drug use mean ( <i>SD</i> ) <sup>a,b,c</sup>	0.34 (1.47)	1.43 (2.95)	5.79 (5.70)	$F(2,1346) = 284.29^{***}$

	Group 1	Group 2	Group 3	
Characteristic:	Never Used NMUPD ( <i>n</i> = 944)	Used NMUPD in Lifetime ( <i>n</i> = 258)	Current NMUPD Users ( <i>n</i> = 147)	Univariate Test of Difference
<b>Delinquency History Severity</b>				
<b>Index</b>				
<b>Lifetime</b>				
Drug delinquency mean ( <i>SD</i> ) <sup>a,b,c</sup>	0.32 (0.36)	0.65 (0.37)	0.77 (0.33)	$F(2,1343) = 154.58^{***}$
Non-aggressive delinquency mean ( <i>SD</i> ) <sup>a,b,c</sup>	0.28 (0.22)	0.48 (0.22)	0.57 (0.22)	$F(2,1342) = 98.31^{***}$
Aggressive delinquency mean ( <i>SD</i> ) <sup>a,b,c</sup>	0.26 (0.18)	0.37 (0.21)	0.44 (0.23)	$F(2,1343) = 76.05^{***}$
<b>Past 6 Months</b>				
Drug delinquency mean ( <i>SD</i> ) <sup>b,c</sup>	0.33 (0.32)	0.30 (0.36)	0.60 (0.36)	$F(2,841) = 39.11^{***}$
Non- aggressive delinquency mean ( <i>SD</i> ) <sup>a,b,c</sup>	0.15 (0.17)	0.16 (0.19)	0.37 (0.24)	$F(2,1123) = 55.17^{***}$
Aggressive delinquency mean ( <i>SD</i> ) <sup>a,b,c</sup>	0.11 (0.13)	0.14 (0.13)	0.24 (0.20)	$F(2,1343) = 53.91^{***}$

*Note.* Values are *N* (unweighted) and % (weighted) unless otherwise specified. NMUPD = Non-medical use of prescription drugs, PTSD = Post traumatic stress disorder.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

<sup>a</sup> Significant difference ( $p < .05$ ) between Group 1 and Group 2

<sup>b</sup> Significant difference ( $p < .05$ ) between Group 1 and Group 3

<sup>c</sup> Significant difference ( $p < .05$ ) between Group 2 and Group 3



Category	Model 1: Demographic			Model 2: Violence Exposure			Model 3: Mental Health			Model 4: Other Drug Use			Model 5: Delinquency History		
	<i>F</i>	<i>df</i>	$\eta^2_p$	<i>F</i>	<i>df</i>	$\eta^2_p$	<i>F</i>	<i>df</i>	$\eta^2_p$	<i>F</i>	<i>df</i>	$\eta^2_p$	<i>F</i>	<i>df</i>	$\eta^2_p$
	<b>Mental health severity</b>														
MDD							3.05	1,993	.003						
PTSD							0.56	1,993	.001						
Alcohol abuse							0.35	1,993	.000						
Alcohol dependency							3.76	1,993	.004						
Drug abuse							7.67**	1,993	.008						
Drug dependency							2.40	1,993	.002						
<b>Other drug use</b>															
Lifetime alcohol use										5.63*	1,1030	.005			
Lifetime marijuana use										3.10	1,1030	.003			
Lifetime illicit drug use										0.02	1,1030	.000			

Category	Model 1:			Model 2:			Model 3:			Model 4:			Model 5:		
	Demographic			Violence Exposure			Mental Health			Other Drug Use			Delinquency History		
	<i>F</i>	<i>df</i>	$\eta^2_p$	<i>F</i>	<i>df</i>	$\eta^2_p$	<i>F</i>	<i>df</i>	$\eta^2_p$	<i>F</i>	<i>df</i>	$\eta^2_p$	<i>F</i>	<i>df</i>	$\eta^2_p$
<b>Delinquency history</b>															
Drug-related													14.11 <sup>***</sup>	1,1028	.014
Non-aggressive													0.10	1,1028	.000
Aggressive													2.98	1,1028	.003
<b>NMUPD Group</b>	15.76 <sup>a,b</sup> <sup>***</sup>	2,1033	.030	9.56 <sup>a,b</sup> <sup>***</sup>	2,1032	.018	2.74	2,993	.005	6.09 <sup>a,b</sup> <sup>**</sup>	2,1030	.012	4.99 <sup>a,b</sup> <sup>**</sup>	2,1028	.010

Note. MDD = Major depressive disorder, NMUPD = Non-medical use of prescription drugs, PTSD = Post traumatic stress disorder, SES = Socioeconomic status.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

<sup>a</sup> Significant difference ( $p < .05$ ) between Group 1: Never Used NMUPD and Group 3: Current NMUPD Users

<sup>b</sup> Significant difference ( $p < .05$ ) between Group : Used NMUPD in Lifetime 2 and Group 3: Current NMUPD Users





Category	Model 1: Demographic			Model 2: Violence Exposure			Model 3: Mental Health			Model 4: Other Drug Use			Model 5: Delinquency History		
	<i>F</i>	<i>df</i>	$\eta^2_p$	<i>F</i>	<i>df</i>	$\eta^2_p$	<i>F</i>	<i>df</i>	$\eta^2_p$	<i>F</i>	<i>df</i>	$\eta^2_p$	<i>F</i>	<i>df</i>	$\eta^2_p$
	<b>Mental health severity</b>														
MDD							0.62	1,993	.001						
PTSD							0.79	1,993	.001						
Alcohol abuse							0.66	1,993	.001						
Alcohol dependency							7.91**	1,993	.008						
Drug abuse							0.02	1,993	.000						
Drug dependency							0.02	1,993	.006						
<b>Other drug use</b>															
Lifetime alcohol use										12.90***	1,1030	.012			
Lifetime marijuana use										0.01	1,1030	.000			
Lifetime illicit drug use										3.91*	1,1030	.004			

Category	Model 1:			Model 2:			Model 3:			Model 4:			Model 5:		
	Demographic			Violence Exposure			Mental Health			Other Drug Use			Delinquency History		
	<i>F</i>	<i>df</i>	$\eta^2_p$	<i>F</i>	<i>df</i>	$\eta^2_p$	<i>F</i>	<i>df</i>	$\eta^2_p$	<i>F</i>	<i>df</i>	$\eta^2_p$	<i>F</i>	<i>df</i>	$\eta^2_p$
<b>Delinquency history</b>															
Drug-related													0.52	1,1028	.001
Non-aggressive													6.28*	1,1028	.006
Aggressive													5.63*	1,1028	.005
<b>NMUPD Group</b>	17.90 <sup>a,b</sup> ***	2,1033	.033	12.23 <sup>a,b</sup> ***	2,1032	.023	3.91 <sup>a,b</sup> *	2,993	.008	5.57 <sup>a,b</sup> **	2,1030	.011	7.05 <sup>a,b</sup> **	2,1028	.014

Note. MDD = Major depressive disorder, PTSD = Post traumatic stress disorder, SES = Socioeconomic status.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

<sup>a</sup> Significant difference ( $p < .05$ ) between Group 1: Never Used NMUPD and Group 3: Current NMUPD Users

<sup>b</sup> Significant difference ( $p < .05$ ) between Group : Used NMUPD in Lifetime 2 and Group 3: Current NMUPD Users



Category	Model 1: Demographic			Model 2: Violence Exposure			Model 3: Mental Health			Model 4: Other Drug Use			Model 5: Delinquency History		
	<i>F</i>	<i>df</i>	$\eta^2_p$	<i>F</i>	<i>df</i>	$\eta^2_p$	<i>F</i>	<i>df</i>	$\eta^2_p$	<i>F</i>	<i>df</i>	$\eta^2_p$	<i>F</i>	<i>df</i>	$\eta^2_p$
	<b>Mental health severity</b>														
MDD							4.84*	1,993	.004						
PTSD							1.15	1,993	.001						
Alcohol abuse							3.41	1,993	.003						
Alcohol dependency							7.33**	1,993	.007						
Drug abuse							5.40*	1,993	.007						
Drug dependency							10.07**	1,993	.009						
<b>Other drug use</b>															
Lifetime alcohol use										35.33***	1,1030	.031			
Lifetime marijuana use										3.70	1,1030	.003			
Lifetime illicit drug use										3.48	1,1030	.003			

Category	Model 1: Demographic			Model 2: Violence Exposure			Model 3: Mental Health			Model 4: Other Drug Use			Model 5: Delinquency History		
	<i>F</i>	<i>df</i>	$\eta^2_p$	<i>F</i>	<i>df</i>	$\eta^2_p$	<i>F</i>	<i>df</i>	$\eta^2_p$	<i>F</i>	<i>df</i>	$\eta^2_p$	<i>F</i>	<i>df</i>	$\eta^2_p$
	<b>Delinquency history</b>														
Drug-related													0.19	1,1028	.000
Non-aggressive													0.51	1,1028	.000
Aggressive													125.46 <sup>***</sup>	1,1028	.102
<b>NMUPD Group</b>	35.42 <sup>a,b,c</sup> ***	2,1033	.060	12.32 <sup>b,c</sup> ***	2,1032	.022	8.42 <sup>a,b,c</sup> ***	2,993	.015	6.46 <sup>b,c</sup> **	2,1030	.012	1.06 <sup>b,c</sup> **	2,1028	.013

Note. MDD = Major depressive disorder, PTSD = Post traumatic stress disorder, SES = Socioeconomic status.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

<sup>a</sup> Significant difference ( $p < .05$ ) between Group 1: Never Used NMUPD and Group 2: Used NMUPD in Lifetime

<sup>b</sup> Significant difference ( $p < .05$ ) between Group 1: Never Used NMUPD and Group 3: Current NMUPD Users

<sup>c</sup> Significant difference ( $p < .05$ ) between Group : Used NMUPD in Lifetime 2 and Group 3: Current NMUPD Users

Table 5

*Final ANCOVA Models for NMUPD Predicting Future Delinquency in Adolescent Offenders*

Final Models	<i>F</i>	<i>df</i>	<i>p</i>	$\eta^2_p$
<b>Drug-related delinquency</b>				
Race/Ethnicity	0.05	1,993	.827	.000
Sex	0.23	1,993	.635	.000
Age	1.07	1,993	.301	.001
SES	3.75	1,993	.053	.004
Proportion of time with no community access	0.40	1,993	.530	.000
Total violence exposure	3.11	1,993	.078	.003
Drug abuse severity	1.61	1,993	.205	.002
Lifetime alcohol use	2.18	1,993	.140	.002
Drug-related delinquency history	12.13	1,993	.001	.012
NMUPD	2.07	2, 993	.127	.004
<b>Non-aggressive delinquency</b>				
Race/Ethnicity	0.09	1,991	.764	.000
Sex	0.11	1,991	.683	.000
Age	5.54	1,991	.019	.006
SES	2.27	1,991	.141	.002
Proportion of time with no community access	0.08	1,991	.928	.000
Total violence exposure	0.11	1,991	.745	.000
Alcohol dependencyseverity	2.21	1,991	.137	.002
Lifetime alcohol use	2.96	1,991	.086	.003
Lifetime illicit drug use	1.72	1,991	.190	.002
Non-aggressive delinquency history	5.13	1,991	.024	.005
Aggressive delinquency history	2.89	1,991	.089	.003
NMUPD	1.85	2, 991	.158	.004

Final Models	<i>F</i>	<i>df</i>	<i>p</i>	$\eta^2_p$
<b>Aggressive delinquency</b>				
Race/Ethnicity	0.64	1,1068	.423	.001
Sex	10.77	1,1068	.001	.010
Age	20.74	1,1068	< .001	.019
SES	1.72	1,1068	.190	.002
Proportion of time with no community access	0.13	1,1068	.716	.000
Total violence exposure	24.53	1,1068	< .001	.022
MDD severity	1.42	1,1068	.233	.001
Alcohol dependency severity	0.95	1,1068	.331	.001
Drug abuse severity	0.02	1,1068	.897	.000
Drug dependency severity	0.88	1,1068	.348	.001
Lifetime alcohol use	8.95	1,1068	.003	.008
Aggressive delinquency history	82.41	1,1068	< .001	.072
NMUPD	1.82	2,1068	.162	.003

Note. MDD = Major depressive disorder, NMUPD = Non-medical use of prescription drugs, SES = Socioeconomic status.