Prescription Drug Misuse Among Antisocial Youths*

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ABSTRACT. **Objective:** The aim of this study was to describe the prevalence and correlates of nonmedical prescription drug misuse (PDM) in a state population of youths in residential care for antisocial behavior. **Method:** Interviews assessing substance use, psychiatric symptoms, antisocial traits/behavior, and traumatic life experiences were conducted with 723 Missouri youths. Participants were predominantly male (87.0%), averaged 15.5 (*SD* = 1.2) years of age, and constituted 97.7% of the service population sampled. **Results:** Overall, 314 youths (43.4%) reported lifetime PDM; 33.7%, 32.0%, and 11.2% had misused prescription opioids, tranquilizers, and barbiturates, respectively. Prescription drug misusers were significantly older, and larger proportions were girls, were White, and resided in small towns, compared with non-prescription drug misusers. Prescription drug misusers evidenced significantly more varied, frequent, and problematic psychoactive drug use; evidenced

higher levels of distressing psychiatric symptoms; and were nearly twice as likely to have been diagnosed with a psychiatric disorder, compared with non-prescription drug misusers. Traumatic life events, experiences of criminal victimization, and suicidal ideation were significantly more prevalent in the histories of prescription drug misusers, compared with non-prescription drug misusers. In multiple logistic regression models, older age; White racial status; prior inhalant, marijuana, and LSD (lysergic acid diethylamide) use; residence in a small town; and impulsivity were associated with increased risk for PDM. **Conclusions:** Adolescents in residential care for antisocial behavior have high rates of PDM, as well as comorbid psychiatric and behavioral problems. Youths served in institutional settings should be routinely screened and treated for PDM and co-occurring disorders. (*J. Stud. Alcohol Drugs, 71,* 917-924, 2010)

MOST EPIDEMIOLOGICAL RESEARCH examining adolescent prescription drug misuse (PDM) has been conducted in schools or, to a lesser degree, in homes. School-based studies, such as the Monitoring the Future (MTF; Johnston et al., 2008) survey, omit populations of truant, dropout, homeless, and institutionalized youths. Neither the MTF nor the National Survey on Drug Use and Health (NSDUH; Substance Abuse and Mental Health Services Administration, 2008) includes institutionalized youths, an adolescent subpopulation at presumably high risk for PDM (Howard et al., 2008; Teplin et al., 2002). This study is the first, to our knowledge, to investigate the prevalence and correlates of PDM among youths in institutional care. The specific aim of this study was to describe the prevalence and correlates of PDM in a state population of youths in residential care for antisocial behavior.

Whereas use of most illicit drugs has plateaued or de-

creased since the early 1990s, PDM has increased markedly (Colliver et al., 2006). Adolescents and young adults are among the largest demographic subpopulations of nonmedical prescription drug misusers (Substance Abuse and Mental Health Services Administration, 2008). More than 1 in 11 (9.2%) 12th-grade students reported prescription opioid misuse in the 2007 MTF national survey, second only to marijuana use in the magnitude of its past-year prevalence of use (Johnston et al., 2008). Prevalence estimates of the 2007 NSDUH were similar to MTF estimates; 9.7% of adolescents ages 12 to 17 reported prescription opioid misuse (Substance Abuse and Mental Health Services Administration, 2008).

An analysis of NSDUH data found illicit drug use to be the strongest correlate of prescription opioid misuse among adolescents (Sung et al., 2005). Similar findings were reported in a survey of 1,017 adolescents residing in the Detroit metropolitan area (Boyd et al., 2006b); prescription opioid misusers were eight and four times more likely, respectively, to use other illicit drugs and to engage in heavy episodic drinking than were nonmisusers of prescription opioids. Misuse of nonopioid prescription drugs (e.g., sedatives and anxiolytics) is also associated with illicit drug use and substance-related problems (McCabe et al., 2007a). One of a few studies to examine the effects of adolescent PDM on adult outcomes found that early adolescent PDM was a significant predictor of PDM and abuse/dependence on prescription drugs in adulthood (McCabe et al., 2007b). Although there is limited research on the long-term consequences of adolescent PDM, adolescent substance use, in general, is associated with adverse outcomes, including lower academic achievement (Ellickson et al., 2004), delinquency (D'Amico et al., 2008), unprotected sexual inter-

course and unplanned pregnancy (Stueve and O'Donnell, 2005), and suicide risk (Cho et al., 2007). Longitudinal research suggests that adolescent substance use also increases risk for criminality (Stenbacka and Stattin, 2007), unemployment (Rohde et al., 2007), and substance-use disorders and psychiatric dysfunction (Brook et al., 2002) in adulthood.

Method

Study sample

The study sample was drawn from the 32 residential rehabilitation facilities of the Missouri Division of Youth Services (DYS), the legal guardian of youths ages 13-17 who are in residential care for antisocial behavior. The 723 youths who were interviewed constituted 97.7% of DYS residents at the time interviews were conducted. Thus, the present study is virtually a census of the population of DYS residents at the time the study was undertaken and a large, representative sample of DYS annual residents. The DYS client population is representative nationally of youths in residential care for antisocial behavior with regard to age, gender, and number of state youths in residential care per 100,000 adolescents (Sickmund, 2002).

Interviews were completed in 2003 and were 60-90 minutes in duration. Fifteen graduate students conducted the interviews after completing an intensive 1-day training session. An interview editor and the project principal investigator were on site at each facility as youths were interviewed to minimize interviewer errors. Interviews were conducted in private areas where confidentiality was assured. Youths signed informed assent forms and were provided with $10.00 for completing the interview. All youths were provided with a description of their privacy rights, a copy of a Washington University brochure ("Your Privacy Matters…),," and a copy of the informed assent agreement. The informed assent form and interview protocol provided residents with detailed information about the study, their rights as human subjects, and the name and contact telephone number for a nonstudy or university-affiliated advocate whom they could call for more information about the study. DYS was the legal guardian of all youths and provided formal permission for youths to participate in the study. The informed consent and study protocols were approved by the Missouri DYS Institutional Review Board, the Washington University Human Studies Committee Institutional Review Board, and the federal Office of Human Research Protection. The study was granted a Certificate of Confidentiality by the National Institute on Drug Abuse.

Measures

Demographic factors. Gender, age, self-reported racial status (i.e., African American, White, Latino/Latina, biracial,

other), grade, family receipt of public assistance (yes or no), and urbanicity of family residence (i.e., urban, suburban, small town, and rural) were recorded for each youth.

Medical history. Respondents indicated whether (yes or no) they had ever experienced each of eight medical conditions (e.g., a head injury that produced unconsciousness; a mental disorder diagnosed by a psychiatrist or other physician).

Prescription drug misuse. Items assessing PDM were adapted from the Diagnostic Interview Schedule for DSM-IV (DIS-IV; Robins et al., 1981). Respondents were asked four questions about their use of prescription drugs that were *not* prescribed for them: (a) "Have you ever used 'other opiates' (e.g., methadone, morphine, OxyContin, Demerol, Vicodin)?"; (b) "Have you ever used barbiturates (e.g., Downers, Yellows, Reds, Blues, or Soapers)?"; (c) "Have you ever used tranquilizers (e.g., Valium, Librium, Xanax, Serax)?"; and (d) "Have you ever used prescription drugs without a prescription?" (if youths responded "yes" to this item, they were asked to name the prescription drugs they had misused, and their responses were recorded verbatim). Any youth reporting nonprescribed use of "other opiates," barbiturates, or tranquilizers was classified as a lifetime prescription drug misuser. Youths who answered affirmatively to the fourth question listed above and who reported nonprescribed use of one or more prescription opioids, barbiturates, or tranquilizers were also classified as lifetime prescription drug misusers. For each of the four PDM questions, youths reported whether they had ever used the specific class of prescription drugs (yes or no) and the total number of days in their lifetime during which they had misused that class of prescription drugs (i.e., <5, 5-10, 11-99, ≥100).

Other substance use. Use of 14 additional categories of psychoactive substances was assessed: inhalants, heroin, cocaine/crack, speed, marijuana, hallucinogens, malt liquor, other alcohol, Ecstasy (3,4-methylendioxymethamphetamine [MDMA]), GHB/GBL (gamma-hydroxybutyrate/gamma-butyrolactone), cigarettes, cigars, oral tobacco, and PCP (phencyclidine). Youths reported whether they had ever used each drug (yes or no) and the number of days of use of that drug in their lifetime (<5, 5-10, 11-99, ≥100).

Substance-related problems. Lifetime substance-related problems were assessed with the eight-item Alcohol/Drug Use Scale of the Massachusetts Youth Screening Instrument–Second Version (MAYSI-2; Grisso and Barnum, 2000). Youths responded yes or no to questions assessing maladaptive substance-related behaviors (e.g., whether they had ever been so drunk or high they could not remember what happened). Scores could range from 0 to 8 (α = .83).

Suicidal ideation. Youths completed the five-item MAYSI-2 Suicide Ideation scale (α = .91). Youths responded "yes" or "no" to questions assessing suicidality (e.g., whether they had ever wished they were dead or felt like life was not worth living).

Lifetime trauma. All respondents completed a four-item Traumatic Experiences scale adapted from the MAYSI-2. Youths responded "yes" or "no" to items assessing history of specific traumatic experiences (e.g., "Have you ever seen someone severely injured or killed [in person—not in the movies or on TV]?") ($\alpha = .69$).

Current psychiatric symptoms. Respondents completed the Brief Symptom Inventory (BSI), consisting of 53 items assessing the extent to which youths were "bothered or disturbed" (0 = *not at all;* 4 = *extremely*) by a variety of thoughts or feelings "over the last 7 days including today" (Derogatis, 1993). The BSI yields a global index of overall current psychiatric distress (possible range: 0-212; $\alpha = .96$) and scores for nine primary symptom dimensions: somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism (α's = .70-.83).

Antisocial traits. Youths completed the Antisocial Process Screening Device (APSD; Vitacco et al., 2003), a 20-item scale assessing features of juvenile psychopathy. Respondents were asked to indicate to what extent each statement was true of them (0 = *not at all true,* 1 = *sometimes true,* 2 = *definitely true*). The APSD total score as well as the Impulsivity ($\alpha = .67$) and Narcissism ($\alpha = .75$) subscales were used in this study. Study participants also completed the 56-item Psychopathic Personality Inventory–Short Version (PPI-SV; Lilienfeld and Andrews, 1996). Youths were asked to decide to what extent each of the personality characteristics described in each statement was false or true as applied to them (1 = *false,* 2 = *mostly false,* 3 = *mostly true,* 4 = *true*). The PPI-SV yields a total score (possible range: 56-224; $\alpha = .76$) and eight subscales: Machiavellian egocentricity, social potency, coldheartedness, carefree nonplanfulness, fearlessness, blame externalization, impulsive nonconformity, and stress immunity (α's = .55-.73).

Delinquent behavior. The Self-Report of Delinquency (Elliott et al., 1989) was used to assess how many times in the year before they entered institutional care youths engaged in 7 nonviolent crimes and in 10 violent crimes. Responses could range from 0 (*never*) to 8 (*two to three times a day*) for each item. Total Self-Report of Delinquency scale scores could range from 0 to 136, and the ranges of possible scores were 0-56 and 0-80 for the nonviolent and violent offense subscales, respectively. Using the same response format, youths completed a four-item victimization index (possible range: 0-32; $\alpha = .76$) to assess frequency of personal experiences of criminal victimization (e.g., "were hit by someone trying to hurt you") in the year before institutionalization. Youths also reported the ages at which they first committed a criminal offense and had contact with police, respectively. For a full description of the study sample, including recruitment and sampling methods and detailed information regarding study measures, see Howard et al. (2008).

Data analysis

The participation rate for this study was high, and there were few missing data; most items were missing less than 1% of responses. Bivariate and adjusted comparisons of lifetime prescription drug misusers and non-prescription drug misusers, as well as low (1-10 lifetime occasions of use; $n = 143$) and high (≥ 11 lifetime occasions of use; $n = 162$) frequency prescription drug misusers, were conducted using chi-square tests and logistic regression for categorical variables and *t* tests and multiple regression for continuous variables. Homogeneity of variance assumptions was tested and degrees of freedom adjusted as appropriate. Effect sizes were computed and presented as either odds ratios (ORs) or Cohen's *d* (Cohen et al., 2003). Multiple logistic regression analyses were used to identify correlates of PDM.

Results

Demographic features of the sample are presented in Table 1. Overall, 314 (43.4%) youths reported lifetime PDM. Prescription opioids, tranquilizers, and barbiturates were misused by 33.7%, 32.0%, and 11.2% of the sample, respectively. Prescription drug misusers often misused multiple classes of prescription drugs. For example, 72.3% of tranquilizer misusers also misused prescription opioids. Of all prescription drug misusers, 40.1% misused a prescription drug from only one class, 43.0% misused drugs from two

TABLE 1. Demographic characteristics of 723 adolescents residing in 32 Missouri Division of Youth Services residential rehabilitation facilities[a]

Demographics	*n*	(%)
Age		
11-12	9	(1.2)
13-14	120	(16.6)
15-16	472	(65.3)
17-18	114	(15.8)
19-20	8	(1.1)
Gender		
Male	629	(87.0)
Female	94	(13.0)
Urbanicity of family residence		
Urban	283	(39.1)
Suburban	100	(13.8)
Small town	286	(39.6)
Rural	54	(7.5)
Race		
African American	238	(33.0)
White	400	(55.4)
Latino/Latina	28	(3.9)
Biracial/multiracial	56	(7.7)
Current/last completed grade		
5th-6th	19	(2.6)
7th-8th	149	(20.7)
9th-10th	444	(61.6)
11th-12th	109	(15.1)

[a]There were two missing values for the grade measure and one missing value for the race measure.

classes, and 16.9% misused drugs from all three prescription drug classes. Thus, a majority of prescription drug misusers were users of multiple classes of prescription drugs. More than half (53.1%) of prescription drug misusers reported more than 10 lifetime occasions of use, and 12.0% of prescription drug misusers reported more than 100 lifetime occasions of use.

Space limitations preclude a complete presentation and discussion of bivariate comparisons of prescription drug misusers and non-prescription drug misusers; thus, only results of significant bivariate contrasts of prescription drug misusers and non-prescription drug misusers are presented in Table 2. However, nonsignificant findings not reported in Table 2 are available from the first author by request. PDM was significantly more prevalent among girls (54.3%) than boys (41.8%), but differences by gender across the three classes of prescription drugs with regard to mean age at first use or number of lifetime days of use were not significant. Prescription drug misusers did not differ from non-prescription drug misusers with regard to proportions with families receiving welfare but did differ significantly from non-prescription drug misusers across measures of age, gender, race, and urbanicity of family residence. Prescription drug misusers were older and more likely to be girls, be White, and reside in a small town than non-prescription drug misusers.

A significantly larger percentage of prescription drug misusers than non-prescription drug misusers sustained a head injury that resulted in loss of consciousness. Significantly more prescription drug misusers than non-prescription drug misusers had been diagnosed with a psychiatric disorder by a psychiatrist or other physician, and prescription drug misusers evidenced a significantly greater severity of current psychiatric symptoms on the BSI Global Severity Index and on eight of nine BSI subscales than non-prescription drug misusers. Prescription drug misusers evidenced significantly greater antisociality on the APSD total score measure and impulsivity subscale, compared with non-prescription drug misusers. Similarly, prescription drug misusers had significantly higher scores on the PPI-SV total score measure of psychopathy, as well as six of eight PPI-SV subscales.

Prescription drug misusers were significantly more likely than non-prescription drug misusers to have used all categories of psychoactive substances (complete findings available on request). Of variables examined in bivariate contrasts, mean lifetime number of drug types used evidenced the largest effect (d = 1.76). In addition, prescription drug misusers reported more lifetime days of use than non-prescription drug misusers for marijuana, $t(622)$ = -9.7, p < .001; LSD (lysergic acid diethylamide), $t(163)$ = -2.3, p < .05; malt liquor, $t(302)$ = -5.9, p < .001; beer, wine, or distilled spirits, $t(585)$ = -11.1, p < .001; cigarettes, $t(239)$ = 6.8, p < .001; and cigars, $t(289)$ = -4.4, p < .001. Prescription drug misusers had significantly higher scores than non-prescription drug misusers on the MAYSI-2 subscales assessing lifetime num-

ber of alcohol and drug-related problems, suicide ideation, and traumatic experiences.

Prescription drug misusers did not differ significantly from non-prescription drug misusers in the number of past-year violent crimes they committed but did commit significantly more numerous past-year property crimes than non-prescription drug misusers. Also, the mean ages at commission of first crime and first contact with police were significantly younger for prescription drug misusers than non-prescription drug misusers.

Variables were included in the logistic regression model identifying correlates of PDM based on prior findings in the PDM and general substance use literatures, and the results of bivariate analyses. A correlation matrix of continuous independent variables was examined for evidence of multicollinearity, and none of the obtained Pearson product-moment correlations exceeded r = .5. The following independent variables were simultaneously entered into the multiple logistic regression model: gender (1 = male, 0 = female), race (African American [reference group], White, Latino/Latina, other), age (years), urbanicity of family residence (1 = small town, 0 = other areas), history of mental illness (0 = no, 1 = yes), lifetime inhalant use (0 = no, 1 = yes), lifetime cocaine/crack use (0 = no, 1 = yes), lifetime marijuana use (0 = no, 1 = yes), lifetime LSD use (0 = no, 1 = yes), MAYSI-2 substance-related problems scale, BSI Global Severity Index, PPI-SV carefree nonplanfulness subscale, PPI-SV fearlessness subscale, Self-Report of Delinquency property crime subscale, APSD impulsivity subscale, MAYSI-2 suicidal ideation subscale, and MAYSI-2 traumatic experiences subscale.

Model coefficients, statistical tests, ORs, and 95% confidence intervals for ORs are presented in Table 3. Seven covariates were significant at p < .05. Compared with African Americans, youths identifying as White or other ethnicities were approximately three times as likely to report PDM. A 1-year increase in age increased the odds of PDM by a factor of 1.6. The highest ORs for the model were observed for substance-use variables. Marijuana users were nine times (OR = 9.2) more likely than marijuana nonusers to report PDM, whereas prior experiences with inhalants (OR = 2.8) and LSD (OR = 4.3) and an impulsive temperament (OR = 1.1) were also significant risk factors for PDM.

Detailed results of bivariate comparisons of low- and high-frequency prescription drug misusers, including statistical test results and effect sizes, are available on request from the first author. Low- and high-frequency prescription drug misusers did not differ on any demographic variables other than racial status; African Americans were more likely to be low-frequency prescription drug misusers, compared with youths of other races. High-frequency prescription drug misusers were significantly more likely than low-frequency prescription drug misusers to report having experienced a head injury that caused unconsciousness and to have been

TABLE 2. Bivariate comparisons of lifetime prescription drug misusers ($n = 314$) and nonusers ($n = 409$) across demographic, health, substance use, mental health, attitudinal, and criminological measures

Variable	Lifetime prescription drug misusers	Nonusers	Results
Demographic			
Gender, n (%)			$\chi^2(1) = 5.2, p < .05$, OR = 1.7 [1.1, 2.6]
Male	263 (83.8%)	366 (89.5%)	
Female	51 (16.2 %)	43 (10.5%)	
Age, M (SD)	15.8 (1.1)	15.2 (1.3)	$t(718) = -6.8, p < .001, d^a = 0.49$
Race, n (%)			$\chi^2(4) = 91.7, p < .001$, OR = 3.1 [2.3, 4.3][b]
African American	44 (14.0%)	194 (47.5%)	
White	222 (70.7%)	178 (43.6%)	
Latino/Latina	15 (4.8%)	13 (3.2%)	
Biracial	25 (8.0%)	20 (4.9%)	
Other	8 (2.5%)	3 (0.7%)	
Urbanicity of family residence, n (%)			$\chi^2(3) = 16.7, p < .01$, OR = 1.7 [1.2, 2.3][c]
Urban	98 (31.2%)	185 (45.2%)	
Suburban	48 (15.3%)	52 (12.7%)	
Small town	146 (46.5%)	140 (34.2%)	
Rural/country	22 (7.0%)	32 (7.8%)	
Physical and mental health, n (%)			
History of:			
Head injury with loss of consciousness	69 (22.0%)	63 (15.5%)	$\chi^2(1) = 5.1, p < .05$, OR = 1.5 [1.1, 2.3]
Receipt of mental illness diagnosis	189 (60.2%)	181 (44.6%)	$\chi^2(1) = 17.3, p < .001$, OR = 1.9 [1.4, 2.5]
Substance use, M (SD)			
Lifetime number of drug classes used	8.6 (3.0)	3.9 (2.3)	$t(566) = -22.9, p < .001, d = 1.76$
Massachusetts Youth Screening Inventory– Second Version, M (SD)			
Alcohol and drug problems	5.4 (1.8)	2.9 (5.4)	$t(498) = -8.6, p < .001, d = 0.62$
Suicidal ideation	2.8 (2.5)	1.8 (2.2)	$t(631) = -5.7, p < .001, d = 0.42$
Lifetime trauma	3.3 (1.5)	2.7 (1.7)	$t(701) = -4.5, p < .001, d = 0.37$
Brief Symptom Inventory, M (SD)			
Global Severity Index	50.4 (35.6)	38.7 (33.4)	$t(721) = -4.6, p < .001, d = 0.39$
Somatization	4.0 (4.5)	3.3 (4.3)	$t(721) = -2.3, p < .05, d = 0.16$
Obsessive-compulsive	8.0 (5.7)	5.5 (4.9)	$t(612) = -6.1, p < .001, d = 0.47$
Depression	5.6 (5.4)	4.0 (4.7)	$t(622) = -4.2, p < .001, d = 0.32$
Anxiety	5.2 (5.0)	3.7 (4.4)	$t(633) = -4.1, p < .001, d = 0.32$
Hostility	6.7 (4.9)	5.5 (4.9)	$t(721) = -3.3, p < .01, d = 0.24$
Phobic anxiety	2.3 (3.4)	1.8 (3.0)	$t(721) = -2.1, p < .05, d = 0.16$
Paranoid ideation	7.0 (4.6)	5.7 (4.7)	$t(721) = -3.5, p < .01, d = 0.28$
Psychoticism	4.4 (4.2)	3.1 (3.5)	$t(610) = -4.5, p < .001, d = 0.34$
Antisocial Process Screening Device (APSD), M (SD)			
APSD total	17.5 (5.3)	15.3 (5.5)	$t(720) = -5.4, p < .001, d = 0.41$
Impulsivity	7.2 (1.9)	5.9 (2.2)	$t(720) = -8.0, p < .001, d = 0.63$
Psychopathic Personality Inventory (PPI), M (SD)			
PPI-Short Version total	140.6 (14.6)	133.2 (12.7)	$t(619) = -7.2, p < .001, d = 0.54$
Social potency	21.0 (4.1)	20.4 (4.2)	$t(721) = -2.1, p < .05, d = 0.14$
Cold-heartedness	15.6 (4.9)	14.9 (4.4)	$t(636) = -2.0, p < .05, d = 0.15$
Carefree nonplanfulness	15.2 (4.0)	13.5 (3.7)	$t(721) = -5.7, p < .001, d = 0.44$
Fearlessness	18.2 (5.2)	16.2 (5.1)	$t(721) = -5.2, p < .001, d = 0.39$
Blame externalization	18.8 (4.6)	17.8 (4.9)	$t(721) = -3.0, p < .01, d = 0.21$
Impulsive nonconformity	15.5 (4.5)	14.2 (3.8)	$t(609) = -4.1, p < .001, d = 0.31$
Self-Report of Delinquency (SRD), M (SD)			
SRD total	27.5 (18.4)	22.0 (18.2)	$t(721) = -4.0, p < .001, d = 0.30$
Property crime	16.7 (11.7)	12.0 (11.5)	$t(721) = -5.4, p < .001, d = 0.41$
Victimization index, M (SD)	6.8 (5.8)	5.9 (6.0)	$t(721) = -2.0, p < .05, d = 0.15$
Onset of criminal offending and contact with police, M (SD)			
Age at commission of first crime	10.3 (2.7)	10.7 (3.0)	$t(719) = 2.0, p < .05, d = 0.14$
Age at first contact with police	10.8 (2.6)	11.2 (2.6)	$t(719) = 2.1, p < .05, d = 0.15$

Notes: OR = unadjusted odds ratio [with 95% confidence interval]; [a]Cohen's effect size for two independent groups computed using t test values and associated degrees of freedom (cf. www.uccs.edu/~faculty/lbecker for effect size calculator); [b]White vs. other; [c]small town vs. other.

TABLE 3.	Multiple logistic regression analysis (with simultaneous entry of variables) identifying correlates of prescription drug misuse ($N = 723$)

Variable	b	SE	Wald	p	OR	[95% CI]
Male vs. female	0.28	0.31	0.80	.37	1.3	[0.72, 2.4]
White vs. African American	**1.0**	**0.30**	**12.4**	**.00**	**2.8**	**[1.6, 5.0]**
Latino/Latina vs. African American	0.07	0.57	0.02	.90	1.1	[0.36, 3.2]
Other races vs. African American	**1.2**	**0.43**	**7.4**	**.01**	**3.3**	**[1.4, 7.6]**
Age, in years	**0.50**	**0.10**	**24.0**	**.00**	**1.6**	**[1.3, 2.0]**
Small town vs. other levels of urbanization	0.41	0.22	3.4	.07	1.5	[0.97, 2.3]
History of mental illness	0.08	0.22	0.12	.73	1.1	[0.70, 1.7]
Lifetime inhalant user	**1.0**	**0.25**	**16.5**	**.00**	**2.8**	**[1.7, 4.5]**
Cocaine/crack use	0.31	0.28	1.2	.27	1.7	[0.79, 2.4]
Lifetime marijuana user	**2.2**	**0.56**	**15.5**	**.00**	**9.2**	**[3.0, 27.6]**
Lifetime LSD user	**1.5**	**0.29**	**24.9**	**.00**	**4.3**	**[2.4, 7.7]**
MAYSI-2 substance-related problems	0.07	0.05	1.9	.17	1.1	[0.97, 1.2]
BSI Global Severity Index	0.00	0.00	0.17	.68	1.0	[0.99, 1.0]
PPI-SV carefree nonplanfulness	0.04	0.03	1.6	.21	1.0	[0.98, 1.1]
PPI fearlessness	-0.03	0.02	1.4	.24	0.97	[0.93, 1.0]
SRD property crimes	0.02	0.01	2.1	.15	1.0	[0.99, 1.0]
APSD Impulsivity Scale	**0.13**	**0.06**	**4.8**	**.03**	**1.1**	**[1.0, 1.3]**
MAYSI-2 suicidal ideation	-0.08	0.06	2.0	.16	0.93	[0.83, 1.0]
MAYSI-2 traumatic experiences	0.03	0.08	0.11	.74	1.0	[0.89, 1.2]

Notes: **Bold** indicates statistical significance at the $p < .05$ level. OR = odds ratio; CI = confidence interval; LSD = lysergic acid diethylamide; MAYSI-2 = Massachusetts Youth Screening Instrument–Second Version; BSI = Brief Symptom Inventory; PPI-SV = Psychopathic Personality Inventory–Short Version; SRD = Self-Report of Delinquency; APSD = Antisocial Process Screening Device.

diagnosed with a psychiatric disorder. High-frequency prescription drug misusers also had significantly higher scores than low-frequency prescription drug misusers on the PPI-SV total score measure, and PPI-SV subscales assessing impulsive nonconformity and carefree nonplanfulness. Scores on the APSD impulsivity subscale, MAYSI-2 suicidal ideation and traumatic experiences scales, and victimization index were also significantly higher for high-frequency than low-frequency prescription drug misusers. High-frequency prescription drug misusers also had significantly higher scores on seven of nine BSI scales, committed significantly more past-year violent and property crimes, and evidenced an earlier onset of criminal behavior than low-frequency prescription drug misusers.

Discussion

The lifetime prevalence of PDM in this state population of institutionalized youths was 43.4%; this PDM prevalence estimate is considerably higher than comparable estimates reported for the general U.S. adolescent population. Prevalence estimates for lifetime prescription opioid and tranquilizer misuse in this sample were nearly three times the lifetime use prevalence rates reported for adolescents in the MTF study (Johnston et al., 2008). Furthermore, a majority of youths reporting PDM had misused multiple classes of prescription drugs.

More than half (54.3%) of the girls interviewed in this study reported PDM, compared with 41.8% of boys. In 8th grade, girls in the general population report slightly higher rates of PDM than boys; however, by 12th grade, PDM

among boys equals or surpasses that of girls (Johnston et al., 2008). The scarcity of girls in this sample older than age 16 prevented comparisons of younger and older youths. Future research should investigate PDM among older youths to discern whether the gender differences observed among antisocial youths in this study dissipate over time.

PDM was most prevalent among White (55.5%) and Latino/Latina (53.5%) youths. Although "only" 18.5% of African American youths reported PDM, this rate is notably higher than that reported for African American youths participating in the 2007 MTF survey (Johnston et al., 2008). Rates of lifetime prescription opioid misuse for 12th-grade students participating in the 2007 MTF survey were 17% for Whites, 4% for African Americans, and 7% for Latinos/Latinas. In this study of younger respondents, prescription opioid misuse was reported by 46% of Whites, 9% of African Americans, and 43% of Latinos/Latinas. Thus, differences between racial groups have been observed in the general U.S. adolescent population and in this study of high-risk youths, although in absolute terms the rates are much higher among the high-risk youths studied in this investigation.

Youths from small towns were disproportionately more likely to report PDM. This finding is consistent with prior research reporting higher prevalence rates of hydrocodone/acetaminophen (Vicodin) and oxycodone (OxyContin) use in nonmetropolitan areas (McCabe et al., 2005). Prescription opioid misuse in the general U.S. adolescent population has leveled off in recent years, although the rate of misuse among adolescents living in nonmetropolitan areas has continued to rise (Johnston et al., 2008). Higher rates of PDM in nonmetropolitan areas may result in part from the limited availabil-

ity of illicit psychoactive substances in more remote areas. Despite the increasing prevalence of PDM among urban and suburban youths, PDM remains a form of substance use that is disproportionally located in nonmetropolitan communities.

Prescription drug misusers evidenced a number of serious medical, psychiatric, and behavioral problems, including more varied, frequent, and problematic psychoactive substance use. This finding is consistent with previous studies showing PDM to be highly correlated with the use of other psychoactive substances (Wu et al., 2008). Prescription drug misusers also reported higher levels of distressing psychiatric symptoms and were significantly more likely to have been diagnosed with a mental illness. Traumatic life experiences, more extensive histories of criminal victimization, and higher levels of suicidal ideation were also found disproportionately in prescription drug misusers. These findings raise the possibility that some PDM results from adolescents' efforts to self-medicate dysphoric or anxious mood states. Previous research has distinguished subgroups of prescription drug misusers based on motives for use (Boyd et al., 2006a; McCabe et al., 2009). Some nonmedical misusers of prescription drugs are motivated to self-medicate symptoms of psychiatric (e.g., anxiety) or medical (e.g., pain) problems, whereas others may be motivated by curiosity about drug effects or the desire to achieve euphoria. Because this study did not inquire about motives for misuse, it is not known whether the high rates of PDM among youths in residential care reflect efforts to self-medicate symptoms of anxiety and depression, a greater propensity to seek out euphoric experiences, or both.

High-frequency prescription drug misusers represented an especially troubled group of adolescents. In comparison with low-frequency prescription drug misusers, high-frequency prescription drug misusers were more impulsive; committed more property and violent crimes; initiated criminal careers at an earlier average age; and were more likely to report a history of head injury, criminal victimization, traumatic life events, psychiatric disorder, and distressing psychiatric symptoms.

Future PDM research should include longitudinal studies to better establish the time-order sequence for many correlates of PDM identified in this study. Additionally, both researchers and treatment providers should account for motives for misuse, because prevention and intervention efforts in this area will likely require such information if they are to be optimally effective. Given the diversity of motives reported in previous studies (Boyd et al., 2006a; McCabe et al., 2009), youths who screen positive for PDM should receive medical and psychiatric examinations to assess the possibility of PDM as self-medication. Prescription drug misusers who are motivated by self-medication may require interventions focused more on mental and physical health care, whereas experimental users may benefit from more general substance use prevention and treatment.

A key strength of this study is that it is among the first to examine the epidemiology of PDM in a sample of high-risk youths in residential care. Other study strengths include the high participation rate and large sample size. This research has three limitations: (a) the cross-sectional nature of the study does not allow for an assessment of the temporal ordering of reported associations, (b) the study did not assess prescription stimulant misuse, and (c) PDM questions asked respondents whether they had used a prescription drug when it was not prescribed for them. This item structure may not have captured youths who misused their own legally prescribed prescription drugs. The second and third limitations (and the self-report nature of the drug use measures) may have resulted in an underestimation of the overall prevalence of PDM in this sample; that said, the prevalence rates identified were among the highest yet reported for any adolescent subpopulation and underscore the seriousness of the current PDM epidemic in the United States.

Acknowledgments

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