

Prescription Pain Reliever Abuse and Dependence Among Adolescents: A Nationally Representative Study

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ABSTRACT

Objective: We examined the prevalence, patterns, and correlates of adolescents' abuse, subthreshold dependence ("diagnostic orphans"), and dependence on prescription pain relievers (PPRs) such as opioids in a representative national sample ($N = 36,992$). **Method:** Data were from the 2005–2006 National Surveys of Drug Use and Health. *DSM-IV* criteria for abuse and dependence were examined. **Results:** Of all adolescents ages 12 to 17, 7% ($n = 2,675$) reported nonprescribed PPR use in the past year, and 1% ($n = 400$) met criteria for past-year PPR abuse or dependence. Among the 2,675 adolescents who reported nonprescribed PPR use, more than one in three reported symptoms of abuse or dependence: 7% abuse, 20% subthreshold dependence, and 9% dependence. Regular PPR use, major depressive episodes, and alcohol use disorders were associated with each diagnostic category. Compared with asymptomatic nonprescribed PPR users, increased odds of abuse were noted among nonstudents (adjusted odds ratio [AOR] 2.6), users of mental health services (AOR 1.8), and those reporting poor or fair health (AOR 2.4); and increased odds of dependence were observed among females (AOR 1.6), those who were involved in selling illicit drugs (AOR 1.7), and users of multiple drugs (AOR 2.9). Subthreshold dependent users resembled dependent users in major depressive episodes (AOR 1.5), alcohol use disorders (AOR 1.8), and use of multiple drugs (AOR 1.7). **Conclusions:** Dependence on PPRs can occur without abuse, and subthreshold dependence deserves to be investigated further for consideration in major diagnostic classification systems. *J. Am. Acad. Child Adolesc. Psychiatry*, 2008;47(9):1020–1029. **Key Words:** opioids, prescription drug abuse, prescription drug dependence, prescription pain medications.

Surveys of the general population and of adolescents in particular have shown that the nonprescribed use of

prescription pain relievers (PPRs) such as opioids has emerged as a major health issue in the United States.^{1,2} Hydrocodone products (e.g., Vicodin, Lortab, Lorcet, Lorcet Plus, generic hydrocodone) are reported to be the most commonly used PPRs by new nonprescribed PPR users.³ The annual Monitoring the Future survey found that lifetime nonprescribed PPR use among 12th graders doubled from about 6% in the early 1990s to 13% in 2005.⁴ The National Survey of Drug Use and Health (NSDUH) estimated that, in 2006, 3.2 million adolescents ages 12 to 17 were lifetime nonprescribed users of psychotherapeutics, and 84% of these users had used PPRs.⁵ In 2006, there were an estimated 2.2 million first-time nonprescribed users of PPRs in the previous 12 months (i.e., past-year new users), a figure rivaling the 2.1 million new users of marijuana, the most commonly used drug in the United States.²

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Adolescents ages 12 to 17 years represented more than one third (37%) of all past-year new nonprescribed PPR users.⁵

Indicators of PPR-related morbidity and mortality also have risen.⁶ Data from both the Drug Abuse Warning Network and the Treatment Episode Data Set reveal a significant upward trend in PPR-related admissions to emergency departments (EDs) and publicly funded substance abuse treatment facilities.^{7,8} The rate of drug-overdose deaths associated with PPR misuse has increased and now exceeds the rate associated with use of heroin or cocaine.⁹ Although these data are good indicators of PPR-related morbidity among treatment-seeking PPR misusers or polysubstance users, they do not provide adequate information concerning the problems resulting from nonprescribed PPR use among adolescents.

Among adolescents ages 12 to 17 who reported a history of nonprescribed PPR use, recent research has demonstrated that 52% had used hydrocodone products, 50% had used propoxyphene (Darvocet or Darvon) or codeine (Tylenol with codeine), and 24% had used oxycodone products (Percocet, Percodan, Tylox, or OxyContin).¹⁰ In particular, girls tend to be more likely than boys to report use of nonprescribed PPRs in the past year,³ although there are no sex differences in this age group in the types of PPRs used and age of first nonprescribed use.¹⁰

Studies also have revealed that nonprescribed PPR use in adolescence is associated with substance use and health problems, a finding that warrants investigation because the magnitude of this problem is unknown. Data from the 2005 NSDUH showed that approximately three fourths of lifetime adolescent users of nonprescribed PPRs report a history of using other drugs.¹⁰ Specifically, adolescent users of nonprescribed PPRs initiate nonprescribed PPR use at a mean age of 13.3 years, which is younger than the mean age of first use of almost all of the other drugs, and occurs as early as the mean age of first use of alcohol (13.1 years) and marijuana (13.6 years).¹⁰ Compared with nonusers, adolescent nonprescribed users have increased odds of using alcohol and other drugs, engaging in criminal behaviors (e.g., being arrested for criminal activities or engaging in selling illicit drugs in the past year), using health care (e.g., receiving treatment in the ED or as an inpatient), receiving treatment services for mental health problems, and reporting poorer health.¹⁰⁻¹³

However, despite the increased use of nonprescribed PPRs, there is limited information concerning adolescents who use PPRs without a prescription and who then meet the criteria for abuse or dependence as specified by the *DSM-IV*,¹⁴ or who perceive symptoms of dependence but do not meet the criteria for a diagnosis (i.e., subthreshold dependence). The latter group is also termed “diagnostic orphans” and includes drug users who exhibit one or two criterion symptoms of dependence but do not meet criteria for abuse and dependence.¹⁵⁻¹⁷ Studies of alcohol^{16,17} and marijuana users¹⁵ have suggested that diagnostic orphans are prevalent and tend to resemble those with abuse in substance use profile. However, we have not found any analogous study examining adolescent nonprescribed PPR users.

Furthermore, a key item on the research agenda for the upcoming *DSM-V* is the categorical nature of substance diagnoses.¹⁸ The categorical classification in the *DSM-IV* may miss substance users who experience substance use-related problems but do not meet the full criteria for a diagnosis. Such a subthreshold dependence condition may benefit from being included in the major diagnostic system given its prevalence and association with other substance abuse.¹⁵ Thus, findings from this investigation not only are likely to shed new light on the magnitude of diagnoses associated with nonprescribed PPR use but they may also provide timely estimates for diagnostic orphans of adolescent PPR users.

In this study, we use the newly released data from the 2006 NSDUH, augmented by data from the previous year, to study the nature and extent of diagnostic patterns and correlates of *DSM-IV* abuse, subthreshold dependence, and dependence on PPRs. Understanding the full extent of diagnostic patterns of PPR use is essential and timely, given increasing rates of nonprescribed PPR use, early onset of such use, and the dearth of research on *DSM-IV* diagnoses for adolescent PPR users.¹⁻⁹ We address the following questions: What is the prevalence of abuse, subthreshold dependence, and dependence among past-year adolescent users of nonprescribed PPRs? What symptoms of abuse and dependence are commonly reported by adolescent users? Are diagnoses of nonprescribed PPR use associated with demographics, access to PPRs, physical health, and risk-related factors?

METHOD

Data Source

This study is based on data from the public use file of the 2005 and 2006 NSDUH.^{2,19} NSDUH is designed to provide estimates of substance use and related disorders for the U.S. general population. It uses multistage area probability sampling methods to select a representative sample of the U.S. civilian, noninstitutionalized population ages 12 years or older in all 50 states. Participants include household residents; residents of shelters, rooming or boarding houses, halfway houses, college dormitories, and group homes; and civilians residing on military bases. To improve the precision of drug use estimates for key subgroups, adolescents ages 12 to 17 years and young adults ages 18 to 25 years are oversampled.

Prospective NSDUH participants were assured that their names would not be recorded and that their responses would be kept strictly confidential. All of the study procedures and protections were carefully explained to them. For adolescents ages 12 to 17 years, the field interviewer first sought verbal consent from their parents or guardians. Once parental permission was granted, field interviewers then approached the adolescents and obtained their agreement to participate in the study. Parents were then asked to leave the interview setting to ensure the confidentiality of their children's responses.

The interview uses computer-assisted interviewing to increase the likelihood of valid respondent reports of drug use behaviors.²⁰ Computer-assisted interviewing methodology combines computer-assisted personal interviewing and audio computer-assisted self-interviewing. Audio computer-assisted self-interviewing is designed to provide the respondent with a highly private and confidential means of responding to questions and is used for questions of a sensitive nature (e.g., substance use). Respondents read questions on the computer screen or questions were read to respondents through headphones, and they entered their responses directly into a laptop computer provided by the interviewer.

A total of 68,308 and 67,802 respondents ages 12 years or older completed the interview in 2005 and 2006, respectively. Weighted response rates for household screening and interviewing in 2005 were 91.3% and 76.2%, respectively; the corresponding rates in 2006 were 90.6% and 74.2%, respectively. Each independent, cross-sectional NSDUH sample is considered representative of the U.S. general population ages 12 years or older. NSDUH designs are reported in detail elsewhere.¹⁹

Study Variables

Nonprescribed PPR use was defined as any self-reported use of prescription pain relievers that were not prescribed for the respondent or that the respondent took only for the experience or feeling they caused.^{10,13} Respondents were read the following statement: "These questions are about PPR use. We are *not* interested in your use of 'over-the-counter' pain relievers such as aspirin, Tylenol, or Advil that can be bought in drugstores or grocery stores without a doctor's prescription." Interviewers also showed a pill card to the respondents and read the following: "Card A shows pictures of some different kinds of PPRs and lists the names of some others. These pictures show only pills, but we are interested in your use of any form of PPRs that were not prescribed for you or that you took only for the experience or feeling they caused."

The following 21 categories of PPRs were listed on pill card A: Darvocet, Darvon, or Tylenol with codeine; Percocet, Percodan, or

Tylox; Vicodin, Lortab, Lorcet, or Lorcet Plus; codeine; Demerol; Dilaudid; Fioricet; Fiorinal; hydrocodone; methadone; morphine; OxyContin; Phenaphen with codeine; propoxyphene; SK-65; Stadol; Talacen; Talwin; Talwin NX; tramadol; and Ultram. A series of separate questions was presented to respondents to assess their use. For example, respondents were asked, "Have you ever, even once, used Darvocet, Darvon, or Tylenol with codeine that was not prescribed for you, or that you took only for the experience or feeling it caused?"

The survey also assessed respondents' age at first nonprescribed use (i.e., onset) of any PPR and the number of days of using PPRs in the past 12 months. Number of days of using PPRs was originally categorized into four groups: 1 to 5 days (experimental use), 6 to 11 days (infrequent), 12 to 51 (approximately monthly), and 52 or more days (approximately weekly). However, due to unstable estimates in the logistic regression analysis caused by small cell sizes and the finding that only the category of use on 52 or more days was significantly associated with diagnostic categories of PPR use, we condensed the four categories into two groups: less than weekly versus weekly or more (i.e., use on ≥ 52 days). Use of multiple PPRs was defined by counting the number of the 21 categories of PPRs specified above that the respondents had ever used without a prescription.

Past-year abuse of and dependence on PPRs were specified by *DSM-IV* criteria.¹⁴ For each criterion of abuse and dependence, the survey explicitly specified, "During the past 12 months, did using PPRs..." The four abuse criteria were assessed by the following questions: (A1) During the past 12 months, did using PPRs cause you to have serious problems like this either at home, work, or school (e.g., neglecting their children, missing work or school, doing a poor job at work or school, losing a job or dropping out of school)? (A2) Did you regularly use PPRs and then do something where using PPRs might have put you in physical danger? (A3) Did using PPRs cause you to do things that repeatedly got you in trouble with the law? (A4) Did you have any problems with family or friends that were probably caused by your use of PPRs? Did you continue to use PPRs even though you thought this caused problems with family or friends?

Likewise, the seven dependence criteria were assessed by the following questions: (D1) During the past 12 months, did you need to use more PPRs than you used to in order to get the effect you wanted? Did you notice that using the same amount of PPRs had less effect on you than it used to? (D2) Did you have three or more of symptoms after you cut back or stopped using PPRs (e.g., feeling kind of blue or down; vomiting or feeling nauseous; having cramps or muscle aches; having teary eyes or a runny nose; feeling sweaty, having enlarged eye pupils, or having body hair standing up on your skin; having diarrhea; yawning; having a fever; or having trouble sleeping)? Did you have three or more of these symptoms at the same time that lasted for longer than a day after you cut back or stopped using PPRs? (D3) Did you try to set limits on how often or how many PPRs you would use? Were you able to keep to the limits you set, or did you often use PPRs more than you intended to? (D4) Did you want to or try to cut down or stop using PPRs? Were you able to cut down or stop using PPRs every time you wanted to or tried to? (D5) Was there a month or more when you spent a lot of your time getting or using PPRs? Was there a month or more when you spent a lot of your time getting over the effects of the PPRs you used? (D6) Did using PPRs cause you to give up or spend less time doing important activities such as working, going to school, taking care of children, doing fun things such as hobbies and sports, and spending time with friends and family? (D7) Did you have any problems with

your emotions, nerves, or mental health that were probably caused or made worse by your use of PPRs? Did you continue to use PPRs even you thought that this was causing you to have problems with your emotions, nerves, or mental health? Did you have any physical health problems that were probably caused or made worse by your use of PPRs? Did you continue to use PPRs even you thought that this was causing you to have physical problems?

Consistent with the *DSM-IV*,¹⁴ respondents who met at least one abuse criterion but did not meet criteria for dependence in the past year were classified as exhibiting PPR abuse, and dependence included respondents who met criteria for at least three dependence symptoms in the past year, regardless of abuse. Subthreshold dependence included respondents who met one to two dependence criteria but did not manifest abuse.

Demographic variables examined included respondents' age, sex, race/ethnicity, and school status.^{10,13} Factors related to access to PPRs included annual family income and health insurance status. For adolescents who were unable to respond to income and insurance questions, proxy responses were accepted from a household member who was better able to give the correct information.

Based on previous findings of nonprescribed PPR use,¹⁰⁻¹³ we examined alcohol use disorders (AUDs), use of multiple drugs, criminal activities, perceived health status, health care use, and mental health-related variables as potential correlates of PPR use disorders. Past-year AUDs (abuse or dependence) was also assessed per *DSM-IV* criteria.^{2,14} Use of multiple drugs was estimated by summing the number of eight drug classes (inhalants, marijuana, cocaine/crack, heroin, hallucinogens, and nonprescribed use of prescription sedatives, tranquilizers, and stimulants) that respondents used in the past year. Use of these drugs was assessed by eight separate subsections, within each of which the survey explicitly listed the names of drugs belonging to each drug class.

Past-year criminal activity was defined as adolescents' self-reported past-year experiences of arrests or bookings for breaking the law, not counting minor traffic violations.²¹ Past-year illicit drug selling was defined as having sold illicit drugs in the past 12 months.¹³ Adolescents' perceived overall health was dichotomized (excellent/good versus fair/poor). Past-year ED visits were defined as treatment in an ED during the past 12 months.¹⁰ Past-year inpatient hospitalization was defined as self-reported inpatient hospitalization (staying overnight or longer in a hospital) during the past 12 months.¹⁰ Past-year use of mental health treatment services was defined as any use of treatment or counseling at any service location in the previous year for emotional or behavioral problems that were not caused by alcohol or drug use (e.g., hospital, residential treatment facility, day treatment facility, mental health clinic, family doctor, school counselor).^{10,22}

Assessments of major depressive episodes (MDEs) were based on *DSM-IV* criteria and adapted from the National Comorbidity Survey-Adolescents.² The NSDUH assessed nine criterion symptoms of MDEs: depressed mood most of the day, markedly diminished interest or pleasure in all or almost all activities most of the day, changes in appetite or weight, sleep problems, psychomotor agitation or retardation, fatigue or loss of energy, feelings of worthlessness, diminished ability to concentrate or make decisions, and thoughts or plans for suicide. Adolescents who had five or more criterion symptoms were classified as having a lifetime MDE, and those who also reported that they had a period of depression lasting 2 weeks or longer while also having some of the symptoms mentioned during the past 12 months were classified as having a past-year MDE. In NSDUH, no exclusions were made for MDE caused by medical illness, bereavement, or substance use disorders.

Data Analysis

We first examined demographic distributions and prevalence rates of use, abuse, and dependence on PPRs among all of the respondents. We found no significant variations in each of these characteristics across the two survey years. We then combined the data from the two survey years ($N = 36,992$). Among the combined subsample of past-year nonprescribed PPR users ($n = 2,675$), we determined the prevalence of abuse, subthreshold dependence, and dependence, as well as their relation with patterns of PPR use. We then examined the pattern of symptoms of abuse and dependence. Bivariate associations were examined with χ^2 tests for categorical variables and with t tests for continuous variables. Finally, we conducted multinomial logistic regression analyses to identify characteristics associated with respondents' category of diagnoses. Due to the complex design of the survey, all of the analyses were conducted with the SUDAAN software.²³ All of the results reported here are weighted estimates; only sample sizes are unweighted.

RESULTS

Demographics

A total of 18,678 and 18,314 adolescents ages 12 to 17 years were identified from the public use data file of 2005 and 2006 NSDUH, respectively. There were no significant yearly variations in the demographics examined (Table 1).

Use, Abuse, and Dependence Among All Adolescents

Of the combined sample ($N = 36,992$), 7% ($n = 2,675$) reported nonprescribed PPR use in the past year. As shown in Table 1, use of nonprescribed PPRs was associated with sex, age group, race/ethnicity, and student status (χ^2 test, $p < .010$). A comparatively high prevalence of nonprescribed PPR use was observed among females (8%), adolescents ages 16 to 17 (11%), whites (8%), adolescents of multiple race (11%), and nonstudents (19%). Prevalence rates of use of each category of PPRs from the NSDUH are reported elsewhere.¹⁰

There was no significant yearly variation in the prevalence of past-year PPR abuse or dependence (data not shown). Approximately 1.1% ($n = 400$) of all of the adolescents met criteria for past-year PPR abuse (0.5%) or dependence (0.6%).

Abuse, Subthreshold Dependence, and Dependence Among Users

Overall, more than one third (35%, $n = 911$) of all nonprescribed users reported one or more symptoms

TABLE 1

Selected Demographic Characteristics of the Study Sample and the Prevalence of Past-Year Nonprescribed Use of Prescription Pain Relievers Among the Total Adolescent Sample Ages 12 to 17 Years ($N = 36,992$)

Characteristic	Total Study Sample, % (No.)	Past-Year Prevalence of Nonprescribed Use, % (SE)
Overall	100 (36,992)	7.0 (0.17)
Sex		
Male	51.1 (18,780)	6.5 (0.24) ^a
Female	48.9 (18,212)	7.5 (0.25)
Age group, y		
12–13	32.0 (11,865)	3.4 (0.26) ^a
14–15	34.6 (12,682)	6.3 (0.23)
16–17	33.5 (12,445)	11.2 (0.36)
Race/ethnicity		
White	60.4 (2,2701)	7.7 (0.18) ^a
African American	15.3 (5,172)	5.9 (0.44)
American Indian/Alaska Native	0.6 (534)	9.8 (1.57)
Asian/Native Hawaiian	4.6 (1,223)	4.3 (0.72)
Multiple race	1.5 (1,320)	10.8 (1.53)
Hispanic	17.6 (6,042)	5.9 (0.53)
Student status		
Yes	98.6 (36,396)	6.8 (0.17) ^a
No	1.5 (596)	18.9 (2.35)
Family income		
\$0–\$19,999	17.4 (6,500)	7.8 (0.43)
\$20,000–\$39,999	22.1 (8,528)	7.1 (0.38)
\$40,000–\$74,999	29.4 (11,381)	7.3 (0.25)
\$75,000 or more	31.2 (10,583)	6.2 (0.29)
Health insurance coverage		
Yes	91.4 (34,366)	7.0 (0.19)
No	8.6 (2,626)	6.8 (0.57)
Survey		
2005	50.0 (18,678)	6.9 (0.23)
2006	50.0 (18,314)	7.1 (0.23)

^a χ^2 tests with variables in the first column, two-tailed: $p < .010$.

of abuse or dependence: abuse, 6.7%; subthreshold dependence, 19.6%; and dependence regardless of abuse, 9.1%.

As shown in Table 2, respondents with dependence reported on average more cumulative days of nonprescribed PPR use (86.7 days) than did those with abuse (55.6 days) or subthreshold dependence (39.6 days; t test, $p < .05$). They on average also reported more categories of PPRs used (3.9 categories) than the abuse (2.7 categories) and subthreshold dependence (2.1 categories) groups (t test, $p < .05$). There were no significant differences in these characteristics between the abuse and the subthreshold groups.

Symptoms of Abuse and Dependence Among Users

As shown in Figure 1, irrespective of diagnostic category, tolerance (using the same amount of PPRs with decreasing effects) and salience (spending a lot of time using or recovering from the effects of PPRs) constituted the most commonly presented symptoms of dependence by users. Both were prevalent in the dependence group (90% and 85%, respectively). Withdrawal (54%), giving up activities (51%), and continued use despite having physical/psychological problems (49%) also were common in the dependence group.

Of all abuse symptoms, hazardous use and role interference were most frequently endorsed by the abuse group (54% and 52%, respectively) and the dependence group (34% and 36%, respectively). More than one fourth of adolescents with dependence also reported problems with family or friends (27%).

It should be noted that 66% (4.4% of 6.7%) of adolescents in the abuse group also reported symptoms of subthreshold dependence (one or two dependence symptoms) and that 58% (5.3% of 9.1%) of adolescents in the dependence group also reported symptoms of abuse.

Correlates of Abuse, Subthreshold Dependence, and Dependence

Table 3 summarizes results from multinomial logistic regression of correlates of abuse (without a dependence diagnosis), subthreshold dependence (without abuse), and dependence (irrespective of any abuse). The odds of being in each category of diagnoses were each compared to users without any criterion symptom. Family income, health insurance, inpatient treatment, criminal activities, and age at first nonprescribed PPR use were unassociated with each diagnostic category and were thus excluded from the adjusted model.

Weekly nonprescribed PPR use (adjusted odds ratio [AOR] 1.4–5.5), MDEs (AOR 1.5–2.4), and past-year AUDs (AOR 1.8–3.4) were associated with each diagnostic category. The association with weekly nonprescribed PPR use was significantly stronger in the dependence group (AOR 5.5) than in the other groups (AOR 1.4–1.7). In addition, past-year MDEs were associated with the two dependence groups (AOR 1.5–1.8). Former MDEs (AOR 1.9–2.4) and past-year ED visits (AOR 1.4–1.9) were associated with abuse and with subthreshold dependence.

TABLE 2
Prevalence of Abuse of and Dependence on Prescription Pain Relievers Among Nonprescribed Users of Prescription Pain Relievers
Ages 12 to 17 Years (N = 2,675)

Past-Year Diagnostic Status	Weighted Prevalence, % (No.)	Age of First Use of Nonprescribed Pain Relievers, Mean (95% CI)	No. of Days of Using Pain Relievers in the Past Year, Mean (95% CI)	Categories of Pain Relievers Ever Used, Mean (95% CI)
Overall	100 (2,675)	13.5 (13.33–13.62)	38.2 (35.11–41.23)	2.0 (1.94–2.13)
Use without <i>DSM-IV</i> symptom	64.7 (1,764)	13.6 (13.44–13.76)	29.0 (25.55–32.49)	1.7 (1.59–1.75)
Abuse	6.7 (186)	13.1^a (12.74–13.43)	55.6^b (39.50–71.75)	2.7^b (2.15–3.26)
Subthreshold dependence	19.6 (511)	13.3 (12.98–13.65)	39.6^b (33.04–46.07)	2.1^b (1.91–2.37)
Dependence regardless of abuse	9.0 (214)	13.3 (12.75–13.76)	86.7^c (73.45–101.89)	3.9^c (3.49–4.32)

Note: Bold type indicates significant differences between diagnostic groups by *t* tests, two-tailed, *p* < .05. CI = confidence interval.

^aAbuse < Use without *DSM-IV* symptom.

^bAbuse, subthreshold dependence > Use without *DSM-IV* symptom.

^cDependence regardless of abuse > Use without *DSM-IV* symptom, abuse, subthreshold dependence.

Several characteristics were associated with the abuse group only, including being age 12 to 15 years (AOR 2.2–2.3), nonstudent status (AOR 2.6), self-reported fair or poor health (AOR 2.4), and use of mental health services for psychological problems (AOR 1.8). For example, relative to nonusers, past-year users of mental health services were 1.8 times more likely to be classified in the abuse group. African Americans (AOR 1.9) and Asians/Native Hawaiians (AOR 2.5) had increased odds of being in the subthreshold dependence group, whereas Asians/Native Hawaiians (AOR 0.1) had reduced odds of being in the dependence group. Females (AOR 1.6) and those who sold illicit drugs in the past year (AOR

1.7) had increased odds of being in the dependence group. Finally, past-year use of three or more drug classes was a significant correlate of the two dependence groups only (AOR 1.7, subthreshold dependence; AOR 2.9, dependence).

DISCUSSION

Among this representative national sample of adolescents ages 12 to 17 years, about 7% reported PPR use without a prescription in the previous 12 months, and approximately 1% met criteria for past-year PPR abuse or dependence. Among the subset of past-year nonprescribed

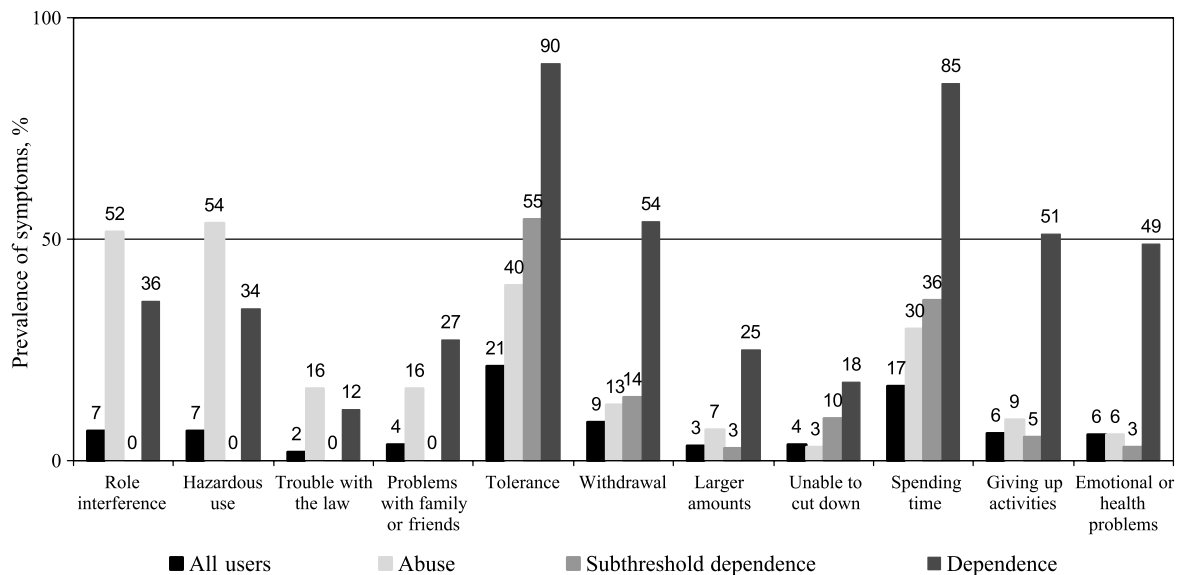


Fig. 1 Prevalence of past-year symptoms of abuse and dependence on prescription pain relievers among past-year nonprescribed users of prescription pain relievers ages 12–17 years: by diagnostic categories (N = 2,675).

TABLE 3

Adjusted Odds Ratios (AORs) and 95% Confidence Intervals (CIs)^a of Abuse of or Dependence on Prescription Pain Relievers Among Past-Year Nonprescribed Users of Prescription Pain Relievers Ages 12 to 17 Years (*N* = 2,675)

Variable	Abuse ^b	Subthreshold Dependence ^b	Dependence Regardless of Abuse ^b
Sex (vs. male)			
Female	0.85 (0.49–1.48)	1.02 (0.77–1.34)	1.60 (1.08–2.39)*
Age group (vs. 16–17 y)			
12–13	2.30 (1.31–4.02)*	1.44 (0.92–2.24)	0.99 (0.52–1.86)
14–15	2.20 (1.36–3.58)*	0.98 (0.74–1.29)	1.20 (0.76–1.91)
Race/ethnicity (vs. white)			
Hispanic	1.04 (0.47–2.28)	0.70 (0.45–1.09)	0.98 (0.56–1.71)
African American	1.53 (0.78–3.00)	1.88 (1.25–2.83)*	1.37 (0.70–2.67)
American Indian/Alaska Native/multiple race	1.40 (0.59–3.32)	1.26 (0.78–2.02)	1.23 (0.52–2.93)
Asian/Native Hawaiian	1.18 (0.21–6.82)	2.54 (1.02–6.33)*	0.13 (0.05–0.34)*
Student status (vs. students)			
Nonstudents	2.62 (1.27–5.39)*	1.02 (0.48–2.17)	0.52 (0.22–1.25)
No. of days of using pain relievers (vs. less than weekly)			
Weekly or more	1.72 (1.00–2.94)*	1.39 (1.02–1.88)*	5.45 (3.97–7.49)*
Perceived overall health (vs. excellent/good)			
Fair/poor	2.37 (1.28–4.37)*	0.95 (0.51–1.76)	1.44 (0.68–3.05)
Emergency department treatment (vs. no)			
Yes	1.91 (1.18–3.08)*	1.36 (1.01–1.83)*	1.46 (0.99–2.16) [†]
Mental health service use (vs. no)			
Yes	1.78 (1.20–2.62)*	0.74 (0.51–1.06)	1.42 (0.91–2.22)
Major depressive episodes (vs. no)			
Episode in the last year	1.31 (0.73–2.33)	1.46 (1.01–2.11)*	1.77 (1.04–3.01)*
Prior to last year	2.42 (1.16–5.06)*	1.90 (1.10–3.27)*	1.45 (0.74–2.87)
Sold illicit drugs (vs. no)			
Yes	1.66 (0.94–2.95)	1.07 (0.77–1.49)	1.74 (1.13–2.69)*
Alcohol use disorder (vs. no)			
Yes	3.44 (2.23–5.30)*	1.81 (1.28–2.56)*	2.12 (1.31–3.43)*
No. of the other 8 drug classes used, not counting pain relievers (vs. none)			
1	0.83 (0.45–1.53)	0.87 (0.61–1.24)	1.21 (0.58–2.51)
2	0.74 (0.43–1.28)	1.03 (0.71–1.51)	1.81 (0.82–3.97)
≥3	1.29 (0.64–2.57)	1.73 (1.10–2.71)*	2.90 (1.43–5.89)*

^aThe adjusted logistic regression model included variables listed in the first column. Total family income, health insurance status, inpatient treatment, past-year arrests for criminal activities, and age at onset of nonprescribed PPR use were tested, but they were not significant and were not included in the adjusted model.

^bThe comparison group included nonprescribed PPR users who did not report any criterion symptom of abuse and dependence.

**p* ≤ .05; [†]*p* = .059.

users, we found that 16% of users met criteria for abuse (7%) or dependence (9%), and an additional 20% exhibited subthreshold dependence. Individuals in the latter group have typically not been recognized (diagnostic orphans). Thus, if we had relied exclusively on the formal *DSM-IV* classification, we would have overlooked one fifth of past-year nonprescribed PPR users who reported symptoms of dependence.

The most salient finding of this study is the high prevalence of clinical features of abuse or dependence

among adolescent users of nonprescribed PPRs: more than one in three users reported one or more *DSM-IV* criterion symptoms, and close to one in six met criteria for abuse or dependence. This observation is in agreement with the pattern of nonprescribed PPR use reported by all of the users in this sample: they reported, on average, using PPRs for 38 days in the past year and using two categories of PPRs. This finding is also consistent with recent studies that revealed substantially increased rates of PPR-related admissions

to EDs and publicly funded substance abuse treatment facilities.^{6–8,24}

The lack of research on PPR use disorders among adolescents has constrained our ability to compare our findings with those of others. We have found one study that reported the prevalence of PPR abuse and dependence among youths. In their sample of youths ages 14 to 24 in Germany,²⁵ investigators reported that about 8% of lifetime nonprescribed PPR users ($N = 114$) met criteria for *DSM-IV* PPR abuse (4.3%) or dependence (3.5%) and an additional 21% met criteria for subthreshold dependence. Although past-year PPR abuse and dependence was not reported by Perkonig et al.,²⁵ our findings clearly show that use of nonprescribed PPRs among domicile American adolescents is noteworthy and deserves further research and attention.

Results from this study also suggest that the *DSM-IV* classification may be insufficient to capture the heterogeneity of symptoms presented by adolescent PPR users. Although the *DSM-IV*,¹⁴ defines a hierarchical distinction between abuse and dependence and implies that abuse occurs before dependence, we found a much higher prevalence of dependence than abuse symptoms. All of the adolescents with subthreshold dependence (20% of nonprescribed users), as well as 42% of those with a dependence diagnosis (3.8% of nonprescribed users), reported no abuse symptom, as compared to 12% of nonprescribed users who reported at least one abuse symptom (i.e., 6.7% with an abuse diagnosis and 5.3% with a dependence diagnosis plus concomitant abuse symptoms). Considering the young age of this sample, our findings support the conclusion that dependence can occur in the absence of abuse and that an exclusive reliance on the presence of abuse symptoms as a screener to identify cases of dependence is likely to miss cases where dependent individuals report no abuse symptoms.²⁶

Consistent with the study of dependence symptoms from nonprescribed PPR use,²⁷ we found that tolerance and salience were the most common symptoms experienced by users. Our results revealed further that both symptoms were endorsed by the majority of the dependence group and that role interference and hazardous use were cited as the most frequently exhibited symptoms of abuse. The latter two abuse symptoms were each reported by more than one third of the dependence group and by more than half of the abuse group. Overall, adolescents classified as having dependence experienced the

most clinical features from PPR use, including symptoms of physiological dependence (tolerance and withdrawal), compulsive PPR use behaviors (spending a great deal of using PPRs, giving up important activities, and continued use despite having psychological or physical problems), as well as consequences from PPR use (role interference and use in hazardous conditions). This higher rate of symptoms in the dependence group is likely related to the greater numbers of days that these adolescents reported using PPRs, as well as additional types of PPRs used.

Results from this study further suggest that a subgroup of vulnerable adolescents with depression or alcohol problems are at risk for using nonprescribed PPRs regularly and that the odds of escalating to a diagnosis are closely associated with additional days of PPR use. We found that having MDEs or AUDs each increased adolescents' odds of being classified in all three diagnostic categories. Past-year ED treatment also increased odds of PPR abuse and subthreshold dependence and was marginally associated with dependence (AOR 1.5, $p = .059$). Because relieving pain is much more likely than getting high to be endorsed by adolescent users of nonprescribed PPRs as the primary reason for their use,¹¹ it seems likely that PPRs are taken to reduce the discomfort associated with physical or mental health problems²⁸ and that the risk for developing abuse or dependence may be exacerbated by existing physical and mental health conditions.

Compared with PPR users who reported no *DSM-IV* symptoms, abusers were generally younger and likely to be nonstudents, had already received services for psychological problems, reported fair/poor health, and had a history of MDEs. Because the abuse group was unassociated with engagement in criminal activities and use of multiple drugs, it seems likely that they had suffered internalizing problems and may have used PPRs for self-medication to alleviate mental health-related conditions.²⁸ Given the young age of this group, longitudinal studies are needed to determine whether the subset of young abusers progresses to dependence as suggested by the *DSM-IV* (i.e., abuse occurs before dependence).

In contrast, adolescents categorized as dependent, as compared to PPR users who reported no *DSM-IV* symptoms, were likely to report past-year MDEs, to sell illicit drugs, and to use multiple drugs in the past year, suggesting co-occurrences of internalizing and externalizing problems. In this group, PPR use may be a

manifestation of self-medication for mental health problems,²⁸ delinquency, and polydrug use.²⁹

Furthermore, dependence on PPRs among girls deserves attention. Girls are more likely than boys to report a history of both prescribed (37% versus 23%) and nonprescribed (22% versus 10%) PPR use.¹¹ They also are more likely than boys to give or lend their PPRs to others (e.g., female friends),³⁰ but appear less likely to use them for getting high.³¹ Given that prescribed PPR use is associated with nonprescribed use and that girls may take PPRs to alleviate menstrual cramps,¹¹ girls' risk for dependence may be related to their greater access to PPRs¹¹ and to their need to self-medicate to reduce discomfort or psychological distress. In addition, nonprescribed PPR users typically obtain their PPRs from peers.³² Affiliation with PPR-using friends may thus pose a risk for nonprescribed use.

Last, the subthreshold dependence group is also characterized by past-year ED treatment, AUDs, use of multiple drugs, and MDEs. This group differs from the dependence group in a lack of association with delinquency variables examined. However, this group appears to be represented by African Americans and Asians/Native Hawaiians. Given the high prevalence of this group, an exclusive use of the *DSM-IV* to find cases in need of clinical attention or research will likely miss minority adolescents who perceived adverse effects from PPR use.

Taken together, adolescents in the dependence group use more PPRs and exhibit more *DSM-IV* symptoms than adolescents in the other groups. They also appear to be more likely than abusers to use multiple drugs, be involved in criminal activities, and experience MDEs recently. In this regard, dependence tends to be more severe than abuse as indicated by the *DSM-IV*.¹⁴ In addition, subthreshold dependence (20%) is more common than the combined prevalence for abuse and dependence (16%), and this group has an increased prevalence of past-year MDEs, AUDs, and use of multiple drugs. Given the young age of this sample, prospective studies are needed to study the course and treatment needs of adolescents with subthreshold dependence. Including a symptom count in addition to relying on the *DSM*'s formal classification criteria may help identify diagnostic orphans of drug users.

These findings should be interpreted within the context of the following limitations. First, due to the cross-sectional nature of the survey, no causal pathways

among the variables examined can be inferred. Self-reports on which this study relies are influenced by various biases, including memory errors and under-reporting due to social desirability biases. In addition, a small (<2%) subgroup of adolescents, including incarcerated, institutionalized, and homeless adolescents, was not included in the NSDUH. These findings do not apply to them. Furthermore, although the diagnoses of abuse and dependence were assessed by standardized questions administered by trained interviewers, they were not validated by clinicians.

Moreover, nonprescribed PPR use is defined broadly.^{10,33} This definition may have led to the inclusion of users who had a legitimate medical condition but lacked a prescription for various reasons.^{10,33} The wording of the survey questions may have served to include PPR users who received medication from friends or family members to alleviate their health-related conditions.^{10,33} Nevertheless, our findings are generally in agreement with research on students indicating an association of substance use with nonprescribed PPR use.¹¹ Last, although the NSDUH explicitly listed more categories of PPRs used than the other population-based surveys,^{4,26} it should be noted that the 21 categories of PPRs specified in the survey are not entirely inclusive. There are a few PPRs that are not listed by the survey.

In conclusion, more than one third of adolescent users of nonprescribed PPRs report *DSM-IV* symptoms of abuse or dependence. Unsupervised use of prescription PPRs places users at risk for adverse interactions with other CNS depressants, of overdose, and of addiction.^{9,34,35} Considering that family members and friends constitute sources of PPRs for adolescents,³⁰ issues concerning the health risk for unsupervised use of prescription PPRs should be included in adolescent drug prevention education efforts among families and in the community.

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