Nonmedical Prescription Opioid Use by Parents and Adolescents in the US

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abstract

BACKGROUND: To date, intergenerational patterns of nonmedical prescription opioid (NMPO) use have not been examined. We investigate the association between parental and adolescent NMPO use in the United States.

METHODS: Data are from 35 000 parent-child dyads with an adolescent aged 12 to 17 years from the 2004–2012 nationally representative National Surveys on Drug Use and Health. Using multivariable logistic regression models, we estimated the association between self-reported parental and adolescent lifetime NMPO use, controlling for parental and adolescent use of other drugs, attitudes about drug use, parental and adolescent psychosocial risk factors, and sociodemographic characteristics.

RESULTS: Controlling for other factors, parental NMPO use was associated with adolescent NMPO use (adjusted odds ratio [aOR] 1.30; 95% confidence interval [CI] 1.09–1.56). Mothers' use had a stronger association with adolescent use than fathers' use (aOR 1.62 [95% CI 1.28–2.056] versus aOR 0.98 [95% CI 0.74–1.24]). Associations between parental and adolescent NMPO use did not differ by adolescent sex or race and/or ethnicity. Parental lifetime smoking, low monitoring, and parent-adolescent conflict were uniquely associated with adolescent NMPO use (aOR 1.19–1.24) as were adolescent smoking, marijuana use, depression, delinquency, and perceived schoolmates' drug use (aOR 1.25–1.71). Perceived risk of drug use and religiosity were associated with lower rates of adolescent NMPO use (aOR 0.77–0.93). Use among older adolescents was higher than among younger adolescents (aOR 1.27; 95% CI 1.21–1.34).

CONCLUSIONS: Parent-based interventions targeted at adolescent NMPO use should address parental NMPO use and smoking and promote positive parenting.

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WHAT'S KNOWN ON THIS SUBJECT: The association between parental and adolescent nonmedical prescription opioid use (NMPO) has not previously been examined. Parental role in adolescent NMPO use was inferred from youth reports that a family member was their drug source.

WHAT THIS STUDY ADDS: In national samples, parental and adolescent NMPO use are significantly associated with each other. Parent-based intervention efforts that address parental NMPO use and promote positive parenting may reduce adolescent use.

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Parental smoking, alcohol use, and marijuana use are associated with increased use of the same drugs by offspring.[1–7] The intergenerational transmission of nonmedical prescription opioid (NMPO) use from parent to child has not previously been examined. The role of the family in adolescent NMPO use has been inferred from the finding that one-third of youth report that a family member was the source of their prescription opioids.[8] The association between parental and adolescent NMPO use remains to be investigated. Parent-child associations reflect 3 classes of factors: heritability of the phenotype of interest, role modeling of the parent by the child, and parental socialization and other environmental influences.

In 2016, 5.4% of adolescents aged 12 to 17 years and 8.9% of adults aged ≥35 years reported ever using NMPO (P.C.G. and D.B.K., unpublished analyses).[9] Rates are lower than those reported from 2004 to 2012, especially among adolescents.[10] Adolescent use is associated with substance use and psychiatric comorbidity and the development of substance use disorders in adulthood, especially among adolescents with early onset.[11–16]

Several risk factors for adolescent NMPO use have been identified.[11–26] Almost exclusively on the basis of adolescent reports of parental behaviors, parental risks for adolescent NMPO use include perceived poor quality of the parent-child relationship (for instance, low levels of parental closeness, support, and monitoring and parental approval of drug use).[12,13,19,21] Adolescent risks include the use of various drugs (particularly previous medical use of prescription opioids), delinquency, depression, anxiety, low religiosity and school engagement, perceived peer drug use and approval of drug use, being older, being of female sex, and being white.[11–13,17,18,20–26]

In the current study, we investigate the intergenerational association of lifetime NMPO use in nationally representative samples of parent-child dyads aged 12 to 17 years sampled within the same households from 9 (2004–2012) National Surveys on Drug Use and Health (NSDUH). Children aged 12 to 17 years were selected because they represent adolescents who normatively live at home with their parents and are in a phase of the life cycle in which the use of drugs, including opioids, has long-term consequences on behavior and neurodevelopment.[27]

To estimate the unique association between parental and offspring NMPO use, other risk factors for NMPO use were controlled. Factors were selected on the basis of the developmental socialization theoretical framework used to explain adolescent drug use and deviant behavior.[28] Common parent and adolescent risk factors ascertained by using self-reports included drug use (NMPO, cigarettes, alcohol, marijuana, and other illicit drugs [OIDs]), drug-use attitudes, and depression. Unique parent-reported factors included education and marital status. Unique adolescent-reported factors included perceived quality of parenting, perceived schoolmates' drug use, delinquency, and religiosity. Sociodemographic factors included parent and child age and sex and child race and/or ethnicity. The adolescent factors have previously been identified as risk factors for adolescent NMPO use in NSDUH samples but without considering parental self-reported behaviors.[12,13,17,19–22]

In the absence of previous studies on parent-child associations of NMPO use, our hypotheses regarding sex and racial and/or ethnic differences were based on findings for smoking and substance use. Stronger associations have been reported for mothers than for fathers and for daughters than for sons,[1,5,29–31] with exceptions.[3,4,32] Stronger associations in white than in African American families have been reported for smoking,[33,34] and no differences have been reported for smoking and marijuana use.[4,5,35] We hypothesized stronger associations for mothers than for fathers, stronger associations for daughters than for sons, and stronger associations for whites than for African Americans.

Three questions were addressed: (1) What is the association between lifetime parental and child NMPO use? (2) What is the unique association between parental NMPO use and child NMPO use when controlling for other factors? (3) Do associations between parental and adolescent NMPO use differ by parent and child sex and race and/or ethnicity? National parent-adolescent dyadic data with independent self-reports by parents and youth were analyzed.

METHODS

Data and Population

Data are from the 2004–2012 NSDUH, which are annual cross-sectional surveys of the US population aged ≥12 years.[36] The target civilian noninstitutionalized population represents >98% of the US population. Persons living in noninstitutional group quarters (homeless shelters, rooming houses, and college dormitories) and civilians living on military bases are included. Individuals on active military duty; those who are in jail, drug treatment programs, or hospitals; and those who are homeless and not in shelters are excluded. Age groups at the highest risk for drug use (12–17 years and 18–25 years) are oversampled. Approximately 67 500 persons are interviewed annually (completion rate 63%–70%). Substance-use and sensitive behaviors were ascertained through

computer-assisted personal and self-interviewing.

Sampling of Dyads and Identification of Parent-Adolescent Dyads

In selected households, 2 persons were selected on the basis of a pair-sampling algorithm[37] (Supplemental Information). Restricted data to link household members and identify their relationships were available through a Data Portal administered by the Center for Behavioral Health Statistics and Quality of the Substance Abuse and Mental Health Services Administration (SAMHSA). SAMHSA abruptly closed the Data Portal in August 2015 and on October 3, 2018, announced that the National Center for Health Statistics would host the restricted data at its Federal Statistical Research Data Centers. Continued administrative requirements and delays prevent data access. Therefore, we report analyses completed before the portal closed using the available survey years of 2004–2012.

The New York State Psychiatric Institute–Columbia University Department of Psychiatry Institutional Review Board approved the study.

Analytical Sample

The sample includes 35 000 parent-adolescent dyads (21 200 mothers; 13 800 fathers) with an adolescent aged 12 to 17 years: 89.6% were biological children, 8.3% were stepchildren, and 2.1% were adopted. The ratio of fathers to mothers in the weighted dyads (0.76) is similar to that of fathers to mothers living with a child aged 12 to 17 years in the United States for each year between 2004 and 2012 (range 0.77–0.79).[38–46]

Measures

NMPO Use

Parent and adolescent self-reported lifetime NMPO use (0 = no; 1 = yes) was ascertained by asking, "We have some questions about drugs that people are supposed to take only if they have a prescription from a doctor. We are only interested in your use of a drug if the drug was not prescribed for you or you took the drug only for the experience or feeling it caused." Twenty-one pain relievers (opioids) were asked about (Table 1).

Other-Drug Use and Perceived Risk of Drug Use

Parent and adolescent self-reported lifetime use of other drugs (0 = no; 1 = yes) was ascertained by asking if they ever (1) smoked a cigarette; (2) had a drink of an alcoholic beverage; (3) used, even once, marijuana or hashish; or (4) used any OID (cocaine,

TABLE 1 Characteristics of Parents and Adolescents in Parent-Adolescent Dyads (2004–2012 NSDUH)

Characteristic	Parents (*N* = 35 000)	Adolescents (*N* = 35 000)
Age, y	43.4 (7.0)	14.5 (1.7)
Female sex, %	56.7	47.5
Parent-child dyads, %		
Mother and son	29.6	—
Mother and daughter	27.1	—
Father and son	22.9	—
Father and daughter	20.4	—
Race and/or ethnicity, %		
African American	—	12.2
White	—	60.4
Hispanic	—	19.7
Other	—	7.7
Education, %		
High school or less	44.4	—
Some college	26.4	—
College graduate	29.2	—
Marital status, %		
Married	79.2	—
Separated or divorced	12.9	—
Widowed	1.2	—
Never married	6.7	—
Perceived parenting by adolescent (past 12 mo), mean (SD)		
Lack of monitoring	2.1 (0.7)	—
Conflict	1.6 (0.8)	—
Lack of support	2.9 (1.4)	—
Lifetime, %		
NMPOs[a]	13.5	8.8
Smoking	68.9	20.6
Alcohol	88.7	35.6
Marijuana	51.0	15.2
OIDs[b]	24.6	3.8
Initiated other drug before NMPOs, %		
Cigarettes	—	18.8
Alcohol	—	32.9
Marijuana	—	13.1
OIDs[c]	—	2.1
Perceived risk of drug use (range 0–6), mean (SD)	4.8 (1.3)	4.1 (1.7)
Perceived drug use of schoolmates,[b] %		
None or a few use	—	52.7
Most or all use	—	47.3
Religiosity (range 1–4), mean (SD)	—	2.5 (0.8)
Delinquency (past 12 mo; range 0–6), mean (SD)	—	0.5 (0.9)
Lifetime depression, %	12.8	12.2

Weighted estimates. —, not applicable.

[a] Includes 21 prescription opioids: Darvocet, Darvon, and Tylenol with Codeine (as a group); Percocet, Percodan, and Tylox (as a group); Vicodin, Lortab, and Lorcet (as a group); Codeine; Demerol; Dilaudid and Fioricet; Fiorinal; Hydrocodone; Methadone; Morphine; Oxycontin; Phenaphen with Codeine; Propoxyphene; Sk-65; Stadol; Talacen; Talwin; Talwin Nx; Tramadol; and Ultram.

[b] Cocaine, crack, heroin, or hallucinogens.

[c] Smoking, alcohol, or marijuana.

crack, heroin, or hallucinogens). For adolescents, the order of initiation between NMPO and other drugs was based on self-reported onset ages of each drug and coded as follows: initiated drug before NMPO (1 = yes) or at the same age, after, or did not use (0 = no). Perceived risk of drug use was based on parents' and adolescents' self-reports, and we summed 6 dichotomized items: great risk of smoking ≥1 cigarette packs per day, having 4 to 5 alcoholic drinks nearly every day, smoking marijuana, or using cocaine, lysergic acid diethylamide (more commonly known as LSD), or heroin once or twice per week.

Parent-Adolescent Relationship

Adolescent-reported quality of the relationship with parents in past 12 months was measured with 7 items that assessed parental monitoring (4 items: limit setting with peers and television, homework oversight and assistance; Cronbach's α 0.58), support (2 items: encouragement and pride; Cronbach's α 0.85), and parent-adolescent conflict (1 item: frequency of arguments). Items were rated (1 = always; 2 = sometimes; 3 = seldom; 4 = never) and averaged within each domain with the exception of parent-adolescent conflict (1 = 0 times; 2 = 1–2 times; 3 = 3–5 times; 4 = 6–9 times; 5 = ≥10 times).

Psychosocial Characteristics

Lifetime major depressive episodes (MDEs) (0 = no; 1 = yes) were assessed among parents and adolescents by using developmentally appropriate depression modules based on the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* and adapted from the National Comorbidity Survey Replication (adults) and National Comorbidity Survey Adolescent.[47] An MDE was defined as experiencing at least 5 of 9 symptoms nearly every day in a 2-week period. Because comparable adult MDE scores were unavailable in 2004, a dummy variable indexed the missing assessment. Adolescent-reported past-12-month delinquency was the sum of 6 dichotomized items: stealing, fighting at school and/or work, group fighting, attacking with intent to hurt, carrying a handgun, and selling illegal drugs. Drug use by same-grade schoolmates was the highest value of adolescents' perceived schoolmates' smoking, drinking, and marijuana use (0 = none or a few; 1 = most or all). Adolescent-reported religiosity was the average of 3 items (coded as 1 [strongly disagree], 2 [disagree], 3 [agree], or 4 [strongly agree]): religious beliefs are very important; religious beliefs influence decisions; and it is important that friends share beliefs.

Sociodemographic Characteristics

Age (adolescents 12–17 years; parents 18–80 years), sex (male or female), race and/or ethnicity (non-Hispanic white, non-Hispanic African American, Hispanic, or other), parent education (high school or less, some college, or college graduate), and marital status (married, separated or divorced, widowed, or never married) were measured.

Statistical Analysis

To determine if parents and adolescents in dyads differed from those in the total sample, we compared the characteristics of (1) parents and adolescents in dyads and (2) parents living with an adolescent aged 12 to 17 years (n = 41 900) and adolescents aged 12 to 17 years living with a parent (n = 193 800) in the total sample.

We examined the prevalence of lifetime NMPO use among all parents and adolescents and by sex and race and/or ethnicity. To determine the unique association between parental and adolescent self-reported lifetime NMPO use, multivariable logistic regression analyses were implemented, controlling for parental and adolescent other-drug use, psychosocial factors, sociodemographic characteristics, and survey year. To determine if the association between parent and adolescent NMPO use differed by parent and adolescent sex and race and/or ethnicity, interaction effects were estimated in multivariable models.

Analyses were implemented in SUDAAN 11.0.1,[48] with design effects adjusted by a Taylor series linearization and sample weights reflecting the selection probabilities at various stages of the sampling design.[37] Pair-level respondent weights were used.

RESULTS

Characteristics of Parents and Adolescents in Dyads and the Total NSDUH Sample

Rates of drug use and other characteristics of parents and adolescents are presented in Table 1.

With few exceptions, parents and adolescents in dyads were similar to all parents living with an adolescent aged 12 to 17 years and adolescents aged 12 to 17 years living with a parent in the total sample (Supplemental Table 5). More parents were married in dyads (79.2%) than in the total sample (76.5%). Because the pair and person samples are in good agreement and the total person sample is representative of the US population, the pair sample is inferred to be nationally representative. However, no good external control data on the pair population are available (A. Hughes, MS, personal communication, 2015).

Prevalence of Lifetime NMPO Use Among Parents and Adolescents

Approximately 14% of parents had ever used an NMPO (Table 1). Fathers had slightly higher rates of use (14.3%; 95% confidence interval [CI] 13.4%–15.3%) than mothers (12.8%;

95% CI 12.1%–13.6%; Table 2). White parents had higher rates of use (15.6%; 95% CI 14.8%–16.4%) than African American parents (9.6%; 95% CI 8.2%–11.2%) and Hispanic parents (9.2%; 95% CI 8.0%–10.4%).

Approximately 9% of adolescents had ever used an NMPO (Table 1). Boys (8.5%; 95% CI 7.8%–9.3%) and girls (9.2%; 95% CI 8.5%–9.9%) had similar rates of use, as did white children (9.2%; 95% CI 8.6%–9.9%), Hispanic children (8.8%; 95% CI 7.8%–9.9%), and African American children (8.3%; 95% CI 6.9%–9.8%). Use increased with age from 4.4% (95% CI 3.5%–5.6%) among 12-year-olds to 14.5% (95% CI 13.1%–16.0%) among 17-year-olds (Table 2).

Association Between Parent and Adolescent NMPO Use

There was a significant positive association between NMPO use by parents and adolescents: 13.9% of adolescents had used an NMPO in their lifetime if a parent had also done so compared with 8.1% when a parent had not used (unadjusted odds ratio [OR] 1.84; 95% CI 1.58–2.15; Table 3). Controlling for other factors, the association between parental and adolescent NMPO use persisted (adjusted odds ratio [aOR] 1.30; 95% CI 1.09–1.56).

The associations between parental and adolescent NMPO use differed by parent sex. Only maternal NMPO use was significantly associated with adolescent NMPO use (aOR 1.62; 95% CI 1.28–2.05) and did not differ by child sex (Table 4). Although there was no overall paternal-child NMPO association (aOR 0.98; 95% CI 0.74–1.24), there was a marginally significant negative association among sons (aOR 0.71; 95% CI = 0.50–1.00), which did not appear at the univariate level (OR 0.96; 95% CI 0.71–1.29). The unadjusted coefficients suggest that the negative association could be explained by the father's use of other drugs, particularly marijuana. Parent-adolescent NMPO use associations did not differ by race and/or ethnicity (data not shown).

Several parental factors were independently associated with adolescent NMPO use, the associations being of similar magnitude (Table 3). Univariate associations of parental smoking, alcohol use, marijuana use, and OID use with adolescent NMPO were similar (OR 1.6–1.8). When controlling for parental use of different drugs and other covariates, only lifetime smoking retained a unique association with adolescent NMPO use (aOR 1.24; 95% CI 1.02–1.51). Poor quality of parenting (in particular, low levels of monitoring and high levels of parent-adolescent conflict) was uniquely associated with higher rates of adolescent NMPO use (monitoring aOR 1.21 [95% CI 1.12–1.31]; conflict aOR 1.19 [95% CI 1.10–1.29]). Parental self-reported belief that drug use was risky was associated with lower adolescent NMPO rates (aOR 0.93; 95% CI 0.87–1.00).

Several adolescent factors were also uniquely associated with lifetime NMPO use (Table 3): starting to smoke cigarettes or use marijuana before NMPO (smoking aOR 1.37 [95% CI 1.14–1.65]; marijuana aOR 1.25 [95% CI 1.02–1.53]), being depressed (aOR 1.62; 95% CI 1.37–1.93) or delinquent (aOR 1.50; 95% CI 1.42–1.59), perceiving that most schoolmates used drugs (aOR 1.71; 95% CI 1.44–2.04), and being of older age (aOR 1.27; 95% CI 1.21–1.34). Alcohol onset before NMPO use, although positively and significantly associated at the univariate level (OR 1.65; 95% CI 1.46–1.87), became negatively associated at the multivariate level (aOR 0.47; 95% CI 0.39–0.55). This reversal occurred because adolescents who had initiated alcohol before NMPO were also more likely to have started to smoke and use marijuana before NMPO. Adolescents were less likely to use NMPO when

TABLE 2 Prevalence of Lifetime NMPO Use Among Parents and Adolescents by Sex, Race and/or Ethnicity, and Adolescent Age in Parent-Adolescent Dyads (2004–2012 NSDUH)

	Lifetime NMPO Use, % (95% CI)	*n*	*P*
Parents			
Mothers	12.8 (12.1–13.6)[a]	21 200	.05
Fathers	14.3 (13.4–15.3)[b]	13 800	—
Race and/or ethnicity			
White	15.6 (14.8–16.4)[a]	23 500	.001
African American	9.6 (8.2–11.2)[b]	4000	—
Hispanic	9.2 (8.0–10.4)[b]	5400	—
Other	11.7 (9.2–14.7)[b]	2200	—
Adolescents			
Male	8.5 (7.8–9.3)	17 900	ns
Female	9.2 (8.5–9.9)	17 100	—
Race and/or ethnicity			
White	9.2 (8.6–9.9)	22 100	ns
African American	8.3 (6.9–9.8)	3900	—
Hispanic	8.8 (7.8–9.9)	6200	—
Other	7.0 (5.4–8.9)	2800	—
Age, y			
12	4.4 (3.5–5.6)[a]	6300	.001
13	4.6 (3.8–5.7)[a]	6500	—
14	6.2 (5.3–7.4)[b]	6000	—
15	11.0 (9.7–12.5)[c]	5700	—
16	12.1 (10.9–13.4)[c]	5500	—
17	14.5 (13.1–16.0)[d]	5000	—

Weighted estimates. For each characteristic (sex, race and/or ethnicity, and age), different superscripts indicate significant group differences at $P < .05$. ns, not significant; —, not applicable.

TABLE 3 Logistic Regression of Parent and Adolescent Characteristics on Adolescent Lifetime Use of NMPOs (2004–2012 NSDUH)

Characteristics	OR (95% CI), (n = 35 000)	aOR (95% CI), (n = 35 000)
Parents		
Age	1.00 (0.99–1.01)	1.00 (0.99–1.01)
Mothers (versus fathers)	1.05 (0.93–1.19)	1.02 (0.89–1.17)
Education (versus college graduate)		
Some college	1.39 (1.16–1.68)***	1.09 (0.89–1.34)
High school graduate or less	1.64 (1.37–1.95)***	1.19 (0.97–1.46)
Marital status (versus married)		
Widowed	1.43 (0.89–2.29)	1.42 (0.82–2.46)
Separated or divorced	1.50 (1.26–1.78)***	1.08 (0.90–1.31)
Never married	1.16 (0.94–1.42)	0.94 (0.72–1.22)
Lifetime substance use (versus never)		
NMPOs	1.84 (1.58–2.15)***	1.30 (1.09–1.56)**
Smoking	1.76 (1.51–2.05)***	1.24 (1.02–1.51)*
Alcohol	1.63 (1.31–2.03)***	1.23 (0.93–1.63)
Marijuana	1.65 (1.45–1.89)***	1.13 (0.93–1.36)
OIDs[a]	1.76 (1.54–2.01)***	1.18 (0.98–1.41)
Perceived risk of drug use[b]	0.86 (0.82–0.91)***	0.93 (0.87–1.00)*
Lifetime depression (versus never)	1.38 (1.16–1.65)***	1.04 (0.85–1.26)
Perceived parenting by child (past 12 mo)[b]		
Lack of monitoring	1.59 (1.50–1.68)***	1.21 (1.12–1.31)***
Lack of support	1.43 (1.35–1.51)***	1.05 (0.98–1.12)
Conflict	1.54 (1.44–1.65)***	1.19 (1.10–1.29)***
Adolescents		
Age	1.34 (1.28–1.39)***	1.27 (1.21–1.34)***
Boys (versus girls)	0.92 (0.80–1.05)	0.89 (0.76–1.03)
Race and/or ethnicity (versus African American)		
White	1.13 (0.92–1.39)	1.06 (0.83–1.36)
Hispanic	1.07 (0.84–1.36)	1.08 (0.81–1.43)
Other	0.83 (0.60–1.16)	0.97 (0.67–1.40)
Religiosity[b]	0.71 (0.67–0.76)***	0.92 (0.86–0.99)*
Initiated other drug before NMPO (versus same age, after, or did not use)		
Cigarettes	3.01 (2.64–3.43)***	1.37 (1.14–1.65)***
Alcohol	1.65 (1.46–1.87)***	0.47 (0.39–0.55)***
Marijuana	3.03 (2.63–3.50)***	1.25 (1.02–1.53)*
OIDs[a]	3.66 (2.72–4.93)***	0.98 (0.63–1.51)
Perceived risk of drug use[b]	0.71 (0.68–0.75)***	0.77 (0.72–0.82)***
Perceived drug use of schoolmates (versus none or some use)[c]		
Most or all use	3.54 (3.04–4.11)***	1.71 (1.44–2.04)***
Delinquency (past 12 mo)[b]	1.72 (1.63–1.80)***	1.50 (1.42–1.59)***
Lifetime depression (versus never)	2.83 (2.43–3.29)***	1.62 (1.37–1.93)***

Weighted estimates.

[a] Cocaine, crack, heroin, or hallucinogens.

[b] Standardized scores.

[c] Smoking, alcohol, or marijuana.

* $P < .05$; ** $P < .01$; *** $P < .001$.

they believed that drug use was risky (aOR 0.77; 95% CI 0.72–0.82) and were highly religious (aOR 0.92; 95% CI 0.86–0.99).

DISCUSSION

To our knowledge, this is the first study to examine the association between parental and adolescent NMPO use on the basis of independent self-reports of parents and offspring in national samples of parent-adolescent dyads. Parental lifetime NMPO use was significantly associated with child lifetime NMPO use. This relationship persisted when controlling for several important parental and adolescent factors, including parents' and adolescents' use of other drugs and adolescent depression, delinquency, and perception that most peers used drugs. Mothers' NMPO use had a stronger association with adolescent NMPO use than fathers' use. Associations between parental and adolescent NMPO use did not differ by child sex or race and/or ethnicity. Parental lifetime smoking was also associated with adolescent NMPO use. Factors associated with adolescent NMPO use identified by others in the NSDUH[12,13,17,19–22] remained significant when controlling for self-reported parental NMPO use.

Associations between parental use of drugs other than NMPO and offspring NMPO use were all statistically significant. When controlling for parental use of different drugs and other covariates in addition to parental NMPO use, only parental smoking retained a significant association with adolescent NMPO use. Thus, the intergenerational association of NMPO use is not explained by a general factor underlying parental use of different drugs.

The stronger association between parent and child NMPO use for mothers than for fathers has also been reported for other drugs, particularly smoking.[1,29,31] The lack of differences in associations by child sex or race and/or ethnicity remains to be explained. Such differences might be detected with measures of current or heavy use. Associations for nicotine dependence and cannabis use disorder have been reported for mother-daughter pairs.[5,30] Although the rates of parental NMPO use were higher among white than African American and Hispanic respondents, and associations with child NMPO use were similar across racial and/or ethnic groups, the rates of adolescent NMPO use did not differ by race and/or ethnicity. Other factors may counteract the influence of parental NMPO use and lower the rate of use among white youth, particularly

TABLE 4 Effects of Parental Lifetime NMPO Use by Parent and Adolescent Sex on Adolescent Lifetime NMPO Use (2004–2012 NSDUH)

Parent-Adolescent Dyads	Adolescent NMPO Use, aOR (95% CI)[a]	*n*
All parents		
Mothers	1.62 (1.28–2.05)**[,b]	21 200
Fathers	0.98 (0.74–1.24)[c]	13 800
Dyads by sex		
Mother-daughter pairs	1.70 (1.25–2.30)***[,b]	10 500
Mother-son pairs	1.53 (1.08–2.15)*[,b]	10 700
Father-daughter pairs	1.25 (0.86–1.80)[b]	6600
Father-son pairs	0.71 (0.50–1.00)*[,c]	7200

Models were controlled for parent and adolescent factors included in Table 3.

[a] In separate models, the interaction effects of parental NMPO use by parent sex and of parental NMPO use by parent and adolescent sex are each statistically significant ($P < .01$ and $P < .001$, respectively).

[b] Different superscripts indicate a statically significant difference at $P < .05$.

[c] Different superscripts indicate a statically significant difference at $P < .05$.

* $P < .05$; ** $P < .01$; *** $P < .001$.

religiosity. A protective effect of high religiosity on NMPO use among white youth only has been reported in the NSDUH.[12,17] A lack of access to the restricted data prevented us from investigating these interactions further.

Risk factors identified for adolescent NMPO use are similar to those that are important for other drugs used by adolescents, including smoking, alcohol use, and illicit drug use.[1,4–7,49–53] In addition to parental drug use, the perceived quality of the parent-child relationship, adolescents' other-drug use, the perceived risk of drug use, drug use by peers, depression, and delinquency are each associated with adolescent NMPO use. The findings highlight the multifactorial nature of adolescent NMPO use and the utility of theoretical models of adolescent deviance and drug use to identify key risk factors for NMPO use.[12,28]

Although several familial processes may account for parent-adolescent associations in lifetime NMPO use that we report (including role modeling of parental NMPO by adolescents, adolescent socialization by parents, ineffective parenting strategies, availability of prescription opioid drugs in the household, and genetic disposition), the relative contribution of each process cannot be determined. The focus on lifetime use is a limitation of the research. Examination of parent-adolescent associations for different aspects of NMPO use other than lifetime use (such as current use, heavy use, and disorder and genetically informative samples) may provide insight into familial environmental and genetic influences in the association between parental and offspring NMPO use.

Other limitations of the data must be recognized. Only 1 parent and 1 adolescent were assessed per household, precluding the assessment of the relative associations between mothers' and fathers' NMPO use with adolescent use in the same families. The data are cross-sectional, whereas longitudinal data are necessary to infer processes of parental influence. Although it is unlikely that adolescent NMPO use influences parent NMPO use, it is possible that adolescent NMPO use could influence parent-child interactions, such as levels of conflict. Measures of parent and adolescent medically prescribed opioid use were not available to determine the associations between nonmedical and medical use of prescription opioids within families. Measures indexed perceptions related to drug use more generally and not NMPO use specifically.

CONCLUSIONS

These national dyadic data provide a unique understanding of the association between parental and adolescent NMPO use in the context of other risk factors. Similar to other types of parental substance use, parental NMPO use is associated with offspring use and should be considered in efforts to reduce adolescent NMPO use. Smoking should also be the target of interventions; there are significant links between parental and adolescent smoking and adolescent NMPO use. Parent-based interventions targeted at NMPO use among youth should not only address parental NMPO use but should also promote positive parenting practices, such as monitoring and reduced conflict.

ABBREVIATIONS

aOR: adjusted odds ratio
CI: confidence interval
MDE: major depressive episode
NMPO: nonmedical prescription opioid
NSDUH: National Survey on Drug Use and Health
OID: other illicit drug
OR: unadjusted odds ratio
SAMHSA: Substance Abuse and Mental Health Services Administration
SUDAAN: Survey Data Analysis

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