

Nonmedical use of opioid analgesics among Ontario students

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ABSTRACT

OBJECTIVE To explore the prevalence and the demographic predictors of nonmedical use of opioid analgesics in the Canadian adolescent population.

DESIGN Data are based on self-reports derived from the 2007 Ontario Student Drug Use and Health Survey, which is an anonymous, in-school, cross-sectional survey.

SETTING Schools in Ontario.

PARTICIPANTS A total of 2914 students in grades 7 to 12.

MAIN OUTCOME MEASURES Demographic predictors of nonmedical use of opioid analgesics during the past year and the sources of opioid analgesics.

RESULTS Students ranged in age from 12 to 19 years (mean 15.0, SD 1.9) and 52% were male. Of the students surveyed, 20.6% (95% confidence interval [CI] 18.9% to 22.3%) reported using opioid analgesics at least once nonmedically during the past year, with 6.2% using exclusively nonmedically and 14.4% using nonmedically and medically. Female students (16.6%, CI 14.1% to 19.6%) were more likely than male students (12.0%, CI 10.0% to 14.2%) to have used opioid analgesics both nonmedically and medically in the past year, although exclusive nonmedical use was similar between female (6.7%, CI 5.3% to 8.5%) and male (5.8%, CI 4.5% to 7.3%) students. Among students who reported using opioid analgesics nonmedically, 72% reported obtaining them from home and only 6% reported obtaining them from friends. Nonmedical opioid analgesic users had higher past-year prevalences for alcohol use, daily smoking, and other illicit drug use compared with nonusers.

CONCLUSION Nonmedical use of opioids is common among Ontario students. The motivation for using these medications without prescriptions or without medical supervision is not known. Students might have used these medications recreationally or for pain relief. Regardless of motivation, these medications are being used without medical supervision. It is important to note that the home is the main source for opioid analgesics in the absence of a prescription. Parents should be vigilant and educate themselves and their children about these medications, ensuring that prescription opioids are stored properly and avoiding casual sharing of these medications among family members.

EDITOR'S KEY POINTS

- Although most illicit drug use among North American youth has declined in the past decade, the misuse of opioid analgesics has increased substantially. This study explored the prevalence, source, and demographic predictors of nonmedical opioid use among students in Ontario.
- Nonmedical use of opioid analgesics was common among Ontario students. The annual prevalence rate (21%) fell behind only alcohol (62%) and cannabis (26%), and students who used opioids nonmedically were more likely to use alcohol or other drugs.
- Educational initiatives targeted at this high-risk subgroup are warranted, both on the proper use of prescribed opioids and the dangers associated with combining these drugs with other central nervous system depressants such as alcohol or benzodiazepines.

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Usage non médical d'opiacés analgésiques chez les étudiants ontariens

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RÉSUMÉ

OBJECTIF Déterminer la prévalence et les indicateurs démographiques de l'usage non médical d'opiacés analgésiques chez les adolescents canadiens.

TYPE D'ÉTUDE Les données proviennent des déclarations des participants au *Ontario Student Drug Use and Health Survey* de 2007, une enquête transversale anonyme en milieu scolaire.

CONTEXTE Écoles de l'Ontario.

PARTICIPANTS Un total de 2914 étudiants de la septième à la douzième année.

PRINCIPAUX PARAMÈTRES À L'ÉTUDE Indicateurs démographiques de l'usage non médical d'analgésiques opiacés durant la dernière année écoulée, et source de ces médicaments.

RÉSULTATS Les étudiants avaient entre 12 et 19 ans (moyenne 15,0, DS 1,9) et 52% étaient des mâles. Parmi les répondants, 20,6% (intervalle de confiance [IC] 18,9 à 22,3%) ont admis avoir fait un usage non médical d'opiacés analgésiques au moins une fois durant les 12 derniers mois, 6,2% uniquement à des fins non médicales et 14,1% à des fins médicales et non médicales. Les élèves féminines étaient plus susceptibles que leurs confrères mâles (12,0%, IC 10,0 à 14,2%) d'avoir consommé des opiacés analgésiques à des fins médicales et non médicales durant la dernière année, quoique l'usage exclusivement non médical ne différait pas entre les élèves féminines (6,7%, IC 5,3 à 8,5%) et leurs confrères mâles (5,8%, IC 4,5 à 7,3%). Parmi les élèves qui déclaraient faire un usage non médical d'opiacés analgésiques, 72% disaient se les procurer chez eux et seulement 6% auprès d'amis. Par rapport aux non-consommateurs, ceux qui faisaient usage d'opiacés analgésiques avaient une prévalence plus élevée de tabagisme et de consommation d'alcool et d'autres drogues illicites.

CONCLUSION L'usage non médical d'opiacés analgésique est fréquent chez les étudiants ontariens. On ignore les raisons pour lesquelles on utilise ces médicaments sans prescription ou sans supervision médicale. Les élèves pourraient avoir pris ces médicaments comme euphorisants ou pour soulager la douleur. Quelle que soit la raison, ces médicaments sont utilisés sans supervision médicale. Il importe de signaler que le domicile familial est la principale source de ces médicaments sans prescription. Les parents ont donc l'obligation de s'informer et d'informer leurs enfants au sujet de ces médicaments; ils devraient aussi ranger les opiacés prescrits de façon à éviter que les membres de leur famille y aient trop facilement accès.

POINTS DE REPÈRE DU RÉDACTEUR

- Même si l'usage des drogues illicites a diminué chez les jeunes nord-américains au cours de la dernière décennie, l'usage inapproprié d'opiacés analgésiques a augmenté de façon importante. Cette étude examinait la prévalence, la source et les indicateurs démographiques de l'usage non médical d'opiacés chez les étudiants ontariens.
- L'usage non médical d'opiacés analgésique est fréquent chez les étudiants ontariens. Son taux de prévalence annuelle (21%) n'était dépassé que par ceux de l'alcool (62%) et du cannabis (26%), et les étudiants qui faisaient un usage non médical d'opiacés étaient plus susceptibles de consommer de l'alcool et d'autres drogues.
- Il y a lieu d'instaurer des interventions éducatives qui ciblent ce sous-groupe à risque élevé, et qui portent sur l'usage approprié des opiacés prescrits et sur les dangers résultant de leur combinaison avec d'autres déprimeurs du système nerveux central comme l'alcool ou les benzodiazépines.

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Opioid drugs used for pain management, such as oxycodone (eg, Percocet, Percodan, OxyContin), codeine (eg, Tylenol No. 3) and meperidine (eg, Demerol), are classified as controlled substances in Canada and the United States because of their potential for abuse and dependence; there are numerous policies in place to provide guidance with respect to appropriate prescribing practices.

Consumption of this drug class has increased in Canada in recent years.¹ While the therapeutic benefits of these drugs for the treatment of pain are important, their increased availability raises concerns about the potential for abuse. There are indicators from the United States and Canada that the abuse of these opioids has been increasing.²⁻⁷

Although most illicit drug use among American youth has declined over the past decade, the misuse of opioid analgesics has increased substantially.⁸ In 2007, the past-year prevalence of use (defined as taking the drug “on your own—that is, without a doctor telling you to take them”) of OxyContin (oxycodone sustained-release product) and Vicodin (hydrocodone and acetaminophen) among American 12th graders was 5.3% and 9.6%, respectively, while the rate for a general indicator of “narcotics other than heroin” use was 9.2%.⁹ The latter rate is currently almost 3 times higher than it was in 1991 when monitoring first began, at which point it was found to be 3.5%.

The US National Survey on Drug Use and Health shows similar trends among respondents aged 12 to 17 for nonmedical use defined as “use of prescription opioid analgesics without a doctor’s prescription or just for the feeling they caused.”^{10,11} This household survey also indicates that the nonmedical use of opioids has the potential to lead to serious health complications, especially if they are used with other substances such as alcohol. Of the 7% of adolescents aged 12 to 17 reporting past-year nonmedical use of prescription pain relievers, more than 1 in 3 reported symptoms of abuse or dependence, according to the *Diagnostic and Statistical Manual of Mental Disorders*, fourth edition, criteria: 7% met the criteria for abuse, 20% for subthreshold dependence, and 9% for dependence.¹²

Little Canadian epidemiologic research exists assessing the nonmedical use of prescription opioid analgesics among the general population, let alone among adolescents. In 2005, the Ontario Student Drug Use and Health Survey (OSDUHS) began to monitor nonmedical use of OxyContin by students in grades 7 to 12, and subsequently found a significant increase in 2007, from 1.0% to 1.8% ($P < .05$).¹³

Questions about the nonmedical use of opioid analgesics, as a general class, and the source of these diverted medications were included in the 2007 OSDUHS. Using these data, we provide a descriptive analysis of nonmedical opioid analgesic users among a mainstream student population, as well as the source of these diverted medications. We also examine the use of

medical opioid analgesics, alcohol, tobacco, and illicit drugs among those students who reported nonmedical opioid analgesic use compared with nonusers.

METHODS

Participants

We analyzed data derived from the 2007 cycle of the OSDUHS.¹³ The OSDUHS, conducted every 2 years since 1977, is the longest ongoing school study of adolescents in Canada. The survey, which employs a regionally stratified, 2-stage (school, class) cluster design, monitors substance use, mental health, physical health, gambling, and risk behaviour. The 2007 cycle was based on a total sample of 6323 students in grades 7 to 12, from 43 school boards and 119 schools. The questions about nonmedical opioid analgesic use were present in half the questionnaires, which were randomly distributed within each classroom, resulting in a final sample of 2914 students. The student sample ranged in age from 12 to 19 years (mean 15.0, SD 1.9), and 52% of respondents were male. Self-administered questionnaires, which promote anonymity, were distributed by staff from the Institute for Social Research of York University in Toronto, Ont, in individual classrooms during a single class period. The student participation rate was 68%. Reasons for student noncompletion included absenteeism (13%) and absence of parental consent (19%). The Centre for Addiction and Mental Health’s Research Ethics Board approved this study. Further details about the survey are available at www.camh.net/research/population_life_course.html.

Measures

We assessed past-year nonmedical opioid analgesic use with the following question: “In the last 12 months, how often did you use pain relief pills (such as Percocet, Percodan, Tylenol #3, Demerol, OxyContin, codeine) without a prescription or without a doctor telling you to take them?” Response options ranged from “1 or 2 times” to “40 or more times,” and also included “used non-medically, but not in the last 12 months,” “never used non-medically in lifetime,” and “don’t know what pain relief pills are.”

Students were also asked about the source of these drugs using the question: “If you used pain relief pills (such as Percocet, Percodan, Tylenol #3, Demerol, OxyContin, codeine) in the last 12 months without a doctor’s prescription, how did you get them? (If you used them more than once, think about the last time you used them.)” Response options were “never used,” “did not use in the last 12 months,” “from home,” “from a friend,” “from someone I know,” “from someone at a bar/club,” “from someone on ‘the street,’” “from another source not listed above,” and “don’t remember.”

Medical analgesic use was assessed with the following question: “In the last 12 months, how often did you

use pain relief pills (such as Percocet, Percodan, Tylenol #3, Demerol, OxyContin, codeine) with a prescription or because a doctor told you to take them?" Response options ranged from "1 or 2 times" to "40 or more times," and also included "used medically, but not in the last 12 months," "never used medically in lifetime," and "don't know what pain relief pills are."

The above drug use questions were adapted from the long-standing US Monitoring the Future student survey, but were modified to include the most common prescription opioid analgesic drugs in Canada. All new survey questions were pretested with a very small convenience sample of young adolescents to assess face validity.

Data analysis

Our analysis was 3-fold. First, we used χ^2 analysis to compare past-year prevalence of nonmedical use and medical use of prescription opioid analgesics for the total sample and by sex. A 2×2 χ^2 test based on a total sample size of 2914 respondents allowed for the detection of small effect sizes with a power greater than 90%.¹⁴ Second, we used a frequency distribution to describe the source of diverted prescription pain medication among students who used prescription opioid analgesics nonmedically. Third, logistic regression analysis was conducted for male and female students separately to examine whether grade and past-year use of alcohol and other illicit drugs were associated with nonmedical use of opioid analgesics. All analyses were conducted using Stata 10.1 and were weighted owing to the unequal probabilities of selection. All variance and statistical tests employed Taylor series methods to account for the complex survey sample design.

RESULTS

The frequency of nonmedical use of opioid analgesics in the past year among the total sample of students surveyed was as follows: 8.0% had used them 1 to 2 times, 4.6% had used them 3 to 5 times, 3.2% had used them 6 to 9 times, 2.5% had used them 10 to 19 times, and 2.3% had used them 20 times or more.

For the purpose of this analysis, we combined all users who had used at least once in the past year. Approximately 20.6% (95% confidence interval 18.9% to 22.3%) of all student respondents reported using opioid

analgesics at least once during the previous year without a doctor's prescription or without a doctor telling them to do so (ie, nonmedically). Of all of the students, 6.2% reported using opioid analgesics without a prescription exclusively, 14.4% reported using analgesics with and without a prescription or without medical supervision, 25.2% reported medical use only, and 54.2% reported no use in the past year (Table 1). There was a significant sex difference, with female students more likely than males to have used opioid analgesics both medically and nonmedically in the past year ($P=.001$). However, the percentage reporting exclusively nonmedical use in the past year did not differ between male and female students (5.8% vs 6.7%, respectively). Of the students who reported using opioid analgesics without a doctor's prescription, most reported obtaining them from home (72.4%), and a small proportion said they obtained them from friends (6.0%) or from people they knew (2.9%) (Table 2).

Tables 3 and 4 present the association between any nonmedical opioid use (combining the 2 nonmedical groups shown in Table 1) and other substance use. Compared with nonusers, those students who reported nonmedical use of opioid analgesics in the past year showed higher past-year prevalence rates for consumption of alcohol, daily smoking, and other illicit drug use. Specifically, among male students, nonmedical opioid users were more likely to report past-year use of alcohol (odds ratio [OR] 1.91), illicit drugs (OR 1.57), and medical opioids (OR 4.35) compared with nonusers. The likelihood of nonmedical opioid use among male students was not significantly associated with grade. Among female students, nonmedical opioid users were more likely to report past-year use of alcohol (OR 1.54), illicit drugs (OR 2.44), and medical opioids (OR 4.03), and also to report daily smoking (OR 1.64), compared with nonusers. Female students showed a small grade effect, with 8th and 9th graders more likely to report nonmedical opioid use compared with 7th graders.

DISCUSSION

Our study showed that nonmedical use of opioid analgesics is highly prevalent (21%) among Ontario students. This annual prevalence rate fell behind only alcohol (62%)

Table 1. Past-year prevalence of nonmedical and medical use of prescription opioid analgesics by sex among Ontario students in grades 7 to 12 in 2007: Percentages are weighted estimates.

SEX	UNWEIGHTED N	NONMEDICAL OPIOID USE ONLY, % (95% CI)	BOTH NONMEDICAL AND MEDICAL OPIOID USE, % (95% CI)	MEDICAL OPIOID USE ONLY, % (95% CI)	NO USE, % (95% CI)
Male	1439	5.8 (4.5-7.3)	12.0 (10.0-14.2)*	23.9 (21.4-26.6)	58.4 (55.3-61.5)*
Female	1475	6.7 (5.3-8.5)	16.6 (14.1-19.6)*	26.9 (24.5-29.5)	49.7 (46.8-52.6)*
Total	2914	6.2 (5.3-7.3)	14.4 (12.6-15.9)	25.2 (23.5-27.2)	54.2 (52.2-56.4)

CI—confidence interval.

*Significant percentage differences between male and female students, $\chi^2 P=.001$.

Table 2. Sources of diverted prescription pain medication among Ontario students in grades 7 to 12 who used opioids nonmedically in the past year: N = 624.

SOURCE	%
From home	72.4
From a friend	6.0
From someone I know	2.9
From the "street"	<0.5
Other sources not listed	8.8
Do not remember	9.7

Table 3. Past-year prevalence of alcohol and illicit drug use among Ontario students in grades 7 to 12: Nonmedical users of opioid analgesics versus nonusers; N = 2914.

SUBSTANCE	NONMEDICAL USERS OPIOID ANALGESICS, N = 624, % (95% CI)	NONUSERS, N = 2290, % (95% CI)	DESIGN- BASED χ^2 P VALUE
Alcohol	75.8 (70.8-80.2)	57.2 (54.3-60.0)	<.001
Daily smoking	9.7 (7.1-13.1)	3.5 (2.7-4.5)	<.001
Cannabis	38.1 (33.6-42.9)	23.0 (20.5-25.7)	<.001
Inhalants*	13.6 (10.4-17.7)	4.5 (3.5-5.8)	<.001
Hallucinogens [†]	17.2 (13.7-21.3)	4.8 (3.8-6.1)	<.001
Cocaine or crack	10.0 (7.3-13.5)	2.1 (1.6-2.8)	<.001
Heroin	2.4 (1.2-4.8)	0.5 (0.3-1.0)	.001
Nonmedical use of OxyContin	6.8 (4.6-9.8)	0.5 (0.3-1.0)	<.001
Nonmedical use of sedatives or tranquilizers [‡]	5.1 (3.3-7.8)	<0.5	<.001
Nonmedical use of stimulants [§]	15.2 (12.1-19.0)	3.5 (2.8-4.4)	<.001
Nonmedical use of ADHD drugs	2.2 (1.3-3.6)	0.7 (0.4-1.4)	.008
Medical opioid analgesic	69.5 (64.5-74.0)	31.8 (29.7-34.0)	<.001

ADHD—attention deficit hyperactivity disorder, CI—confidence interval.

*Inhalants include glue and other solvents.

[†]Hallucinogens include LSD, PCP, mescaline, psilocybin, and ecstasy.

[‡]Tranquilizers include Valium and Ativan.

[§]Stimulants include diet pills and stay-awake pills.

^{||}ADHD drugs include any drug usually prescribed for ADHD, such as Ritalin, Concerta, or Adderall.

Table 4. Nonmedical use of opioid analgesics by male and female students, according to grade and other past-year substance use: Owing to list-wise deletion, the sample size for the regressions totaled 2868.

CHARACTERISTICS	MALE STUDENTS, N = 1410, ADJUSTED OR (95% CI)	FEMALE STUDENTS, N = 1458, ADJUSTED OR (95% CI)
Grade (age, y)		
• 7 (12)	1.00 (reference)	1.00 (reference)
• 8 (13)	1.91 (0.94-3.90)	2.32* (1.11-4.86)
• 9 (14)	1.62 (0.81-3.23)	2.34* (1.12-4.91)
• 10 (15)	1.25 (0.60-2.58)	1.68 (0.75-3.76)
• 11 (16)	1.13 (0.57-2.25)	1.65 (0.78-3.46)
• 12 (17)	1.27 (0.56-2.87)	1.05 (0.50-2.22)
Alcohol use	1.91 [†] (1.16-3.17)	1.54* (1.01-2.35)
Daily smoking	1.52 (0.81-2.86)	1.64* (1.04-2.58)
Illicit drug use [†]	1.57 [†] (1.10-2.24)	2.44 [†] (1.69-3.52)
Medical opioid analgesic use	4.35 [†] (3.03-6.25)	4.03 [†] (2.79-5.83)

CI—confidence interval, OR—odds ratio.

*P < .05.

[†]P < .01.

[†]Illicit drug use includes any 1 of the following: cannabis, inhalants, LSD, PCP, mescaline, psilocybin, cocaine, crack, heroin, nonmedical use of OxyContin, nonmedical use of sedatives, nonmedical use of stimulants, and nonmedical use of attention deficit hyperactivity disorder drugs.

findings to suggest that students were using these medications for pain relief rather than recreationally. However, it should be noted that the only question in their previous survey cycles about opiates referred exclusively to heroin use in the past 12 months. In a US study, Boyd et al¹⁶ examined adolescents' motivation to abuse prescription medications from 4 classes of drugs. Almost 80% of the students reporting nonmedical use of opioid analgesics said it was for pain relief. In order to clarify this, the 2009 OSDUHS will include a question about motivation for use. Regardless of whether the reason for use is to self-medicate or to get "high," it must be borne in mind that these young people are using potentially dangerous medications without medical supervision.

Our data reveal another important finding: although 6% of students reported using prescription opioids only nonmedically, approximately 14% of students reported using prescription opioids both medically and nonmedically. It is possible that some students were prescribed analgesics for legitimate medical purposes and continued to use these medications without medical supervision either to get "high" or to self-medicate. Our data show that students who used opioids nonmedically were more likely to use alcohol or other drugs, although we do not know if use was concurrent. Educational initiatives targeted at this high-risk subgroup are warranted, both on the proper use of prescribed opioids and the dangers associated with combining these drugs with

and cannabis (26%). In 2007, a similar question was included in the Atlantic Provinces Survey, and 20%, 18%, 17%, and 19% of students in Nova Scotia, New Brunswick, Newfoundland, and Prince Edward Island, respectively, indicated that they had used opioid analgesics.¹⁵ Because these rates were so much higher than those reported in previous survey cycles conducted in 2002, 1998, and 1996 (in which 2% of students said that they had used opiates in the past year), the authors interpreted their

other central nervous system depressants such as alcohol or benzodiazepines.

Another interesting finding is that almost 40% of students reported that they had received a prescription for opioid pain relievers in the past 12 months. At first glance this figure seems to be elevated for this age group. However, another indicator from the 2007 OSDUHS found that approximately 37% of students had sought treatment for an injury in the past year. Although we cannot be certain, it is possible that a considerable number would have received prescriptions for opioid analgesics for their injuries.¹⁷

Another important finding was that almost three-quarters (72%) of those who used opioid analgesics nonmedically reported obtaining them from home. Our findings confirm observations made by other investigators that the home is a common source of these medications. In a sample of high school students in the Detroit, Mich, area, 34% reported getting these drugs from family members and 17% reported obtaining them from friends.¹⁸ Loaning, trading, and sharing prescription medications among adolescents is common.¹⁹

Much can be done to prevent prescription drug abuse in adolescents. Levine²⁰ suggests that parents, pharmacists, and physicians can all play roles in prevention. Physicians should carry out psychosocial screening with adolescents they see in any health care setting (eg, after-hours clinic, emergency department) to identify those adolescents who have or who are at risk of developing substance abuse difficulties. This can be done using a brief HEADDS²¹ assessment or using a screening tool for substance use, such as the CRAFFT,²² which was developed and validated specifically for use with adolescents. Such identification is important, as these adolescents require close follow-up and possibly referral for further assessment and treatment.

Physicians should be cautious about prescribing opioids to their adolescent patients, and should consider other analgesics wherever possible. When opioids are prescribed, small total amounts should be prescribed, with clinical reassessment if there is a request for additional prescriptions.

Parents and other adults need to be aware that the adolescent population frequently misuses opioid medications. While their own adolescent might not be at risk of taking and misusing these medications, other adolescents visiting their household might look for opioids, and it is advisable that "leftover" opioids be either kept in a secure location, such as a locked medicine cabinet, or returned to the pharmacy for disposal.


Pharmacists should advise individuals receiving prescription opioids to store the medication securely and to return unused medication for appropriate disposal. They should also warn patients of the potential dangers associated with sharing medications.

Limitations

It is possible that including Tylenol No. 3 in the list of medications led to students misinterpreting the question and including use of over-the-counter analgesics, thereby inflating the prevalence of nonmedical opioid analgesic use. In their study of medical and nonmedical use of prescription pain medication in public school students (grades 5 to 10), Boyd and colleagues¹⁸ also used Tylenol No. 3 as an example in their question; their results showed that 22.4% of 10th graders reported past-year use of opioid analgesics, a percentage similar to that reported by 10th graders in this study (21.8%). The next OSDUHS cycle will test the possibility that students misinterpreted the question as including use of over-the-counter medications.

Methodologic limitations must also be noted. First, our data apply only to youth who attend school and, therefore, do not represent all adolescents in this age group (eg, school dropouts, those in facilities). Second, we do not know the characteristics of those students who were absent from class or who refused to participate in the survey. It is possible that these students have higher levels of substance use and that our results are underestimates. Third, our data rely on self-reports that might be influenced by both memory and disclosure error (ie, underreporting and overreporting), the extent of which cannot be determined. Underreporting is more likely in this case, owing to the perceived social undesirability of substance use. As well, respondents reporting the use of a fictitious drug in the past year, or those reporting highly frequent use of all the illicit drugs asked about in the questionnaire, were omitted from the data analysis, thereby reducing the likelihood that our results were affected by overreporting by students. Despite these limitations, the anonymous self-report method in a school setting is frequently used in drug research and has been found to have good reliability and validity.²³⁻²⁵

Conclusion

To our knowledge, this is the first descriptive study of nonmedical use of the general class of opioid analgesics among a mainstream Canadian adolescent population. Our results suggest that nonmedical opioid analgesic use is common among students, and physicians and parents should be vigilant to ensure that these medications are used appropriately. 

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Contributors

Dr Brands contributed substantially to the concept and design of the study and interpretation of the data, and prepared the article for submission. **Ms Paglia-Boak** contributed substantially to the concept and design of the study; acquisition, analysis, and interpretation of the data; and critically revising the article. **Drs Sproule** and **Leslie** contributed substantially to interpretation of the data and critically revised the article. **Dr Adlaf** contributed substantially to the concept and design of the study and interpretation of the data, and critically revised the article. All authors approved the final version to be published.

Competing interests

None declared

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