Original Research

Nonmedical Use of Prescription Medication Among Adolescents Using Drugs in Quebec

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Objective: To determine the prevalence and factors associated with nonmedical use of prescription medication (NMUPM) among adolescents who use drugs (ages 12 to 17 years) in Quebec.

Method: Secondary data analyses were carried out with data from a 6-month study, namely, the 2010–2011 Quebec Health Survey of High School Students—a large-scale survey that sought to gain a better understanding of the health and well-being of young Quebecers in high school. Bivariate and multivariate logistic regression analyses were conducted to study NMUPM among adolescents who use drugs, according to sociodemographic characteristics, peer characteristics, health indicators (anxiety, depression, or attention-deficit disorder [ADD] with or without hyperactivity), self-competency, family environment, and substance use (alcohol and drug use) factors.

Results: Among adolescents who had used drugs in the previous 12 months, 5.4% (95% CI 4.9% to 6.0%) reported NMUPM. Based on multivariate analyses, having an ADD (adjusted odds ratio [AOR] 1.47; 95% CI 1.13 to 1.91), anxiety disorder (AOR 2.14; 95% CI 1.57 to 2.92), low self-esteem (AOR 1.62; 95% CI 1.26 to 2.08), low self-control (AOR 1.95; 95% CI 1.55 to 2.45), low parental supervision (AOR 1.43; 95% CI 1.11 to 1.83), regular alcohol use (AOR 1.72; 95% CI 1.36 to 2.16), and polysubstance use (AOR 4.09; 95% CI 3.06 to 5.48) were associated with increased odds of reporting NMUPM.

Conclusions: The observed prevalence of NMUPM was lower than expected. However, the associations noted with certain mental health disorders and regular or heavy use of other psychoactive substances are troubling. Clinical implications are discussed.

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Utilisation non médicale des médicaments d'ordonnance chez les adolescents utilisant des drogues au Québec

Objectif : Déterminer la prévalence de l'utilisation non médicale des médicaments d'ordonnance (UNMMO) et les facteurs qui y sont associés chez les adolescents (de 12 à 17 ans) qui utilisent des drogues au Québec.

Méthode : Des analyses de données secondaires ont été exécutées avec les données d'une étude de 6 mois, l'Enquête québécoise sur la santé des jeunes du secondaire 2010-2011, une enquête de grande envergure visant à obtenir une meilleure compréhension de la santé et du bien-être des jeunes québécois du secondaire. Des analyses de régression logistique bivariée et multivariée ont été menées pour étudier l'UNMMO chez les adolescents qui utilisent des drogues, selon les facteurs des caractéristiques sociodémographiques, des caractéristiques des pairs, des indicateurs de la santé (anxiété, dépression, ou trouble de déficit de l'attention [TDA] avec ou sans hyperactivité), de l'auto-efficacité, de l'environnement familial, et de l'utilisation de substances (utilisation d'alcool et de drogues).

Résultats : Parmi les adolescents qui avaient utilisé des drogues dans les 12 mois précédents, 5,4 % (IC à 95 % 4,9 % à 6,0 %) déclaraient une UNMMO. Selon les analyses multivariées, un TDA (ratio de cotes ajusté [RCC] 1,47; IC à 95 % 1,13 à 1,91), un trouble anxieux (RCC 2,14; IC à 95 % 1,57 à 2,92), une faible estime de soi (RCC 1,62; IC à 95 % 1,26 à 2,08), un faible autocontrôle (RCC 1,95; IC à 95 % 1,55 à 2,45), une faible supervision parentale (RCC 1,43; IC à 95 % 1,11 à 1,83), une utilisation d'alcool régulière (RCC 1,72; IC à 95 % 1,36 à 2,16), et une utilisation de polysubstances (RCC 4,09; IC à 95 % 3,06 à 5,48) étaient associés à des probabilités accrues de déclarer une UNMMO.

Conclusions : La prévalence observée de l'UNMMO était plus faible que prévu. Cependant, les associations notées entre certains troubles de santé mentale et l'utilisation régulière ou intensive d'autres substances psychoactives sont inquiétantes. Les implications cliniques sont discutées.

Nonmedical use of prescription medications is now a serious health problem in North America.[1] There has been a substantial increase in the misuse of prescribed opioids, psychoactives, and stimulants in the United States and Canada during the past few decades. The high availability and use of prescription medications have created environments conducive to NMUPM in North America.[2–5] There are social and health harms associated with prescription medications, and although these drugs have therapeutic purposes, they are likely to be misused because of their psychoactive properties and associated risks for psychological and physical dependence. Excluding tobacco and alcohol, prescription medications are the most prevalent type of drug used in North America after cannabis.[6]

Use of NMUPM is more prevalent among adolescents and young adults than among older adults.[7–9] According to data from the Youth Smoking Survey 2010–11, 8.2% of young Canadians in grades 6 to 12 reported taking prescription and over-the-counter medications in the past year for recreational purposes (to get high).[10] Studies have shown that teenagers think prescription medications are much safer to use[11] and easier to get than street drugs.[12] In the United States, the Substance Abuse and Mental Health Service Administration estimated that annual drug-related visits to emergency departments involving misuse or abuse of prescription medications increased 115% between 2004 and 2010.[13] The 12- to 17-year-old age group accounted for 6.1% of visits, which is 300.6 visits to emergency departments per 100 000 people.[14]

It is important to prevent or reduce adolescents' psychoactive substance use. During adolescence, the brain

Clinical Implications
• NMUPM is associated with mental health problems in adolescents, problems that are either underdiagnosed or suboptimally treated.
• Increased efforts in the detection of young people with NMUPM are needed, especially among those who use illicit drugs.
Limitations
• Our study design was cross-sectional and, therefore, temporal relations could not be examined.
• Difficulty in accurately assessing NMPUM may have caused an underestimation of the problem.
• Although there is a potential impact of desirability bias, it is less likely, as the subsample already reported having used drugs in the past.

undergoes rapid and extensive development.[15] It is more vulnerable to the effects of alcohol and drug use that can lead to neurological and behavioural changes associated with higher risk of substance abuse and multiple drug use.[16–21] Moreover, misuse of prescription medications comes with its share of consequences, including physical injuries, psychiatric conditions, problems with the law, fatal and nonfatal overdoses, respiratory depression, heart arrhythmia, and increased risks for HIV and hepatitis C virus infections.[22–27]

Several studies have examined factors that characterize adolescents who use prescription medications for nonmedical purposes. According to a systematic review covering scientific papers published between 2001 and 2011,[28] almost all studies reported a positive association between drug use and NMUPM, yet no studies to date have examined correlates of NMUPM among adolescents who use drugs. Using data from the QHSHSS 2010–2011, we carried out secondary analyses to estimate the prevalence of NMUPM and associated correlates among adolescents who reported using substances illicitly. Sociodemographic characteristics, peer characteristics, health indicators, and factors related to self-competency, family environment, and substance use were examined.

Abbreviations

ADD	attention-deficit disorder
ADHD	attention-deficit hyperactivity disorder
ISQ	Institut de la statistique du Québec
NMUPM	nonmedical use of prescription medication
QHSHSS	Quebec Health Survey of High School Students

Methods

Study Design

This cross-sectional study was based on data collected in the QHSHSS 2010–2011, a survey based on a representative sample of high school students living in the province of Quebec. The survey was carried out by the ISQ, with the aim to assess physical, mental, and psychosocial health and lifestyle habits of high school students. Ethical approval was obtained from the ethical committee of the institute.

Description of the Quebec Health Survey of High School Students

Full methodological details on the QHSHSS have previously been described.[29,30] Briefly, all pupils enrolled in high school grades 1 to 5 (12 to 17 years old) in public or private schools in the fall of 2010 were eligible, excluding those from the regions of Nunavik and Terres-Cries-de-la-Baie-James, vocational and technical schools, schools in which the language of instruction is an Aboriginal language, institutions that are not in the education system (other ministries or the federal government), and schools where at least 30% of students are disabled or have adjustment difficulties or learning disabilities. Schools were selected for the QHSHSS as follows: for both given health region and grade level (for example, secondary 1), schools were selected randomly and in proportion to their size from among all schools with students enrolled in that particular grade level. Then, based on a standard social science course, a list of classes was made for each school selected for a given grade level. Classes were then selected from this list. Numerous classes in the same school may have been selected.

Data Collection

The survey was based on a computerized self-administered questionnaire, and took place between November 2, 2010, and May 17, 2011, in the 16 health regions involved. On the day of data collection in a given school, a team of 2 interviewers brought the necessary equipment with them, including computers, routers, and a server. Before data collection began in a given class, youth were informed about the survey objectives and the collection procedures. They were also told that participation was voluntary. During collection, the interviewers were available to answer any questions from the youth. A total of 63 196 students in 2651 secondary 1 to 5 classes at 470 schools completed the QHSHSS 2010–2011, for a final overall response rate of 88.1%.

Measures

Students could choose to fill out the questionnaire in either French or English. The section on drug use started with a general question about lifetime drug use. Among adolescents who answered yes, drug use during the past 12 months was assessed using DEP-ADO, a questionnaire validated for screening adolescents.[31] It covered use of 7 different types of illicit drugs and use of a medication taken without prescription, for an effect. A list of examples of medications was provided, including Valium, Librium, Dalmane, Halcion, Ativan, Ritalin, Dilaudid, codeine, and OxyContin. Adolescents who reported having used a medication were asked to name it. Each answer was verified by one of the authors, who is a physician, to make sure that the substance named was a true medication. This question made it possible to identify the youth reporting NMUPM (the outcome under study) among adolescents who had used any drugs or medications in the previous 12 months (the subsample under study). The number of categories of illicit substances used by participants during the 12-month period was estimated and treated as a dichotomous covariable (1, compared with 2 or more). Lifetime regular use of alcohol, defined as at least once a week during at least a month, was also measured.

As for the other covariates, several domains were examined. They were selected based on the literature and their interest as modifiable factors for the purpose of prevention. The mental health domain included 3 questions asking the youth if they had any of the following health problems that had been diagnosed or confirmed by a doctor or other health professionals: attention problems with or without hyperactivity, anxiety, and depression. The self-competency domain included 3 constructs, and for each one, participants were classified into 2 groups: low, compared with moderate, or high. One construct was self-esteem, assessed using the Rosenberg Index.[32] The second was global self-efficacy, measured with questions on self-confidence and perseverance previously used in similar surveys carried out in the United States and Canada.[33,34] The third construct was self-control, which refers to a person's ability to override impulses and interrupt or restrain an internal reaction to avoid undesired behaviours or to reach a goal or follow a rule.[35] Some questions from Tangney et al's[35] index of self-control were retained to examine this dimension, and a brief index was developed.

The family domain included 3 measures. One was an index of social support in the home environment, which included 7 questions about students' perceptions of the quality of their relationships with their parents or other adults in their home and about high expectations expressed by those adults.[36] The second measure was level of meaningful participation in the home; 3 questions focused on a student's perception of his or her contributions to family life. Finally, 2 questions from the parenting style measurement instrument based on an instrument developed by Steinberg et al,[37] were used to assess the third measure, level of parental supervision. In our analyses, participants were classified into 2 groups: low supervision, compared with medium, or high supervision.

Relationships with friends were assessed using 2 measures. One referred to the level of social support from friends. It is a scale that measures if students think they benefit from significant support from their friends.[36,38] The second measure uses questions to determine the degree to which

a participant's friends have prosocial behaviours.[36,38] Again, in our analyses, scores were treated as dichotomous covariables, with values corresponding to low, compared with medium, or high scores.

Statistical Analyses

The 17 565 QHSHSS participants who reported using drugs in the past year were included in the analyses. For each variable, weighted proportions were estimated and their 95% confidence intervals were calculated using the bootstrap confidence intervals method based on the empirical distribution of the estimates.[39] Bivariate analyses were performed for each explanatory variable and NMUPM. Interactions between sex and mental health covariates were also examined. Then analyses were carried out for each specific domain, where variables within each domain were analyzed together. Second, significant variables within each domain subanalyses were then considered in a backward-stepwise regression model, with a *P* value of 0.05 or less to stay in the model controlling for sex. SUDAAN software[40] was used to perform the analyses.

Results

Among the 17 565 participants who had used drugs, 847 participants reported they had used a medication without a prescription for an effect, for a weighted proportion of 5.4% (95% CI 4.9% to 6.0%). There was no difference between boys 5.5% (95% CI 4.8% to 6.2%) and girls 5.3% (95% CI 4.5% to 6.3%). The most popular class of medications was stimulants (2.7%), followed by opioids (1.9%), sedatives, hypnotics, and other tranquilizers (1.1%), and other drugs (0.1%) (for examples, antiinflammatory drugs).

Table 1 shows the distribution of all covariates, and comparisons between boys and girls. Almost one-third of the youth (31.9%) reported regular alcohol use in their lifetime and 45.8% of youth reported using more than 1 illicit drug in the previous 12 months. ADDs with or without hyperactivity were reported by 17.7% of the sample, while the presence of anxiety and depression was reported by 12.2% and 9.2%, respectively. One-quarter of participants had low global self-efficacy (25.5%) and a similar proportion had low self-esteem (22.7%). More than one-third of the sample had low self-control. Although one-third of the sample reported low parental supervision, only a minority said they had low support from their families. Few youth found that they had low support from their friends or that their friends had low prosocial behaviours. Except for family support, there are substantial differences between boys and girls.

Results of bivariate analyses and domain-specific multivariate logistic regression models are presented in Table 2. The final multivariate model presented in Table 3 shows that participants with some mental health problems, as well as some self-competency and parental characteristics, were more likely to report NMUPM. These include ADDs (AOR 1.47; 95% CI 1.13 to 1.91) and anxiety disorders

(AOR 2.14; 95% CI 1.57 to 2.92), low self-esteem (AOR 1.62; 95% CI 1.26 to 2.08) and low self-control (AOR 1.95; 95% CI 1.55 to 2.45), and low parental supervision (AOR 1.43; 95% CI 1.11 to 1.83). Regular alcohol use (AOR 1.72; 95% CI 1.36 to 2.16) and polysubstance use (AOR 4.09; 95% CI 3.06 to 5.48) also increased the odds of reporting NMUPM.

Discussion

In our study, we examined the prevalence and key correlates of NMUPM among Quebec adolescents who reported using drugs. The observed prevalence of NMUPM (5.4%) is lower than that reported in adolescents of the same age who, unlike our sample, had not all necessarily used drugs in the past year. In Canada, according to the Youth Smoking Survey 2010–11, 8.2% reported any NMUPM in the previous year.[10] Further, in that study, opioids were the most often used prescription medication (14% of respondents, compared with 4.1% for stimulants and 1.9% for tranquilizers). In our study, stimulants were the most popular, followed by opioids. Several factors could explain these differences. A first hypothesis is based on the results of a recent study[41] on prescription opioid analgesics dispensing in Canada, which showed that dispensing patterns varied among provinces, particularly because of regulatory frameworks. This could explain, at least in part, the differences observed in prevalence of NMUPM and class of medications used. It is also possible that patterns of use of nonmedical prescription medications vary depending on whether youth use drugs (our study sample). Indeed, young drug users may be using drugs to achieve effects that may differ from those sought by the other youth: in the first case, use of prescription medication is often for a specific purpose, such as to relieve the negative effects of drugs or to boost the pleasant effects.

Sex differences observed among participants regarding the prevalence of several correlates is similar to what we know in the general adolescent literature. For instance, boys were more likely to have ADDs, while girls were more likely to have anxiety and depression.[42,43] Controlling for sex, our results reveal that, in adolescents who have used drugs, NMUPM is associated with several factors that suggest personal and environmental vulnerability. Low self-esteem and low self-control were found to be positively associated with NMUPM. The links between NMUPM and these characteristics have not yet been thoroughly documented. However, the results are consistent with the theory that those characteristics are dispositional factors showing a propensity to engage in risk taking.[44] As for family environment, our results are coherent with Ford,[45] who found that adolescents with strong bonds to parents were less likely to report NMUPM. In fact, similar to low self-esteem and low self-control, low parental supervision could foster risk taking, including the possibility of using medications stored in family medicine cabinets. Note that together, these factors separate young people who engage in

Table 1 Characteristics of participants having used psychoactive substances in the previous 12 months (*n* = 17 565)

Characteristics	Total		Male		Female		
	n (%)	95% CI	n (%)	95% CI	n (%)	95% CI	P
Substance use							
Lifetime regular alcohol use	5708 (31.9)	30.7 to 33.1	3285 (35.0)	33.4 to 36.6	2423 (28.5)	26.8 to 30.3	<0.001
Number of illicit drugs used (≥2)	7737 (45.8)	44.5 to 47.2	3723 (43.1)	41.5 to 45.0	4014 (48.7)	46.9 to 50.5	<0.001
Mental health							
Attention-deficit disorder with or without hyperactivity	2878 (17.7)	16.8 to 18.8	1760 (20.7)	19.4 to 22.1	1118 (14.5)	13.3 to 15.9	<0.001
Anxiety disorder	2045 (12.2)	11.5 to 12.9	714 (8.0)	7.2 to 8.9	1331 (16.7)	15.5 to 18.0	<0.001
Depression	1427 (9.2)	8.5 to 9.9	564 (7.3)	6.4 to 8.2	863 (11.3)	10.2 to 12.5	<0.001
Social competency							
Low self-esteem	3717 (22.7)	21.8 to 23.7	1420 (16.9)	15.7 to 18.3	2297 (29.0)	27.5 to 30.5	<0.001
Low self-control	6166 (37.7)	36.6 to 38.9	3387 (39.5)	38.0 to 41.3	2779 (35.7)	34.1 to 37.5	0.001
Low self-efficacy	4238 (25.5)	24.5 to 26.6	1821 (21.6)	20.3 to 22.9	2417 (29.9)	28.4 to 31.5	<0.001
Family domain							
Low parental supervision	6176 (37.7)	36.5 to 38.9	3567 (42.1)	40.4 to 43.7	2609 (32.8)	31.4 to 34.4	<0.001
Low social support	777 (4.6)	4.1 to 5.2	378 (4.4)	3.8 to 5.1	399 (4.8)	4.1 to 5.6	0.39
Low participation in family life	2948 (18.4)	17.5 to 19.5	1383 (16.8)	15.6 to 18.1	1565 (20.2)	18.9 to 21.7	<0.001
Peer domain							
Low social support and affection from friends	620 (3.5)	3.1 to 4.0	434 (4.8)	4.1 to 5.4	186 (2.1)	1.7 to 2.6	<0.001
Low prosocial behaviours	613 (3.6)	3.1 to 4.0	447 (5.0)	4.3 to 5.8	166 (2.0)	1.6 to 2.4	<0.001

NMUPM from those who do not, even in a sample of youth who reported having used drugs.

Study participants who reported ADDs and anxiety disorders diagnosed or confirmed by a doctor or other health professional were more likely to endorse NMUPM. There is a dearth of literature on the relation between anxiety and NMUPM among adolescents. According to a Mississippi study[46] of 6790 youth in grades 6 to 12 enrolled in public schools, young people with symptoms consistent with anxiety disorders were more likely to report lifetime NMUPM. While they were unable to verify this hypothesis, the authors suggest that these young people were engaging in NMUPM to self-medicate. As for hyperactivity, in Canada, self-medication seems to play an important role. According to a 2002 Student Drug Use Survey carried out in the Atlantic Provinces, 26% of the adolescents who had prescriptions for methylphenidate had given or sold some of their pills.[47] Further, self-reported ADHD symptoms were found to be associated with the nonmedical use of methylphenidate and its diversion. We should underline that in our study, questions about mental health concerned diagnoses confirmed by professionals and not symptoms; therefore, respondents who reported problems were or had been in contact with the health system. In short, what emerges from the literature and our study results is that NMUPM is at least partly linked to mental health problems

in adolescents, problems that are either underdiagnosed or suboptimally treated.

Our finding that regular alcohol and polysubstance use increase the odds of reporting NMUPM is not unexpected. In a recent systematic review, 3 US-wide representative studies (National Survey on Drug Use and Health, Monitoring the Future, and the National Survey of Adolescents—Replication) and 6 non-nationally representative studies found positive associations between NMUPM and other illicit drug use.[28] Our work adds to this body of evidence. It demonstrates that among adolescents who reported using at least one drug in the past year, NMUPM is associated with possibly problematic co-use of alcohol or several illicit drugs during the same period. However, those young people's patterns of co-usage are not known. Studies are needed to examine where use of medications fits in the process of initiation to substance use and in substance use patterns involving combinations.

Our study results need to be considered in light of the following limitations. First, it is possible that some youth did not recognize the names of medications presented as examples or did not report the use of other medications than the examples proposed. This would underestimate the extent of NMUPM in the sample. The difficulty of accurately assessing NMUPM and even problems of inconsistency between studies in the wording of questions

Table 2 Domain-specific analyses of correlates of nonmedical use of prescription medication

Characteristics	Bivariate analyses OR (95% CI)	Multivariate analyses[a] OR (95% CI)
Sex, male	1.03 (0.83 to 1.28)	n/a
Substance use		
Lifetime regular alcohol use	2.50 (2.02 to 3.09)	1.88 (1.50 to 2.35)
Number of illicit drugs used (≥2)	6.01 (4.54 to 7.95)	5.30 (3.97 to 7.08)
Mental health		
Attention-deficit disorder with or without hyperactivity	2.34 (1.86 to 2.94)	1.74 (1.36 to 2.22)
Anxiety disorder	3.13 (2.38 to 4.10)	2.00 (1.46 to 2.74)
Depression	3.57 (2.69 to 4.73)	2.31 (1.69 to 3.16)
Social competency		
Low self-esteem	2.39 (1.92 to 2.99)	1.91 (1.51 to 2.41)
Low self-control	2.98 (2.37 to 3.74)	2.69 (2.12 to 3.40)
Low self-efficacy	1.76 (1.43 to 2.17)	1.14 (0.90 to 1.43)
Family domain		
Low parental supervision	2.30 (1.82 to 2.89)	2.01 (1.59 to 2.55)
Low social support	2.39 (1.62 to 3.53)	1.46 (0.96 to 2.20)
Low participation in family life	2.17 (1.77 to 2.67)	1.67 (1.34 to 2.08)
Peer domain		
Low social support and affection from friends	2.29 (1.46 to 3.60)	1.95 (1.21 to 3.16)
Low prosocial behaviours	2.92 (2.04 to 4.20)	2.64 (1.80 to 3.87)

[a] Controlling for variables within each domain

n/a = not applicable

Table 3 Final multivariate analyses of correlates of nonmedical use of prescription medication

Characteristics	Multivariate analyses OR (95% CI)
Sex	
Female	1.0 (Reference)
Male	1.16 (0.91 to 1.48)
Lifetime regular alcohol use	1.72 (1.36 to 2.16)
Number of illicit drugs used (≥2)	4.09 (3.06 to 5.48)
Attention-deficit disorder with or without hyperactivity	1.47 (1.13 to 1.91)
Anxiety disorder	2.14 (1.57 to 2.92)
Low self-esteem	1.62 (1.26 to 2.08)
Low self-control	1.95 (1.55 to 2.45)
Low parental supervision	1.43 (1.11 to 1.83)

to assess NMUPM has been previously raised.[28] This calls for more efforts to improve validity and reliability of NMUPM assessment tools. Second, the potential impact of desirability bias is always a concern in studies that are based on self-reported data. However, this bias is less likely, as the subsample already reported having used illicit drugs. Finally, the study was cross-sectional, which makes it impossible to examine temporal links between variables and to determine whether causal relations are plausible.

Conclusion

Our study allowed us to estimate the prevalence of NMUPM among adolescents who reported using drugs and to identify some associated factors. Our research emphasizes that it is important for clinicians to identify substance use for recreational or self-medicating purposes, including NMUPM in adolescents with mental health problems, especially regular or abusive use that can exacerbate or even hasten the onset of mental health problems. In addition, the risks of polysubstance use should be assessed for young people who take medications for nonmedical purposes, especially when they mix several substances, as this can have serious immediate health consequences. Schools might have a role in the prevention of NMUPM. In their review

of the literature, Griffin and Botvin[48] and Hodder et al[49] highlighted the use of school-based prevention programs focused on skills (that is, social skills or self-regulation) and resilience training in adolescents as effective prevention strategies for drug use. Parents should also be made aware of the issue to ensure that medications are stored safely at home.

Acknowledgements

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