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Résumé

La consommation de drogues illicites chez les étudiants canadiens du premier cycle

Edward M. Adlaf, Louis Gliksman, Andrée Demers et Brenda Newton-Taylor

Cette recherche vise à identifier les taux et les pratiques de consommation de drogues illicites chez les étudiants canadiens du premier cycle, à les comparer à ceux de la population non universitaire et à décrire les tendances concernant la consommation de drogues chez les étudiants du premier cycle dans la province d'Ontario, entre 1988 et 1998. Une enquête postale a été menée à l'échelle nationale, selon une méthode à échantillonnage stratifié exécutée en deux étapes. L'échantillonnage comprenait 7800 étudiants canadiens du premier cycle, de 16 universités (52 % de répondants admissibles). Environ 47,5 % ont dit avoir consommé une drogue illicite au cours de leur vie, 29,6 % l'ayant consommée au cours des 12 derniers mois et 18,7 % depuis le début de l'année scolaire. Le cannabis était de loin la drogue la plus consommée (47,0 %, 28,7 % et 18,2 %, respectivement). Un grand nombre d'associations liées à l'appartenance sexuelle et au facteur géographique se sont avérées les mêmes que celles relevées dans les enquêtes ciblant la population générale. Les comparaisons à des pairs non universitaires n'ont pas révélé des taux particulièrement élevés chez les étudiants universitaires. Parmi les étudiants ontariens du premier cycle, les taux de consommation de cannabis, d'hallucinogènes, de méthamphétamines, de crack et d'héroïne sont demeurés stables entre 1988 et 1998. La consommation de la cocaïne a diminué, passant de 4,8 % à 1,7 %. Les taux de consommation de drogues illicites n'étaient pas beaucoup plus élevés que ceux relevés chez la population non universitaire. D'autres questions de santé publique, tels que la consommation abusive d'alcool et les problèmes de santé mentale, sont plus pressantes que celles liées à la consommation de drogues illicites.

Mots clés : consommation de drogues illicites, étudiants du premier cycle, Canada, enquête

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Illicit Drug Use Among Canadian University Undergraduates

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The purpose of this study was to examine rates and patterns of illicit drug use among Canadian university undergraduates, to compare these rates with those for non-university samples, and to describe drug-use trends among university undergraduates in the province of Ontario between 1988 and 1998. A national mail survey was carried out based on a stratified 2-stage sample design. The sample comprised 7,800 Canadian undergraduates from 16 universities (52% of eligible respondents). Approximately 47.5% reported use of an illicit drug during their life, 29.6% in the previous 12 months, and 18.7% since the beginning of the academic year. Cannabis was by far the most widely used drug (47.0%, 28.7%, and 18.2%, respectively). Many of the gender and regional associations were similar to those found in general-population surveys. Comparisons to non-university peers did not indicate elevated rates among university students. Among Ontario university undergraduates the use of cannabis, hallucinogens, methamphetamines, crack, and heroin remained stable between 1988 and 1998. The use of cocaine declined from 4.8% to 1.7%. Rates of illicit drug use were not appreciably higher than those among their non-university peers. Other public-health issues, such as heavy drinking and poor mental health, override those related to illicit drug use.

Keywords: illicit drug use, undergraduates, university students, Canada, survey

The university campus is a physical and social environment conducive to elevated health-risk behaviours, including heavy drinking (Gliksman, Newton-Taylor, Adlaf, & Giesbrecht, 1997; Wechsler, Dowdall, Maenner, Gledhill-Hoyt, & Lee, 1998) and cigarette smoking (Gfroerer, Greenblatt, & Wright, 1997). There is reason to speculate that rates of illicit drug use would also be elevated, given the new-found freedom of campus life coupled with the finding that young adults report the highest rates of illicit drug use (Poulin, 1997; Substance Abuse and Mental Health Services Administration, 1999).

The prevalence and pattern of health behaviours such as illicit drug use have important implications for the nursing profession. First, decreasing the rate of illicit drug use, especially among young adults, has been identified as a key health objective of the Healthy People 2010 target (US Department of Public Health and Human Services, 2000). This target is that no more than 3% of adults aged 18 and older will have used

an illicit drug within a 1-month period. In Canada, the most recent available estimates are for Ontario adults, about 6% of whom report monthly use of marijuana (Adlaf & Ialomiteanu, 2001). Second, for those working with young adults, the co-occurrence of illicit drug use and other conditions such as mental illness can complicate diagnosis, intervention, and treatment. Finally, illicit drug use and other health-related behaviours have become more dominant in nursing education (Floyd, 1991; Hayes, 2002; Ott & Haertlein, 2002) and in the field of student services (Thorne, 1996).

There are three key epidemiological issues regarding illicit drug use among university students: prevalence, rates compared to those among their non-university peers, and trends. The first prerequisite in evaluating illicit drug use among university students is to establish prevalence, preferably based on large, multi-campus, representative samples. As mentioned, prevalence estimation is especially relevant in this population because young adults tend to have the highest rates of illicit drug use (Substance Abuse and Mental Health Services Administration, 1999). The longest study of drug use among university students is derived from follow-up samples of the US Monitoring the Future (MTF) study — specifically, high-school graduates 1 to 4 years past high school who are enrolled full-time in a 2-year or 4-year program (Johnston, O'Malley, & Bachman, 2002). In addition, national campus-based surveys conducted by researchers at Harvard University (Campus Alcohol Survey – CAS) have recently been established. These American national surveys (Gledhill-Hoyt, Lee, Strote, & Wechsler, 2000; Wechsler et al., 1998) have found that over one third of college undergraduates used an illicit drug during the previous year (37.9% MTF2001); about one third used cannabis (35.6% MTF2001; 27.4% CAS99) and about one in eight used an illicit drug other than marijuana (16.4% MTF2001; 12.5% CAS99). Generally, use of drugs other than marijuana or hallucinogens does not exceed 5%. Although cross-national comparisons are limited, these American rates appear to be higher than those for university undergraduates in other countries such as Austria (lifetime use estimated at 41% for any drug and 37% for marijuana; Mangweth, Pope, Ionescu-Pioggia, Kinzl, & Biebl, 1997) and Spain (previous-year use estimated at 16.7% for any drug and 13.3% for cannabis; Martinez, Carmen Del Rio, Lopez, & Alvarez, 1999). Although a handful of single- or multi-campus studies have been conducted in Canada (Caleekal-John & Goodstadt, 1983; Gliksman et al., 1997; Mathieson, Faris, Stam, & Egger, 1992; Spence & Gauvin, 1996), there has never been a national probability survey of Canadian university students to assess the extent of illicit drug use.

Although behaviours such as drug use are multi-causal, a few key factors have been identified. First, general demographic factors such as

sex, age, and region remain significant predictors of drug use among post-secondary undergraduates, just as they do in the general population (Bell, Wechsler, & Johnston, 1997; Gledhill-Hoyt et al., 2000; Johnston, O'Malley, & Bachman, 1999). However, one of the most robust factors is living arrangement. Generally, students living at home with family report the lowest rates of use and those living in fraternities or sororities the highest (Bell et al.; Gfroerer et al., 1997; Gledhill-Hoyt et al.; Gliksman, Newton-Taylor, Adlaf, DeWit, & Giesbrecht, 1994).

The second key issue centres on population differences. This matter is particularly important for prevention and intervention programming both on campuses and in high schools. For example, historically drug-use diffusion has changed with time in the United States. In the 1960s illicit drug use was generally first adopted among university youths and diffused to younger populations. However, in the resurgence of drug use in the 1990s it appears that many drugs have been first adopted by high-school students and diffused upward to university students (O'Malley & Johnston, 2002). Although internationally the evidence is scanty, American data have been quite consistent in showing rates of illicit drug use to be generally lower among university students than their non-university peers. For example, the 1998 MTF follow-up showed that use of about six of 15 drugs (any illicit drug excluding marijuana, LSD, cocaine, amphetamines, barbiturates, and tranquillizers) during the previous year was notably lower among university respondents than similarly aged non-university respondents (Johnston, O'Malley, & Bachman, 2000b). A recent synthesis of these data shows that the largest differences between university and non-university respondents are in cocaine use (O'Malley & Johnston). These simple comparisons, however, have been tempered by findings indicating substantial variation in drug use among subgroups of both university and non-university respondents. For example, pooled data for the years 1991 to 1993 from the US National Household Survey on Drug Abuse (Gfroerer et al., 1997) show that although previous-month marijuana use was 12.4% among university students versus 13.8% among non-university students, use among university students varied from 8.4% (those living with parents) to 16.3% (those not living with parents) and use among non-students varied from 12.4% (high-school graduates living with parents) to 18.6% (high-school dropouts living with parents). Logistic regression analyses based on educational status and living arrangement did not reveal a significant difference between university students and non-university high-school graduates in previous-month marijuana use (OR = .88; 12.4% vs. 12.4%); however, this comparison was significant for previous-month cocaine use (OR = .43; 1.0% vs. 2.2%). Thus, although variation in drug use exists in both university and

non-university populations, the data typically show higher rates of use among non-university respondents.

The third key epidemiological issue is trends in drug use. Results from the MTF sample show large declines in illicit drug use during the 1980s. For example, the prevalence of previous-year use of any illicit drug dropped from 56% in 1980 to 29% in 1991. This downward trend was also noted in several other American college samples (Meilman, Gaylor, Turco, & Stone, 1990). Since 1991, illicit drug use has increased, rising to 38% in 2001. The upward trend was recently documented in a national campus survey (Gledhill-Hoyt et al., 2000). However, this trend in drug use is part of a widespread secular change among high-school students (Adlaf, Paglia, Ivis, & Ialomiteanu, 2000; Johnston, O'Malley, & Bachman, 2000a) and others not attending college (Johnston et al., 1999).

While trends in illicit drug use among university students seem consistent and well-documented for the United States (Gledhill-Hoyt et al., 2000; Johnston et al., 1999), this is not the case internationally. Indeed, few international studies are available across time, and those that are available are often restricted to single-campus or regional samples. For example, survey results from a single university in Spain found a similar downward trend in past-year illicit drug use between 1984 (22%) and 1990 (15.6%) but no significant resurgence in the mid-1990s (16.7% in 1994) (Martinez et al., 1999). Campus surveys in the United Kingdom have suggested increases in cannabis use among university students, but national trends are available mostly for universities with medical faculties (Webb, Ashton, Kelly, & Kamali, 1996, 1997). In sum, international trend data on drug use among university students remain underdeveloped.

The purpose of this paper is three-fold. First, we describe the prevalence of illicit drug use among Canadian university undergraduates surveyed in 1998 and evaluate several risk factors; second, we assess secular trends in drug use among samples of Ontario undergraduates surveyed in 1988, 1993, and 1998; and third, we briefly compare rates of drug use between our university sample and samples derived from other youthful populations.

Methods

CCS Sample

The 1998 Canadian Campus Survey (CCS) employed a stratified two-stage cluster selection of students enrolled in full-time undergraduate studies at accredited universities during the 1998/99 academic year. (In Canada the post-secondary school system consists of colleges — diploma-granting institutions typically for applied-skill training — and

universities — publicly funded degree-granting institutions.) In 1998, the Canadian university system was represented by almost 50 universities with almost 450,000 full-time undergraduates. The sampling frame consisted of 49 universities (defined as administrative sites — i.e., affiliates of large universities in different geographical locations were treated as separate sampling units). The sample was stratified into five regions: British Columbia; Prairies (Manitoba, Saskatchewan, and Alberta); Ontario; Québec; and Atlantic Provinces (Newfoundland, Prince Edward Island, Nova Scotia, and New Brunswick). Four universities per region were selected with probability proportional to size. Presidents of selected universities were solicited for their approval to survey students and to provide the necessary postal information. Sixteen of the 23 universities approached agreed to participate. Within each university, 1,000 students were randomly selected with equal probability regardless of year or field of study.

A total of 16,000 questionnaires were mailed, of which 15,188 were deemed eligible mailings (non-eligibles included incomplete and foreign addresses). Four mailings (a questionnaire, a reminder card, a second questionnaire, and a second reminder card) were made during a 5-week period beginning on October 20, 1998. Returned questionnaires were accepted until December 15, 1998. To enhance the response rate, lottery incentives were offered. A total of 7,800 eligible and useable completions were returned, for a 51% completion rate. The 7,800 students in the sample represented about 442,000 Canadian undergraduates.

One means of evaluating the potential bias caused by non-response is to compare the responses of those who respond early with the responses of those who respond late (Henry, 1990). Although such call-back analysis does not fully resolve the non-response problem, given that it assumes that non-responders resemble late responders, it can still provide useful information (Lohr, 1999). This comparison revealed few differences between early and late responders. Although some alcohol measures differed by response time, none of the factors used in this analysis (i.e., gender, year of study, residence, region, and illicit drug use) differed significantly by response time. As well, available comparisons between the CCS sample and a subsample of 1,000 post-secondary respondents derived from Canada's national health survey (i.e., 1996 National Population Health Survey) revealed no significant differences for sex, age, cigarette use, and frequency of alcohol use (comparisons of illicit drug use are not available). Earlier research based on this population also found no significant differences between responders and non-responders on demographic and drug-use measures (Gliksman, Smythe, & Engs, 1992).

The demographic data and weighted percentages are as follows: *sex* — men, 2,884 (45.6%); women, 4,916 (54.4%); *region* — BC, 1,795 (9.8%); Prairies, 1,467 (18.4%); Ontario, 1,277 (40.5%); Quebec, 2,306 (22.5%); Atlantic, 955 (8.8%); *year of study* — first, 1,903 (25.9%); second, 1,910 (25.3%); third, 2,044 (25.4%); fourth, 1,943 (23.4%); *living arrangement* — university residence, 1,254 (15.3%); off-campus with parents, 3,433 (48.0%); off-campus not with family, 3,072 (36.7%).

Ontario Samples, 1988, 1993

To assess trends, we also used surveys of Ontario university undergraduates conducted in 1993 and 1988 (Gliksman, Engs, & Smythe, 1989; Gliksman et al., 1994). The 1993 survey employed stratified two-stage probability sampling to select 14,000 full-time students from seven Ontario universities. In the first stage of selection, four universities were selected with probability proportional to size, while three self-representing universities (chosen because of their involvement in an independent community-based study) represented the second strata. In the second stage of selection, 2,000 students were randomly selected with equal probability within each of the selected universities. Within each university the 2,000 students were equally allocated among the four academic years (n = 500). One of the four universities representing the first strata chose not to participate at a late stage in the fieldwork and could not be replaced; consequently, only 12,000 students from six universities were mailed questionnaires. In January 1993 the students were mailed a package that included an introductory letter, a questionnaire with a pre-stamped return envelope, coupons for pizza discounts, and a coded, pre-stamped return card. Overall, 5,954 questionnaires were returned, representing a completion rate of 52.9% (280 questionnaires were undeliverable).

The 1988 study surveyed 4,911 students from four Ontario universities; in this study, however, universities were purposively chosen to represent both urban and rural locations and four geographic regions in the province. Although universities were not randomly selected, 4,000 students were randomly selected from enrolment information within each university (1,000 per year of study). In September 1988 students were mailed a package consisting of an introductory letter, a questionnaire, and a self-addressed envelope. Two weeks later, reminders were sent to students with mailboxes and advertisements were placed in university newspapers reminding students to return questionnaires. Of the 13,014 eligible questionnaires (186 of the 13,200 were undeliverable), a total of 4,911 (38%) useable surveys were returned. Regarding the Ontario university population, it is important to note that enrolment in Ontario universities represents approximately 40% to 45% of the national enrolment.

Measures

The 16-page CCS questionnaire contained a total of 320 scan-coded items and assessed a range of issues including alcohol use and abuse, illicit drug use, and other health behaviours. Substance use was measured using the question "When was the last time, if ever, that you tried the following drugs?" The possible responses were "(1) never in life, (2) in life, but not in past 12 months, (3) in past 12 months but not since September, (4) since September." The list of drugs included cannabis, heroin, methamphetamines, powder cocaine, crack cocaine, LSD, hallucinogens, anabolic steroids, and MDMA (ecstasy). For prevalence of drug use, we present the percentage reporting use at least once during lifetime, during the 12 months preceding the survey, and during the period commencing in September. Other illicit drug use refers to the use of at least one of seven drugs (heroin, methamphetamines, cocaine, crack, LSD, hallucinogens, and MDMA). Drug-use estimates derived from the 1988 and 1993 Ontario samples were restricted to previous-12-months prevalence.

For descriptive purposes, we restrict attention to four subgroup factors previously identified as important predictors of drug use (Gfroerer et al., 1997; Gledhill-Hoyt et al., 2000; Wechsler et al., 1998): sex (male, female); year of study (first through fourth); living arrangement (university housing; off-campus with family, off-campus not with family); and region (British Columbia, Prairies, Ontario, Quebec, Atlantic).

Our analysis employs Taylor linearization methods available in *Stata* (StataCorp, 1999) in order to ensure proper variance estimation for weighted complex sampling (Korn & Graubard, 1999). Any percentage less than 0.6% for the total sample (based on a coefficient of variation exceeding 15.0) was suppressed due to unreliability. Subgroup analyses were conducted by gender, year of study, living arrangement, and region. Adjusted odds ratios (OR) were based on logistic regression models and the significance of group effects was determined by adjusted Wald statistics (Korn & Graubard).

We also make selected comparisons of our CCS data with three samples. The first is a 1998 sample of 1,440 American full-time college students drawn from the national MTF study (Johnston et al., 1999). The second is based on data from senior high-school students (Grade 13) derived from the 1997 and 1999 Ontario Student Drug Use Survey (Adlaf et al., 2000). The third is a 1998 general-population survey of Ontario adults aged 18 to 29 derived from the Ontario Drug Monitor (Adlaf, Paglia, & Ialomiteanu, 1999). These samples were chosen because they were fielded in 1998 and contain items of similar measurement.

Table 1 ***Percentage Reporting Use of Illicit Drug — CCS, 1998 (n=7,800)***

Drug	Lifetime %	Lifetime 95% CI	Past 12 Months %	Past 12 Months 95% CI	Since September %	Since September 95% CI
Any drug	47.5	(42.6–52.5)	29.6	(26.5–32.8)	18.7	(16.5–21.1)
Cannabis	47.0	(42.1–51.9)	28.7	(25.6–31.8)	18.2	(15.7–20.6)
Other illicit drugs						
Heroin	0.7	(0.2–1.1)	*		*	
Methamphetamines	5.8	(4.7–6.9)	1.8	(1.4–2.1)	0.8	(0.4–0.9)
Powder cocaine	5.1	(3.9–6.4)	1.6	(1.3–2.0)	0.6	(0.3–0.9)
Crack ccocaine	0.9	(0.7–1.2)	*		*	
LSD	12.4	(9.9–14.9)	1.8	(1.2–2.5)	0.5†	(0.3–0.8)
Hallucinogens	19.6	(16.4–22.7)	8.2	(6.8–9.7)	3.0	(2.2–3.8)
Ecstasy (MDMA)	4.2	(3.1–5.3)	2.4	(1.4–3.3)	1.2	(0.7–1.8)

* Data suppressed due to unreliability; † caution: percentage is unstable.

Results

As shown in Table 1, 47.5% of students reported use of an illicit drug at least once in their life, 29.6% during the previous 12 months, and 18.7% since the beginning of the academic year. Cannabis is by far the most widely used (47.0% during lifetime, 28.7% during past year, and 18.2% since September). The next most prevalent substance is hallucinogens, with LSD being used by 12.4% during lifetime, 1.8% during past year, and less than 1% since September, and other hallucinogens such as mescaline and psilocybin being used by 19.6% during lifetime, 8.2% during past year, and 3.0% since September. With the exception of cannabis, rates of illicit drug use during the since-September period do not exceed 3%. The percentage reporting any injection-drug use during their lifetime was 2.3% (95% CI, 1.8–2.9%) (data not tabled). Subgroup estimates were too small for further analysis.

Table 2 shows rates of past-year and since-September cannabis use by sex, year of study, living arrangement, and region. As noted, only living arrangement and region have significant effects. Holding other factors constant, those not living with parents are about one and one half times more likely than those living with parents to have used cannabis. Also notable is the fact that these differences increase in magnitude for the

since-September period. Regionally, the effect-coded contrasts show that, compared to the national average, the prevalence of past-year and since-September cannabis use is highest in Quebec (OR = 1.31 and 1.43, respectively) and lowest in the Prairie provinces (OR = 0.82 and 0.70, respectively). The remaining regions do not differ significantly from the average. Gender and year of study are not significantly related to either outcome.

Table 2 ***Percentage Reporting Cannabis Use in Past Year and Since September, by Gender, Year of Study, Living Arrangement, and Region — CCS, 1998***

	Past 12 Months			Since September		
	%	95% CI	Adjusted OR	%	95% CI	Adjusted OR
Total	28.7	(25.6–31.8)		18.2	(15.7–20.6)	
Gender	ns			ns		
Men	29.6	(27.4–32.0)	1.09	19.8	(18.0–21.8)	1.23
Women	28.0	(24.1–32.3)	—	16.8	(13.7–20.5)	—
Year of Study	ns			ns		
First	29.3	(26.6–32.1)	—	18.8	(16.7–21.1)	—
Second	31.5	(26.8–36.7)	1.11	19.3	(16.7–22.2)	1.04
Third	28.2	(26.0–30.5)	0.95	18.2	(16.4–20.1)	0.97
Fourth	25.7	(20.8–31.3)	0.87	16.3	(11.7–22.3)	0.9
Living Arrangement	***			***		
University housing	35.8	(31.2–40.7)	1.59***	24.3	(21.1–27.9)	1.75***
Off-campus with family	24.7	(21.7–28.0)	—	14.5	(12.3–17.0)	—
Off-campus not with family	31.2	(28.5–34.0)	1.38**	20.7	(18.0–23.4)	1.52**
Region	*			*		
British Columbia	30.3	(21.2–40.8)	1.11	18.8	(11.6–29.0)	1.09
Prairies	24.1	(21.3–27.2)	0.82*	12.8	(9.8–16.6)	0.70*
Ontario	27.2	(21.0–34.4)	0.93	17.1	(12.8–22.9)	.90
Quebec	35.6	(31.0–40.5)	1.31**	24.7	(21.5–28.3)	1.43**
Atlantic	26.5	(26.5–26.5)	0.9	17.3	(16.2–18.3)	0.97

Notes: *$p < .05$; **$p < .01$, ***$p < .001$, ns = not significant; group effects are based on adjusted Wald statistics; reference groups are women, first year, off-campus with family; effect-coded reference group for region is Ontario.

Table 3 ***Percentage Reporting Illicit Drug Use[1] in Past Year and Since September, by Gender, Year of Study, Living Arrangement, and Region — CCS, 1998***

	Past 12 Months			Since September		
	%	95% CI	Adjusted OR	%	95% CI	Adjusted OR
Total	10.2	(8.5–11.7)		4.2	(3.2–5.1)	
Gender	*			*		
Men	11.7	(10.1–13.7)	1.35*	5.2	(4.5–6.0)	1.59
Women	8.9	(7.2–11.0)	—	3.3	(2.5–5.0)	—
Year of Study	ns			ns		
First	12.1	(9.3–15.7)	—	4.5	(2.8–7.2)	—
Second	9.6	(8.1–11.4)	0.74**	4.7	(3.1–6.8)	0.96
Third	10.1	(7.9–13.0)	0.76	4.0	(2.9–5.6)	0.81
Fourth	8.9	(6.4–12.0)	0.63**	3.4	(2.7–4.3)	0.64
Living Arrangement	***			**		
University housing	13.9	(11.2–17.2)	2.00***	6.1	(3.8–9.8)	2.38**
Off-campus with family	7.4	(6.3–8.6)	—	2.6	(2.1–3.3)	—
Off-campus not with family	12.5	(10.4–14.9)	1.95***	5.4	(3.8–7.7)	2.34**
Region	*			**		
British Columbia	14.3	(9.8–20.5)	1.69**	6.7	(4.4–10.1)	1.92***
Prairies	8.9	(6.9–11.4)	0.95	2.8†	(2.0–3.9)	0.75
Ontario	11.2	(8.3–14.9)	1.17	5.0	(3.3–7.4)	1.0
Quebec	9.4	(8.4–10.4)	0.88	3.3	(3.0–3.7)	0.76
Atlantic	5.9	(5.8–6.0)	0.60***	2.7†	(1.7–4.1)	0.07

[1] Excludes cannabis use; † caution: percentage is unstable; * $p < .05$; ** $p < .01$; *** $p < .001$; ns = not significant; group effects are based on adjusted Wald statistics; reference groups are women, first year, off–campus with family; effect–coded reference group for region is Ontario.

As seen in this table, living arrangement and region are also significantly associated with both past-year and since-September use of illicit drugs other than cannabis. As we found with cannabis use, those not living with parents are about twice as likely to use other illicit drugs than those living with parents. Again, this effect is more noticeable for the since-September period. Regionally, past-year and since-September use of illicit drugs is highest in British Columbia (OR = 1.69, 1.92) and past-year use is below average in the Atlantic provinces (OR = 0.60).

Table 4 ***Sample Comparisons***

	US MTF (College) 1998	US CAS (College) 1999	Ontario High School 1997/99	Ontario Adults 1998
Population	High-school follow-up respondents, 1 to 4 years past high school and registered 0as full-time students in 2- or 4-year college	Full-time undergraduates in a 4-year college (n = 128 colleges)	13th-graders (OAC) derived from province-wide Ontario Student Drug Use Survey	18–29-year-old non-students derived from CAMH Monitor
Age (years)	19–22	23% freshmen; 22% sophomores; 25% juniors; 30% seniors	18.3 (1997); 18.1 (1999)	24.3
Sex (% male)	41	39	46	54
Interview mode	Self-administered mail	Self-administered mail	Self-administered in classroom	Computer-assisted telephone interview
Measures				
Question Stem	"On how many occasions (if any) have you used... in the last 12 months?"	"How often, if ever, have you used any of the drugs listed below?"	"In the past 12 months, how often did you use...?"	"How many times, if any, have you used...during the past 12 months?"
Cannabis	"...marijuana (weed, pot) or hashish (hash, hash oil)"	"Marijuana (or hashish)"	"...cannabis (also known as marijuana, grass, pot, hashish, hash, hash oil)"	"...marijuana or hash"
Crack	"... 'crack' (cocaine in chunk or rock form)"	"Crack cocaine"	"...cocaine in the form of crack"	Not available
Cocaine	"...cocaine in any other form"	"Other forms of cocaine"	"...cocaine (also known as coke, snow, snort, blow)"	"...cocaine"
LSD	"...LSD ('acid')"	"LSD"	"...LSD or 'acid' "	Not available
MDMA		"Ecstasy (MDMA)"	"...MDMA or 'Ecstasy' "	Not available

Table 5 *Percentage Reporting Past-Year Drug Use — CCS Versus Other Populations*

Drug	CCS98	US MTF (College) 1998 (n = 1,440)	US CAS (College) 1999 (n = 13,986)	Ontario 13th-Graders 1997 (n = 917)	Ontario 13th-Graders 1999 (n = 447)	Ontario 18–29-year-olds 1998 (n = 332)
Cannabis	28.7 (25.6–31.8)	35.9	27.4	31.9 (29.7–34.1)	43.3 (29.6–58.1)	25.6 (20.4–31.7)
Cocaine	1.6 (1.3–2.0)	4.6	3.6	2.1 (0.6–3.6)	6.4 (1.8–19.9)	2.7 (1.3–5.8)
Crack	†	1.0	0.9	0.8 (0.1–1.3)	1.1 (0.3–4.1)	na
LSD	1.8 (1.2–2.5)	4.4	3.7	7.1 (3.3–10.9)	6.9 (2.0–21.2)	na
MDMA	2.4 (1.4–3.3)	3.9	4.7	3.9	7.8	na

† Data suppressed due to unreliability; entries in parentheses are 95% CIs; n's might vary due to missing values.

To provide some context for the CSS data, in Tables 4 and 5 we present drug-use comparisons for other populations. In Table 5, the first two columns are based on the US MTF (Johnston et al., 1999) and CAS (Gledhill-Hoyt et al., 2000) samples. The next two are based on surveys of Ontario 13th-graders in 1997 and 1999 (Adlaf, Paglia, & Ivis, 1999). The final column presents estimates based on a general-population sample of Ontario non-students aged 18 to 29 derived from the Ontario Drug Monitor (Adlaf, Paglia, & Ialomiteanu, 1999). Without knowledge of the specific variance and related confidence intervals for all samples, we cannot directly compute statistical tests. Instead, to evaluate sample differences we assess whether estimates of the comparison samples are bounded by the CCS confidence intervals. Table 5 suggests that rates of drug use in the CCS sample rarely exceed rates for other populations. First, rates for past-year use of cocaine, LSD, and MDMA are lower than those among US college students (1.6% vs. 4.6% MTF and 3.6% CAS; 1.8% vs. 4.4% MTF and 3.7% CAS, and 2.4% vs. 3.9% MTF and 4.7% CAS, respectively). The use of other drugs is similar across samples. Second, drug use in the CCS sample is generally lower than that among 13th-graders. Finally, the prevalence of cannabis and cocaine use in the CCS sample is comparable to that among Ontarians aged 18 to 29.

Table 6 ***Trends in Past-Year Illicit Drug Use Among Ontario Undergraduates, 1988, 1993, 1998***

Drug	1988 ($n = 4,911$)	1993 ($n = 5,954$)	1998 ($n = 1,277$)
Cannabis	31.9	27.0 21.7–33.0	27.2 16.2–41.9
Hallucinogens (excluding LSD)	7.7	7.6 4.5–12.8	9.2 4.9–16.8
Cocaine	4.8	2.6 2.3–3.0	1.7 0.8–3.7
LSD	3.2	7.0 4.1–11.8	1.7 0.2–10.5
Crack	†	1.3 1.2–1.5	†
Heroin	†	1.2 1.0–1.4	†
Methamphetamines	1.6	2.0 1.5–2.6	2.1 1.4–3.4

CIs available only for 1993 and 1998; † estimate unstable.

Table 6 presents trends in drug use among Ontario university undergraduates between 1988 and 1998. Three general patterns emerge from these data. First, the use of cannabis, hallucinogens, methamphetamines, and — because of their low prevalence — crack and heroin remained stable. Second, the use of cocaine declined from 4.8% in 1988 to 1.7% in 1998, a finding that corresponds to trends in other populations. LSD, on the other hand, fluctuated (from 3.2% to 7.0% to 1.7%).

Discussion

Our findings should be tempered by the limitations of our study. First, although we did employ methods shown to enhance validity of self-reports such as self-administration (Harrison & Hughes, 1997), we nonetheless consider our estimates to be understated. Second, estimates could be biased due to non-response. Still, as noted earlier, a cursory evaluation of potential non-response bias did not identify any obvious problems. Finally, we intentionally restricted our analysis to key demographic and campus factors and thus ignored other potential factors. These data, however, still provide important findings related to campus public health.

Perhaps one of the most robust findings relates to living arrangement. For all substance-use indicators, those living with family were significantly less likely to report use of any drug. This finding is perhaps one of the most robust in the literature (Bell et al., 1997; Gfroerer et al., 1997; Wechsler et al., 1998). Nonetheless, its interpretation remains ambiguous since we cannot separate selection from causal processes (i.e., whether those seeking normative freedom are drawn to campus residence or whether the campus ecology leads to increased drug-taking). Still, an important implication of this finding is that the influence of living arrangement is similar for illicit and licit drugs. Thus, prevention programs for heavy alcohol use directed towards those living away from family may influence other health behaviours as well.

Our findings regarding region and gender are likely reflections of differences in the general population. The most recent Canadian national substance-use survey, conducted in 1994 (Poulin, 1997), also found higher rates of illicit drug use in British Columbia and lower rates in the Atlantic provinces. Unique to our data is the finding of lower rates of cannabis use in the Prairies and higher rates in Quebec. Evaluation of this regional variation will require more recent estimates. The finding that men are more likely than women to use illicit drugs on campuses is also typical for general-population surveys. For example, the 1994 Canada Alcohol and Other Drug Survey found that men were more likely than women to report past-year use of any illicit drug (10.1% vs. 5.1%), cannabis (10.0% vs. 4.9%), and LSD (1.3% vs. 0.6%) (Poulin). Given that

the gender-related odds ratios were not particularly large in our study, one future research focus would be to evaluate whether gender differences are smaller in university undergraduate populations than in non-university populations.

Although comparison of our CCS estimates to those for other populations is crude, our substantive findings are comparable to the findings of other research. Our findings show that drug use among Canadian university undergraduates is no higher than that among comparably aged respondents in the general population, while other studies have found drug use to be lower among university than non-university respondents (Gfroerer et al., 1997; Johnston et al., 1999, 2002; O'Malley & Johnston, 2002). Although cannabis use is comparable for Canadian and American undergraduates, cocaine use is lower for Canadians, a finding similar to the findings of comparative studies with younger students (Ivis & Adlaf, 1999). Finally, rates of drug use among Canadian university students are generally lower that those among the most senior high-school students, a finding also evident in the US MTF study (Johnston et al., 1999).

Regarding trends, with the exception of cocaine, which showed a decline in use, drug use among Ontario university students displays nominal change compared to that among US university students and Ontario high-school students. For example, both the MTF and CAS samples show an increase in past-year cannabis use between 1993 and 1997/98 (from 27.9% to 35.9% and from 24.0% to 28.0%, respectively) (Gledhill-Hoyt et al., 2000; Johnston et al., 1999). However, the rate remained stable among Ontario university students (27.0% vs. 27.2%). This stability is also interesting given the increase in cannabis use among Ontario 13th-graders, from 21.6% in 1993 to 31.9% in 1997 (Adlaf, Paglia, & Ivis, 1999). This group of students represents a significant proportion of the undergraduate population in Ontario in 1998. One important issue that could not be addressed in our study is the increase in MDMA use, which is more striking in university than in high-school populations (Strote, Lee, & Wechsler, 2002).

Given our findings, then, what are some of the wider implications of illicit drug use on Canadian campuses for public health and for the nursing profession? In our view, the data suggest that other public-health issues override those related to illicit drug use. Indeed, we found that illicit drug use on campuses was typically lower, or did not exceed, the rates for non-university populations. Moreover, unlike the case for tobacco and alcohol, it is well established that most drug users report infrequent use during the prevalence period. Indeed, heavy drinking episodes (i.e., five or more drinks on a single occasion) are far more prevalent among university undergraduates and typically exceed rates found in non-university populations (Gliksman et al., 1994; Johnston et

Gledhill-Hoyt, J., Lee, H., Strote, J., & Wechsler, H. (2000). Increased use of marijuana and other illicit drugs at US colleges in the 1990s: Results of three national surveys. *Addiction, 95*(11), 1655–1667.

Gliksman, L., Engs, R., & Smythe, C. (1989). *The drinking, drug use and lifestyle patterns of Ontario's university students.* Toronto: Addiction Research Foundation.

Gliksman, L., Newton-Taylor, B., Adlaf, E. M., DeWit, D., & Giesbrecht, N. (1994). *University student drug use and lifestyle behaviours: Current patterns and changes from 1988–1993.* Toronto: Addiction Research Foundation.

Gliksman, L., Newton-Taylor, B., Adlaf, E., & Giesbrecht, N. (1997). Alcohol and other drug use by Ontario university students: The roles of gender, age, year of study, academic grade, place of residence and program of study. *Drugs: Education, Prevention and Policy, 4*(2), 117–129.

Gliksman, L., Smythe, C., & Engs, R. (1992). Responders vs. non-responders to a mail survey: Are they different? *Canadian Journal of Program Evaluation, 7,* 131–137.

Harrison, L., & Hughes, A. (Eds.). (1997). *The validity of self-reported drug use: Improving the accuracy of survey estimates.* Rockville, MD: US Department of Health and Human Services.

Hayes, P. (2002). Substance abuse integration in nursing education: An innovative collaborative model. *Substance Abuse, 23*(1), 67–79.

Henry, G. T. (1990). *Practical sampling,* Vol. 21. Newbury Park, CA: Sage.

Ivis, F. J., & Adlaf, E. M. (1999). A comparison of trends in drug use among students in the United States and Ontario, Canada: 1975–1997. *Drugs: Education, Prevention and Policy, 6*(1), 17–27.

Johnston, L. D., O'Malley, P. M., & Bachman, J. G. (1999). *National survey results on drug use from the Monitoring the Future study, 1975–1998. Vol. 2: College students and young adults.* NIH 99-4661. Washington: National Institute on Drug Abuse.

Johnston, L. D., O'Malley, P. M., & Bachman, J. G. (2000a). *Monitoring the future. National survey results on drug use, 1975–1999. Vol. 1: Secondary school students.* NIH 00-4802. Washington: National Institute on Drug Abuse.

Johnston, L. D., O'Malley, P. M., & Bachman, J. G. (2000b). *Monitoring the future. National survey results on drug use, 1975–1999. Vol. 2: College students and adult ages 19–40.* NIH 00-4803. Washington: National Institute on Drug Abuse.

Johnston, L. D., O'Malley, P. M., & Bachman, J. G. (2002). *Monitoring the future. National survey results on drug use, 1975–2001. Vol. 2: College students and adult ages 19–40.* NIH 02-5107. Bethesda, MD: National Institute on Drug Abuse.

Korn, E. L., & Graubard, B. I. (1999). *Analysis of health surveys.* New York: Wiley.

Lohr, S. L. (1999). *Sampling: Design and analysis.* Pacific Grove, CA: Duxbury.

Mangweth, B., Pope, H. G., Ionescu-Pioggia, M., Kinzl, J., & Biebl, W. (1997). Drug use and lifestyle among college students in Austria and the United States. *Substance Use and Misuse, 32*(4), 461–473.

Martinez, J. M., Carmen Del Rio, M. D., Lopez, N., & Alvarez, F. J. (1999). Illegal drug-using trends among students in a Spanish university in the last decade (1984–1994). *Substance Use and Misuse, 34*(9), 1281–1297.

Mathieson, C. M., Faris, P. D., Stam, H. J., & Egger, L. A. (1992). Health behaviours in a Canadian community college sample: Prevalence of drug use and interrelationships among behaviours. *Canadian Journal of Public Health, 83*(4), 264–267.

Meilman, P., Gaylor, M., Turco, J., & Stone, J. (1990). Drug use among college undergraduates: Current use and 10 year trends. *International Journal of Addictions, 25,* 1025–1036.

O'Malley, P. M., & Johnston, L. D. (2002). Epidemiology of alcohol and other drug use among American college students. *Journal of Studies on Alcohol* (Suppl. 14), 23–39.

Ott, C., & Haertlein, C. (2002). Social norms marketing: A prevention strategy to decrease high risk drinking among college students. *Nursing Clinics of North America, 37*(2), 351–364.

Poulin, C. (1997). Illicit drugs. In I. Webster (Ed.), *Canada's Alcohol and Other Drugs Survey 1994: A discussion of the findings* (pp. 61–72). Ottawa: Minister of Public Works and Government Services.

Roberts, R., Golding, J., Towell, T., & Weinreb, I. (1999). The effects of economic circumstances on British students' mental and physical health. *Journal of American College Health, 48*(3), 103–109.

Spence, J. C., & Gauvin, L. (1996). Drug and alcohol use by Canadian university athletes: A national survey. *Journal of Drug Education, 26*(3), 275–287.

StataCorp. (1999). *Stata statistical software: Release 6.0.* College Station, TX: Stata Corporation.

Strote, J., Lee, J. E., & Wechsler, H. (2002). Increasing MDMA use among college students: Results of a national survey. *Journal of Adolescent Health, 30*(1), 64–72.

Substance Abuse and Mental Health Services Administration. (1999). *Summary findings from the 1998 National Household Survey on Drug Abuse.* Rockville, MD: Department of Health and Human Services. Retrieved January 22, 2001, from the World Wide Web: http://www.samhsa.gov/statistics/statistics.html

Thorne, S. (1996). On-campus physicians witnessing changes in medical problems faced by university students. *Canadian Medical Association Journal, 154*(1), 77–79.

US Department of Public Health and Human Services. (2000). *Healthy people 2010.* Retrieved September 7, 2001, from the World Wide Web: http://www.health.gov/healthypeople/document/html/volume1/

Webb, E., Ashton, C. H., Kelly, P., & Kamali, F. (1996). Alcohol and drug use in UK university students. *Lancet, 348,* 922–925.

Webb, E., Ashton, C. H., Kelly, P., & Kamali, F. (1997). Patterns of alcohol consumption, smoking and illicit drug use in British university students: Interfaculty comparisons. *Drug and Alcohol Dependence, 47,* 145–153.

Wechsler, H., Dowdall, G. W., Maenner, G., Gledhill-Hoyt, J., & Lee, H. (1998). Changes in binge drinking and related problems among American college students between 1993 and 1997. *Journal of American College Health, 47,* 57–68.

Wechsler, H., Moeykens, B., Davenport, A., Castillo, S., & Hansen, J. (1995). The adverse impact of heavy episodic drinkers on other college students. *Journal of Studies on Alcohol, 56,* 628–634.

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