



3,4-Methylenedioxy-Methamphetamine (MDMA, Ecstasy or Molly)

Key Points

- In Canada, the prevalence of 3,4-methylenedioxy-methamphetamine (MDMA, ecstasy or molly) use among the general population (ages 15 years and older) was 1.1% in 2019, with roughly equal proportions of males (1.3%) and females (1.0%) reporting any use in the previous year. These estimates were unchanged from 2017.
- The highest prevalence of ecstasy use was among young adults. In 2019, 5.5% of those aged 20–24 years reported ecstasy use in the previous year. In 2019–20, 6% of postsecondary students reported using ecstasy.
- MDMA is illegal to possess, sell or produce in Canada. However, an exemption will come into effect on Jan. 31, 2023, in British Columbia, so adults (ages 18 years and older) will not be subject to criminal charges for personal possession of small amounts of MDMA.
- Medical-grade MDMA is being studied as a potential treatment for post-traumatic stress disorder (PTSD), anxiety, eating disorders and other psychiatric conditions.
- MDMA is one of the most frequently identified controlled substance in illegal drugs seized by Canadian law enforcement agencies.

Introduction

Ecstasy (abbreviated E, X or XTC) and Molly are street names for pills, capsules or powder assumed to contain 3,4- methylenedioxymethamphetamine (MDMA), a synthetic chemical known as a party drug, used in raves and nightclubs.^{1,2} MDMA acts as both a stimulant and hallucinogen, and belongs to a class of drugs known as substituted amphetamines.*

MDMA was studied as a possible supplement to psychotherapy in the 1970s and '80s.³ More recently, there is growing research exploring MDMA-assisted psychotherapy for treating post-traumatic stress disorder (PTSD), eating disorders, anxieties related to life-threatening illnesses and neurodevelopmental disorders.^{4–10} Ongoing research studies use medical-grade MDMA[†] in clinically supervised settings. However, Canada does not have any MDMA products approved for therapeutic use.¹¹ Further study is needed to examine any adverse cognitive effects of clinically relevant doses of MDMA.¹⁰

* Substituted amphetamines are a class of compounds that resemble the chemical structure of amphetamine.

† Medical-grade (also referred to as pharmaceutical-grade) MDMA meets or exceeds the purity and quality standards for medicinal or pharmaceutical consumption.



Although the terms MDMA and ecstasy are often used interchangeably, an increasing number of different substances or products marketed as “ecstasy” have appeared on the illegal drug market in the past two decades.¹² Ecstasy typically refers to pressed pills or capsules that contain MDMA in crystalline form and are commonly marketed and sold as “pure MDMA.” However, these tablets are often laced with other synthetic substitutes, also known as adulterants, that help bind MDMA into pill form and can have harmful effects. These adulterants include¹³⁻¹⁵:

- Central nervous system stimulants
 - Ephedrine
 - Amphetamine and
 - Methamphetamine
- Synthetic cathinones or “bath salts”
 - Ethylone
 - Pentylone
 - Paramethoxyamphetamine (PMA)
 - Paramethoxymethamphetamine (PMMA)
 - Methylenedioxyamphetamine (MDA) and
 - α -methyl-3,4-methylenedioxyphenylpropionamide (MMDPPA).

Effects of MDMA

Short-Term Effects

MDMA increases the neurotransmission of serotonin, dopamine and norepinephrine in the brain, leading to feelings of relaxation, euphoria and arousal.^{1,16} People who use MDMA report having visual illusions, feelings of arousal and wakefulness, and intense sensations of well-being, enhanced sociability and heightened stimulation.¹⁷⁻²⁰ The onset of subjective effects occur within 20 to 40 minutes of oral consumption, reaching peak effects at 75 to 120 minutes, which then plateau for about 3.5 hours.¹⁹ MDMA also increases blood flow, heart rate, and body temperature (hyperthermia).¹⁹

MDMA can lead to adverse effects like high blood pressure, muscle cramping, blurred vision, fainting, anxiety and panic attacks.²¹⁻²⁵ Some adverse effects, such as hyperthermia, heat exhaustion and dehydration, may be due to MDMA often being consumed in nightclubs and parties where there is a lot of physical movement and not enough water consumption.^{2,26} Women may be more sensitive than men to both the acute physical (e.g., temperature regulation, locomotor activity) and psychological effects (e.g., perceptual changes, thought disturbances, willingness to communicate feelings) of ecstasy. Men may be more sensitive to the acute physiological effects (e.g., increased blood pressure, weight change) of ecstasy.²⁷⁻²⁹

Long-Term Effects

Repeated use of MDMA, especially in high doses, has been associated with paranoia,³⁰ depression,³¹ kidney damage,³² liver damage,³² altered sex drive^{33,34} and decreased appetite.^{11,35} Some of these symptoms may not be directly attributable to MDMA use but due to other drugs often used in combination with MDMA (such as cocaine, alcohol or cannabis) or to adulterants commonly



found in MDMA tablets.^{13,36} Previous studies have examined the cognitive and neurocognitive consequences of repeated long-term MDMA use in animal models and found neurotoxic effects on serotonin neurons.^{37,38} More research is needed to identify the degree of serotonergic neurotoxicity in humans from MDMA effects, which is complicated by confounding factors, such as polysubstance use, genetic and environmental factors, and reliance on self-reports of previous drug use.³⁷⁻³⁹

Legal Status in Canada

MDMA is controlled under Schedule I of the *Controlled Drugs and Substances Act*.⁴⁰ The sale, possession and production of MDMA are illegal unless given ministerial exemption for medical, scientific or industrial purposes. Possession of MDMA can result in seven years imprisonment, while trafficking and production of the drug can result in life imprisonment. However, since the COVID-19 pandemic, there has been some leniency given to federal prosecutors in the form of de facto decriminalization for certain drug possession.⁴¹ In May 2022, a federal exemption under subsection 56(1) of the act was granted in British Columbia, so adults (age 18 years and older) will not be criminally charged for personal possession of small amounts of certain illegal drugs. This exemption will come into effect Jan. 31, 2023, until Jan. 31, 2026, and applies to illegal opioids, cocaine, methamphetamine and MDMA up to 2.5 grams in total per person. British Columbia is the first province to receive an exemption.⁴²

Since 2017, MDMA has received U.S. Food and Drug Administration breakthrough therapy[‡] status for treatment of PTSD. It is in Phase 3 clinical trials for PTSD treatment at sites in the U.S., Canada and Israel.^{43,44} Canada has made amendments to accessing restricted drugs through the Special Access Program to simplify the process of receiving medical access to controlled substances, including MDMA for treating mental health and substance use disorders.⁴⁵ After a complaint about Health Canada-approved trials being conducted by a U.S. non-profit organization, Health Canada is reviewing all clinical trials involving MDMA to ensure patient safety.⁴⁶

Use of Ecstasy in Canada

Self-Reported Use in the Past Year

General population (age 15 years and older): According to the 2019 Canadian Alcohol and Drugs Survey,⁴⁷ the prevalence of ecstasy use among the general population was 1.1%, unchanged from 2017 (0.9%)⁴⁸ (see Figure 1).

Youth (age 15–19 years): The most recently available estimate among youth is from 2017, when 1.6% reported using ecstasy in the previous year (compared with 2.3% in 2015).^{48,49}

Young adults (age 20–24 years): The highest prevalence of ecstasy use is among young adults was 5.5% in 2019, a non-significant increase from 3.1% in 2017.⁴⁷

Students (grades 7–12): Findings from the 2018–2019 Canadian Student Tobacco, Alcohol and Drugs Survey indicate that 0.8% of students in grades 7–9 reported using ecstasy in the previous year, compared with 3.2% of students in grades 10–12. The prevalence of previous-year ecstasy use was significantly higher among males (2.6%) than females (1.4%).⁵⁰

[‡] Breakthrough therapy is a designation used by the U.S. Food and Drug Administration to expedite the development and review of drugs for serious or life-threatening conditions.

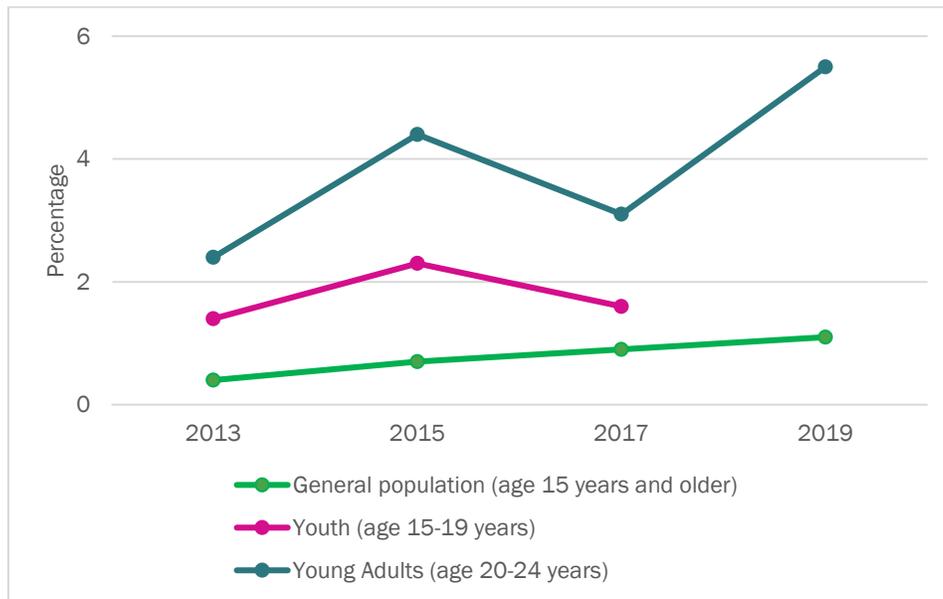


Postsecondary students: Results from the 2019/2020 Canadian Postsecondary Education Alcohol and Drug Use Survey show 6.2% of postsecondary students reporting ecstasy use (5.2% in first and second year, and 6.9% in third and fourth year). This included 6.5% of males and 5.6% of females.⁵¹

Adults (age 25 years and older): According to the 2019 Canadian Alcohol and Drugs Survey, 0.8% of adults age reported using ecstasy in the previous year.⁴⁷

Sex: Among the general population (age 15 years and older) in 2019, the prevalence of previous-year ecstasy use was similar among males (1.3%) and females (1.0%). This was relatively unchanged from 2015[§] for both males (1.0%) and females (0.5%).⁴⁷

Figure 1. Prevalence of self-reported ecstasy use among Canadians by year and age category



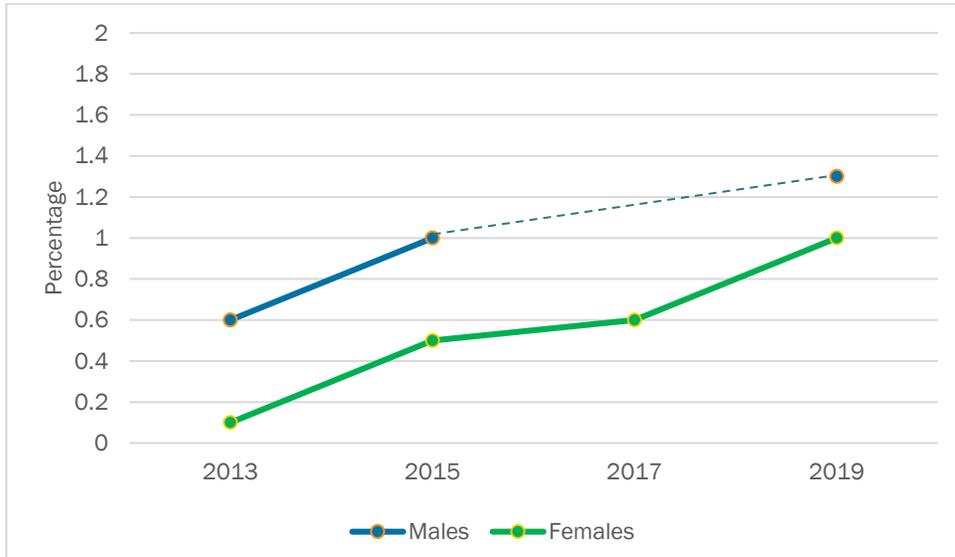
Sources: CTADS 2013,⁵² 2015,⁴⁹ 2017⁴⁸ and CADS 2019⁴⁷

Note: Data for adults (age 25 years and older) and youth (ages 15-19 years⁴⁷) in 2019 are not shown due to high sampling variability.

[§] Estimates suppressed due to high sampling variability.



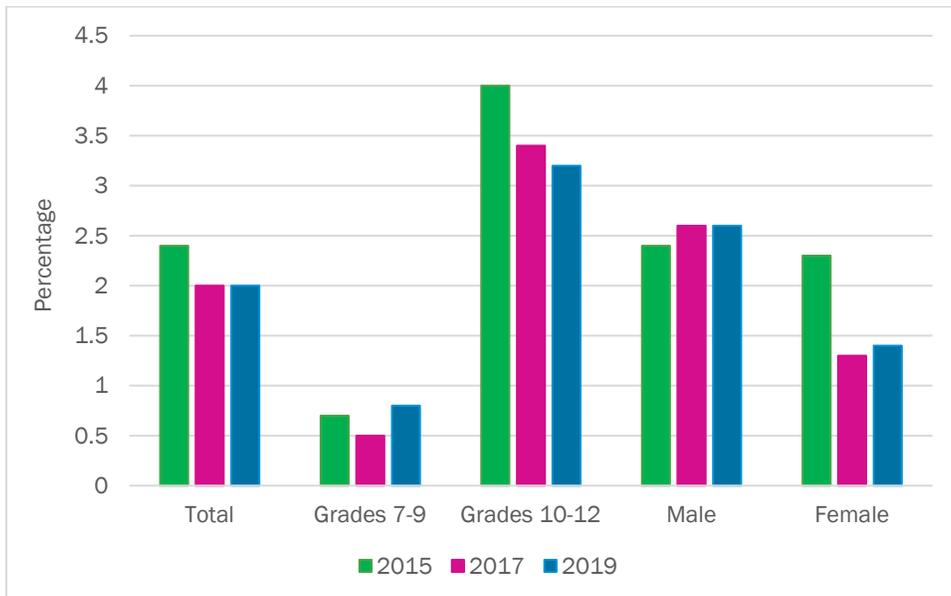
Figure 2. Prevalence of self-reported ecstasy use among Canadians by year and sex



Sources: CTADS 2013,⁵² 2015,⁴⁹ 2017⁴⁸ and CADS 2019⁴⁷

Note: Data for 2017 males is suppressed due to small sample size.

Figure 3. Prevalence of self-reported previous-year ecstasy use among Canadian students by year, grade and sex

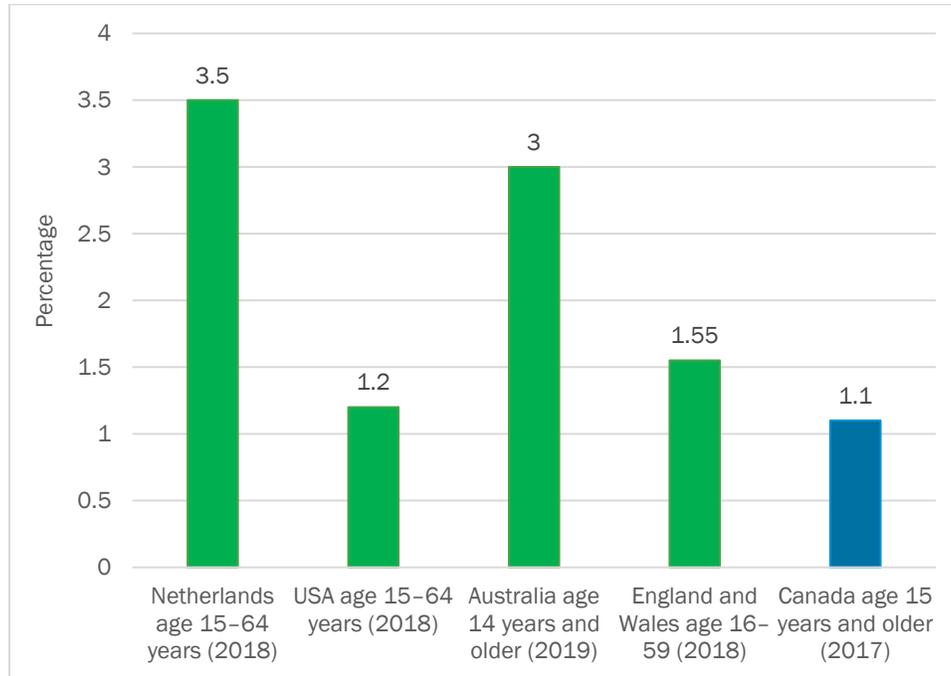


Sources: CSTADS 2015⁵³, 2017⁵⁴ and 2019⁵⁰

International comparison: According to the United Nations Office on Drugs and Crime¹² and the 2019 Canadian Alcohol and Drugs Survey,⁴⁷ annual prevalence of ecstasy use in 2019 among the general population (aged 15 years and older) in Canada was lower than other selected western countries (Figure 4).



Figure 4. Prevalence of self-reported previous-year ecstasy use among the general population by country and year



Sources: UNODC 2021¹² and CADS 2019⁴⁷

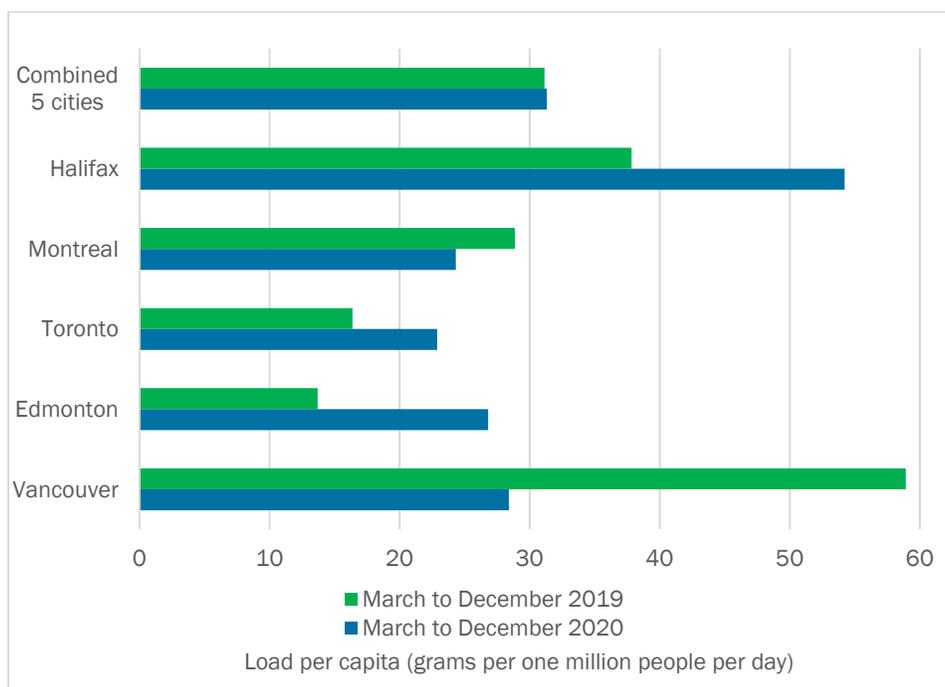
Note: International prevalence rates are not directly comparable due to variations in survey methods, dates and population age ranges.

Wastewater-based Estimates of MDMA Use in Canada

The human body excretes detectable amounts of MDMA metabolites,⁵⁵ allowing for the detection of MDMA in wastewater systems across Canada.⁵⁶ Statistics Canada wastewater collection data in five major Canadian cities showed changes in ecstasy average load estimates between March to December 2019 and March to December 2020. Among the most notable differences observed, Halifax showed a 7% increase in the average ecstasy estimates from March 2019 to December 2020, whereas Vancouver estimates decreased by nearly half between March to December 2019 and March to December 2020.⁵⁷



Figure 5. Wastewater-based estimates of Ecstasy (MDMA) in Canada (2019 and 2020)



Source: Statistics Canada 2022⁵⁷

Drug Seizures

Seizure data provide a supply-related indicator of the availability of drugs in the illegal market.

National: According to the United Nations Office on Drugs and Crime (UNODC), about 57 kilograms of ecstasy-type substances were seized in Canada in 2019, relatively unchanged from 52 kg in 2018 and 54 kg in 2017.⁵⁸ This compares with 4,827 kg of cocaine and 1,094 kg of methamphetamine seized in 2019.⁵⁸

Results from the Drug Analysis Service^l indicated that in 2020, MDMA was the fourth-most frequently identified controlled substance in illegal drugs seized by Canadian law enforcement agencies (after methamphetamine, cocaine and fentanyl).⁵⁹ There were 2,441 samples of MDMA identified by the service that year. By comparison, there were 420 samples of MDMA identified in 2021, making MDMA the eighth-most frequently identified controlled substance in samples analyzed.

International: The quantity of ecstasy seized globally has almost quadrupled to 16 tonnes (16,000 kg) in 2019, the second-highest level ever reported.¹² This trend appears to have reversed in 2020 due to restrictions related to the COVID-19 pandemic.^{60,61}

Europe continues to be a primary source of MDMA products that supply the global market. While shipments of MDMA from Europe to North America have increased ecstasy trafficking from Canada to the United States have declined in recent years. In recent years, there has been an increase in

^lThe Drug Analysis Service analyzes suspected illegal drugs seized by Canadian law enforcement agencies. The drugs analyzed do not represent the total number of substances seized by law enforcement and should not be used to estimate the number or types of drugs available on the street. A single sample can contain more than one substance.



“fake” ecstasy tablets containing substances other than MDMA on the United States market. This suggests that there could be a shortage of MDMA on the market.⁶²

Criminal Justice Statistics

The Government of Canada collects information on criminal incidents reported by police services, including drug violations for possession, trafficking, production or distribution of controlled substances.^{59,63} Between 2016 and 2020, the overall rate of MDMA criminal violations remained constant (from 5,987 violations per 100,000 population in 2016 to 5,856 violations per 100,000 population in 2020). However, the rate for importation and exportation violations increased three-fold from 0.26 violations per 100,000 population in 2016 ($n = 95$) to 0.80 violations per 100,000 ($n = 305$) in 2020.⁶³

Additional Resources

- [Canadian Postsecondary Education Alcohol and Drug Use Survey](#)
- [Canadian Student Tobacco, Alcohol and Drugs Survey](#)
- [Controlled Drugs and Substances Act](#)
- [World Drug Report 2021](#)

References

- 1 Meyer J. S. (2013). 3,4-methylenedioxymethamphetamine (MDMA): current perspectives. *Substance Abuse and Rehabilitation*, 4, 83–99. <https://doi.org/10.2147/SAR.S37258>
- 2 Palamar, J. J., & Sönmez, İ. (2022). A qualitative investigation exploring why dance festivals are risky environments for drug use and potential adverse outcomes. *Harm Reduction Journal*, 19(1), Article 12. <https://doi.org/10.1186/s12954-022-00598-5>
- 3 Passie, T. (2018). The early use of MDMA (‘Ecstasy’) in psychotherapy (1977–1985). *Drug Science, Policy and Law*, 4. <https://doi.org/10.1177/2050324518767442>
- 4 De Gregorio, D., Aguilar-Valles, A., Preller, K. H., Heifets, B. D., Hibicke, M., Mitchell, J., & Gobbi, G. (2021). Hallucinogens in mental health: Preclinical and clinical studies on LSD, psilocybin, MDMA, and ketamine. *Journal of Neuroscience*, 41(5), 891–900. <https://doi.org/10.1523/JNEUROSCI.1659-20.2020>
- 5 Feduccia, A. A., & Mithoefer, M. C. (2018). MDMA-assisted psychotherapy for PTSD: Are memory reconsolidation and fear extinction underlying mechanisms? *Progress in Neuro-Psychopharmacology & Biological Psychiatry*, 84(Pt A), 221–228. <https://doi.org/10.1016/j.pnpbp.2018.03.003>
- 6 Mithoefer, M. C., Wagner, M. T., Mithoefer, A. T., Jerome, L., & Doblin, R. (2011). The safety and efficacy of (+/-)3,4-methylenedioxymethamphetamine-assisted psychotherapy in subjects with chronic, treatment-resistant posttraumatic stress disorder: The first randomized controlled pilot study. *Journal of Psychopharmacology*, 25(4), 439–452. <https://doi.org/10.1177/0269881110378371>



- 7 Oehen, P., Traber, R., Widmer, V., & Schnyder, U. (2013). A randomized, controlled pilot study of MDMA (\pm 3,4-Methylenedioxy-methamphetamine)-assisted psychotherapy for treatment of resistant, chronic post-traumatic stress disorder (PTSD). *Journal of Psychopharmacology*, 27(1), 40–52. <https://doi.org/10.1177/0269881112464827>
- 8 Sessa B. (2017). MDMA and PTSD treatment: “PTSD: From novel pathophysiology to innovative therapeutics.” *Neuroscience Letters*, 649, 176–180. <https://doi.org/10.1016/j.neulet.2016.07.004>
- 9 Wolfson, P. E., Andries, J., Feduccia, A. A., Jerome, L., Wang, J. B., Williams, E., ... Doblin, R. (2020). MDMA-assisted psychotherapy for treatment of anxiety and other psychological distress related to life-threatening illnesses: a randomized pilot study. *Scientific Reports*, 10, Article 20442. <https://doi.org/10.1038/s41598-020-75706-1>
- 10 Sessa, B., Higbed, L., & Nutt, D. (2019). A Review of 3,4-methylenedioxy-methamphetamine (MDMA)-assisted psychotherapy. *Frontiers in Psychiatry*, 10, Article 138. <https://doi.org/10.3389/fpsy.2019.00138>
- 11 Health Canada. (2020). MDMA. <https://www.canada.ca/en/health-canada/services/substance-use/controlled-illegal-drugs/ecstasy.html#therapy>
- 12 United Nations Office of Drugs and Crime. (2021). *World drug report 2021*. Vienna: Author. <https://www.unodc.org/unodc/en/data-and-analysis/wdr2021.html>
- 13 Canadian Centre on Substance Use and Addiction and Canadian Community Epidemiology Network on Drug Use. (2020). *Contaminants and co-occurring substances in drugs on the illegal market in Canada* [CCENDU Bulletin]. Ottawa, Ont.: Canadian Centre on Substance Use and Addiction. <https://www.ccsa.ca/adulterants-contaminants-and-co-occurring-substances-drugs-illegal-market-canada-ccendu-bulletin>
- 14 McCrae, K., Tobias, S., Tupper, K., Arredondo, J., Henry, B., Mema, S., Wood, E., & Ti, L. (2019). Drug checking services at music festivals and events in a Canadian setting. *Drug and Alcohol Dependence*, 205, Article 107589. <https://doi.org/10.1016/j.drugalcdep.2019.107589>
- 15 Cristiano N. (2022). Fentanyl contamination as a risk priority: The Impact of the fentanyl epidemic on club drug-using behaviours. *Substance Use & Misuse*, 57(6), 975–982. <https://doi.org/10.1080/10826084.2022.2058705>
- 16 Department of Justice Drug Enforcement Administration. (2020, Apr.) *Ecstasy/MDMA* [Drug Fact Sheet]. https://www.dea.gov/sites/default/files/2020-06/Ecstasy-MDMA-2020_0.pdf
- 17 Cohen R. S. (1995). Subjective reports on the effects of the MDMA (‘ecstasy’) experience in humans. *Progress in Neuro-Psychopharmacology & Biological Psychiatry*, 19(7), 1137–1145. [https://doi.org/10.1016/0278-5846\(95\)00231-6](https://doi.org/10.1016/0278-5846(95)00231-6)
- 18 Hopfer, C., Mendelson, B., Van Leeuwen, J. M., Kelly, S., & Hooks, S. (2006). *Club drug use among youths in treatment for substance abuse*. *American Journal on Addictions*, 15(1), 94–99. <https://doi.org/10.1080/10550490500419144>
- 19 Bates, M., & Trujillo, K. A. (2021). Use and abuse of dissociative and psychedelic drugs in adolescence. *Pharmacology, Biochemistry, and Behavior*, 203, Article 173129. <https://doi.org/10.1016/j.pbb.2021.173129>
- 20 Kirkpatrick, M. G., Gunderson, E. W., Perez, A. Y., Haney, M., Foltin, R. W., & Hart, C. L. (2012). A direct comparison of the behavioral and physiological effects of methamphetamine and



- 3,4-methylenedioxy-methamphetamine (MDMA) in humans. *Psychopharmacology*, 219(1), 109–122. <https://doi.org/10.1007/s00213-011-2383-4>
- 21 Greene, S. L., Kerr, F., & Braitberg, G. (2008). Review article: Amphetamines and related drugs of abuse. *Emergency Medicine Australasia*, 20(5), 391–402. <https://doi.org/10.1111/j.1742-6723.2008.01114.x>
 - 22 Michael White C. (2014). How MDMA's pharmacology and pharmacokinetics drive desired effects and harms. *Journal of Clinical Pharmacology*, 54(3), 245–252. <https://doi.org/10.1002/jcph.266>
 - 23 National Center for Biotechnology Information. PubChem Compound Summary for CID 1615, 3,4-Methylenedioxy-methamphetamine [Internet]. 2022. Available from: https://pubchem.ncbi.nlm.nih.gov/compound/3_4-Methylenedioxy-methamphetamine.
 - 24 National Institute on Drug Abuse. MDMA (Ecstasy) Abuse [Internet]. 2006. Available from: https://nida.nih.gov/sites/default/files/rmdma_0.pdf
 - 25 Parrott A. C. (2014). The potential dangers of using MDMA for psychotherapy. *Journal of Psychoactive Drugs*, 46(1), 37–43. <https://doi.org/10.1080/02791072.2014.873690>
 - 26 Karila, L., Billieux, J., Benyamina, A., Lançon, C., & Cottencin, O. (2016). The effects and risks associated to mephedrone and methylone in humans: A review of the preliminary evidences. *Brain Research Bulletin*, 126(Pt 1), 61–67. <https://doi.org/10.1016/j.brainresbull.2016.03.005>
 - 27 Allott, K., & Redman, J. (2007). Are there sex differences associated with the effects of ecstasy/3,4-methylenedioxy-methamphetamine (MDMA)? *Neuroscience and Biobehavioral Reviews*, 31(3), 327–347. <https://doi.org/10.1016/j.neubiorev.2006.09.009>
 - 28 Liechti, M. E., Gamma, A., & Vollenweider, F. X. (2001). Gender differences in the subjective effects of MDMA. *Psychopharmacology*, 154(2), 161–168. <https://doi.org/10.1007/s002130000648>
 - 29 Piper B. J. (2007). A developmental comparison of the neurobehavioral effects of ecstasy (MDMA). *Neurotoxicology and Teratology*, 29(2), 288–300. <https://doi.org/10.1016/j.ntt.2006.10.002>
 - 30 Patel, A., Moreland, T., Haq, F., Siddiqui, F., Mikul, M., Qadir, H., & Raza, S. (2011). Persistent psychosis after a single ingestion of “ecstasy” (MDMA). *Primary Care Companion for CNS Disorders*, 13(6), Article PCC.11I01200. <https://doi.org/10.4088/PCC.11I01200>
 - 31 Verheyden, S. L., Hadfield, J., Calin, T., & Curran, H. V. (2002). Sub-acute effects of MDMA (+/-3,4-methylenedioxy-methamphetamine, "ecstasy") on mood: evidence of gender differences. *Psychopharmacology*, 161(1), 23–31. <https://doi.org/10.1007/s00213-001-0995-9>
 - 32 da Silva, D. D., Silva, E., Carvalho, F., & Carmo, H. (2014). Mixtures of 3,4-methylenedioxy-methamphetamine (ecstasy) and its major human metabolites act additively to induce significant toxicity to liver cells when combined at low, non-cytotoxic concentrations. *Journal of Applied Toxicology*, 34(6), 618–627. <https://doi.org/10.1002/jat.2885>
 - 33 May, A. L., & Parrott, A. C. (2015). Greater sexual risk-taking in female and male recreational MDMA/ecstasy users compared with alcohol drinkers: a questionnaire study. *Human Psychopharmacology*, 30(4), 272–275. <https://doi.org/10.1002/hup.2432>



- 34 Zemishlany, Z., Aizenberg, D., & Weizman, A. (2001). Subjective effects of MDMA ('Ecstasy') on human sexual function. *European Psychiatry*, 16(2), 127–130. [https://doi.org/10.1016/s0924-9338\(01\)00550-8](https://doi.org/10.1016/s0924-9338(01)00550-8)
- 35 National Institute on Drug Abuse. (2021, April 13). What are the effects of MDMA?. <https://nida.nih.gov/publications/research-reports/mdma-ecstasy-abuse/what-are-effects-mdma>
- 36 Palamar, J. J., Salomone, A., Vincenti, M., & Cleland, C. M. (2016). Detection of “bath salts” and other novel psychoactive substances in hair samples of ecstasy/MDMA/”Molly” users. *Drug and Alcohol Dependence*, 161, 200–205. <https://doi.org/10.1016/j.drugalcdep.2016.02.001>
- 37 Montgomery, C., & Roberts, C. A. (2022). Neurological and cognitive alterations induced by MDMA in humans. *Experimental Neurology*, 347, Article 113888. <https://doi.org/10.1016/j.expneurol.2021.113888>
- 38 Karlsen, S. N., Spigset, O., & Slørdal, L. (2008). The dark side of ecstasy: Neuropsychiatric symptoms after exposure to 3,4-methylenedioxymethamphetamine. *Basic & Clinical Pharmacology & Toxicology*, 102(1), 15–24. <https://doi.org/10.1111/j.1742-7843.2007.00159.x>
- 39 de Win, M. M., Jager, G., Booij, J., Reneman, L., Schilt, T., Lavini, C., ... van den Brink, W. (2008). Neurotoxic effects of ecstasy on the thalamus. *British journal of Psychiatry*, 193(4), 289–296. <https://doi.org/10.1192/bjp.bp.106.035089>
- 40 *Controlled Drugs and Substances Act*, S.C. 1996, c. 19. (1996). <https://laws-lois.justice.gc.ca/eng/acts/C-38.8/FullText.html>
- 41 Public Prosecution Service of Canada. (2020). 5.13 Prosecution of possession of controlled substances contrary to s. 4(1) of the *Controlled Drugs and Substances Act*. In Author, *Public Prosecution Service of Canada Deskbook*. Ottawa, Ont.: Author. <https://www.ppsc-sppc.gc.ca/eng/pub/fpsd-sfpg/fps-sfp/tpd/p5/ch13.html>
- 42 Health Canada. (2022). Subsection 56(1) class exemption for adults in the province of British Columbia to possess small amounts of opioids, cocaine, methamphetamine and MDMA. Ottawa, Ont.: Author. <https://www.canada.ca/en/health-canada/services/health-concerns/controlled-substances-precursor-chemicals/policy-regulations/policy-documents/exemption-personal-possession-small-amounts-certain-illegal-drugs-british-columbia/subsection-56-1-class-exemption-adults-18-years-age-older.html>
- 43 Multidisciplinary Association for Psychedelic Studies. (2021). A Multi-Site Phase 3 Study of MDMA-Assisted Therapy for PTSD (MAPP1). San Jose, California: Author. <https://maps.org/mdma/ptsd/mapp1/>
- 44 Mitchell, J. M., Bogenschutz, M., Lilienstein, A., Harrison, C., Kleiman, S., Parker-Guilbert, K., ... Doblin, R. (2021). MDMA-assisted therapy for severe PTSD: a randomized, double-blind, placebo-controlled phase 3 study. *Nature Medicine*, 27(6), 1025–1033. <https://doi.org/10.1038/s41591-021-01336-3>
- 45 Health Canada. (2021). Notice: Clarifications regarding access to restricted drugs through the Special Access Program (SAP). Ottawa, Ont.: Author. <https://www.canada.ca/en/health-canada/services/drugs-health-products/special-access/notice-clarifications-regarding-restricted-drugs-program.html>



- 46 Lindsay, L. (2022, April 8). Health Canada announces review of all MDMA trials, as complaint alleges major flaws and safety issues: PTSD patients say they have hope for the drug-assisted therapy, despite concerns about the research. Vancouver, B.C.: CBC News. <https://www.cbc.ca/news/canada/british-columbia/health-canada-mdma-trial-complaints-flaws-safety-issues-1.6409849>
- 47 Health Canada & Statistics Canada. (2021). Canadian Alcohol and Drugs Survey (CADS): Summary of results for 2019. Ottawa, Ont.: Health Canada. <https://www.canada.ca/en/health-canada/services/canadian-alcohol-drugs-survey/2019-summary.html>
- 48 Statistics Canada. (2021). Canadian Tobacco, Alcohol and Drugs Survey (CTADS): Summary of results for 2017. Ottawa, Ont.: Health Canada. <https://www.canada.ca/en/health-canada/services/canadian-alcohol-drugs-survey/2017-summary.html>
- 49 Statistics Canada. (2021). Canadian Tobacco Alcohol and Drugs (CTADS): 2015 summary. Ottawa, Ont.: Health Canada. <https://www.canada.ca/en/health-canada/services/canadian-alcohol-drugs-survey/2015-summary.html>
- 50 Propel Centre for Population Health Impact. (2019). Summary of results for the Canadian Student Tobacco, Alcohol and Drugs Survey 2018-19. Ottawa, Ont.: Health Canada. <https://www.canada.ca/en/health-canada/services/canadian-student-tobacco-alcohol-drugs-survey/2018-2019-summary.html>
- 51 Health Canada. (2021). Canadian Postsecondary Education Alcohol and Drug Use Survey, 2019/2020. Ottawa, Ont.: Author. <https://health-infobase.canada.ca/alcohol/cpads/data-tables.html>
- 52 Statistics Canada. (2015). Canadian Tobacco Alcohol and Drugs (CTADS): 2013 summary. Ottawa, Ont.: Health Canada. <https://www.canada.ca/en/health-canada/services/canadian-alcohol-drugs-survey/2013-summary.html>
- 53 Propel Centre for Population Health Impact. (2016). Summary of results: Canadian Student Tobacco, Alcohol and Drugs Survey 2014-15. Ottawa, Ont.: Health Canada. <https://www.canada.ca/en/health-canada/services/canadian-student-tobacco-alcohol-drugs-survey/2014-2015-summary.html>
- 54 Propel Centre for Population Health Impact. (2018). Summary of results for the Canadian Student Tobacco, Alcohol and Drugs Survey 2016-17. <https://www.canada.ca/en/health-canada/services/canadian-student-tobacco-alcohol-drugs-survey/2016-2017-summary.html>
- 55 González-Mariño, I., Zuccato, E., Santos, M. M., & Castiglioni, S. (2017). Monitoring MDMA metabolites in urban wastewater as novel biomarkers of consumption. *Water Research*, 115, 1–8. <https://doi.org/10.1016/j.watres.2017.01.063>
- 56 Werschler, T. & Brennan, A. (2019). Wastewater-based estimates of cannabis and drug use in Canada: Pilot test detailed results [Analysis in Brief]. Ottawa, Ont.: Statistics Canada. <https://www150.statcan.gc.ca/n1/pub/11-621-m/11-621-m2019004-eng.htm>
- 57 Statistics Canada. (2022). Table 13-10-0820-01 Drug metabolites in wastewater in select Canadian cities, by month. <https://doi.org/10.25318/1310082001-eng>
- 58 United Nations Office on Drugs and Crime. (2022). Annual drug seizures <https://dataunodc.un.org/data/drugs/Annual%20Drug%20Seizures>



- 59 Health Canada. Drug Analysis Service. <https://health-infobase.canada.ca/drug-analysis-service/analyzed-drug-report.html?p=CA&y=2021&q=Q3>
- 60 Winstock, A. R., Zhuparris, A., Gilchrist, G., Davies, E. L., Puljević, C., Potts, L., ... Barratt, M. J. (2020). GDS COVID-19 special edition key findings report. London, England: Global Drug Survey. <https://www.globaldrugsurvey.com/gds-covid-19-special-edition-key-findings-report/>
- 61 United Nations Office on Drugs and Crime. (2022). Drugs Monitoring Platform. <https://dmp.unodc.org/node/1180709>
- 62 U.S. Department of Justice Drug Enforcement Administration. (2021). *2020 National Drug Threat Assessment*. https://www.dea.gov/sites/default/files/2021-02/DIR-008-21%202020%20National%20Drug%20Threat%20Assessment_WEB.pdf .
- 63 Statistics Canada. (2020). Table 35-10-0177-01 Incident-based crime statistics, by detailed violations, Canada, provinces, territories, Census Metropolitan Areas and Canadian Forces Military Police. <https://doi.org/10.25318/3510017701-eng>

