



Trajectories of Marijuana use Across a Decade: Their predictors in adolescence and impact on the health, academic, social and economic outcomes of Canadian Young Adults

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Success in the developmental tasks of young adulthood creates the foundation for life-long health, lifestyle choices, and economic well-being. Developmental tasks of this phase (from about age 19 to late 20's) include building the capacity for financial and residential independence through post-secondary education and job training and also establishing stable sources of support from parents, romantic partners, and peers. These are the social determinants of life-long health.

According to a 2013 UNICEF survey, Canadian youth ages 11 to 15 are the highest users of cannabis among developed countries, with 28% reporting using cannabis in the last year. Legislators aspire to reduce these numbers by setting a minimum age for recreational use and providing criminal penalties for people who sell or give cannabis to minors, create cannabis products that appeal to children or adolescents, or engage children or adolescents in the distribution of cannabis to youth.

Research also suggests cannabis use peaks between ages 21 and 23. Our understanding of how cannabis use affects Canadian youth is limited by a lack of Canadian longitudinal research, and by poor statistical monitoring of cannabis use and harms specific to this foundational period of life. In November 2018, we co-organized a conference with legislators, funders and researchers from Canada and the US, entitled: Cannabis Legalization and Youth: Developing Clear Messages in an Evolving Policy Climate (Boulder Colorado, Institute of Behavioral Science, (see <https://www.colorado.edu/symposium/cannabis-legalization/sites/default/files/attached-files/cannabis-legalization-and-youth-2018-final-conference-report.pdf>). We identified identify gaps in our understanding of youth cannabis use and preventive and intervention approaches that offer solutions. Our research sought to address one of these gaps – understanding the consequences of different patterns of cannabis use in youth.

Summary. Past research clearly shows that youth who start using cannabis before age 15 and become chronic users of cannabis (about 10% of the population of users) suffer the most

negative consequences and are most likely to become addicted or long-term users. Early risks for chronic use include co-occurring externalizing, mental health, and academic problems. We also know that cannabis use, alcohol use, and binge drinking frequently co-occur. Early onset and chronic polysubstance use in adolescence also predict substance use problems and dependency in young adulthood. Chronic use is also associated with poorer academic and economic outcomes in young adulthood. Other patterns of cannabis use (e.g., onset after age 18, occasional use, increasing use) are more common than chronic use across the transition to young adulthood. Identification of patterns of cannabis use has helped us distinguish between problematic and non-problematic use patterns, identify subgroups of young people who are at increased risk of experiencing negative consequences from their use, and inform prevention efforts. Findings show that high-risk users of cannabis in adolescence and young adulthood has long-term and, likely, life-long consequences. See the summary video at <https://vimeo.com/319979970>.

Our research on cannabis use in the transition to young adulthood is based on data collected over a decade (2003 to 2013) from a randomly recruited sample of 662 youth from British Columbia. We used Latent Class Growth Analysis (LCGA) to detect group differences in the frequency of their cannabis use. Five use patterns were found over time. The “*Abstainers*” (29%) never used cannabis. The “*Occasional users*” (27%) started as abstainers in adolescence and increased use up to a “few times a year” after age 17. The “*Decreasers*” (14%) used cannabis a few times per month at age 15 and decreased to less than a few times per year by age 23. The “*Increasers*” (20%) used a few times per year by age 15 and increased rapidly, peaking at more than once per week about age 22 and then declining to a few times per month by age 28. The “*Chronic users*” (11%) used cannabis more than once per week across all ages.

Our findings indicate that, compared to Abstainers, the Increasers and Chronic users were at greater risk from their cannabis use. We found the following:

1. **BEHAVIOUR PROBLEMS** Chronic users had more problem behaviors (Oppositional behaviors, ADHD, and conduct problems) in adolescence and young adulthood and more depressive symptoms in young adulthood than other classes. Increasers were similar to Chronic users, but reported more illicit drug use in adolescence than other classes and lower levels of mental health problems in young adulthood.
<http://dx.doi.org/10.1037/cbs0000090>
2. **MENTAL HEALTH** Decreasers reported more depressive symptoms in adolescence than other classes and were less likely to co-use other substances in young adulthood. Cannabis use was associated with more psychotic symptoms following age 22, depressive symptoms from ages 16–19 and following age 25. Cannabis use disorder was associated with more psychotic symptoms following age 23, depressive symptoms at ages 19–20 and following age 25 and anxiety symptoms ages 26–27 only.
<http://dx.doi.org/10.1111/add.14459>
3. **PHYSICAL HEALTH** Chronic users reported more physical symptoms, poorer physical self-concept, less physical activity, poorer eating practices, less sleep, and a higher number of sexual partners *during adolescence* than other classes. Decreasers also reported poorer physical self-concept and poorer eating practices than abstainers. Chronic users also reported more acute health problems (i.e., serious injuries, early sexual debut, a

higher number of sexual partners, greater likelihood of having a STI) *in young adulthood* than all other classes. <http://dx.doi.org/10.1002/ijop.12549>

4. **SUBSTANCE USE** Rates of co-use of alcohol (i.e., binge drinking) with cannabis use. Using baseline data to identify classes of polysubstance use (cigarette, alcohol, cannabis, and illicit drug use) during adolescence. Findings showed a *poly-use* class that had high probabilities of use among all substances, a *co-use* class that had high probabilities of use among alcohol and cannabis, and a *low-use* class that had low probabilities of use among all substances. Strong continuity of substance use was found by class across 10 years. Additionally, higher average levels of use at age 14 were associated with growth of other substances used over time. <http://dx.doi.org/10.1080/10826084.2018.1455702>

There was considerable movement among the groups from adolescence to young adulthood. However, examining the transitions from adolescence to young adulthood, we found evidence that school, employment, and relationship status disrupted problematic substance use patterns, such that, individuals that indicated entering school, working full-time, or getting married or entering a relationship were more likely to transition to a low-risk substance use class than remain in the high-risk class.

<http://dx.doi.org/10.1080/10826084.2020.1729200>

5. **EDUCATIONAL AND OCCUPATIONAL SUCCESS** Chronic users reported lower levels of educational attainment, lower occupational prestige, lower income, greater debt, and more difficulty paying for medical necessities in young adulthood compared to abstainers. Similarly, *Increasesers* also reported lower educational attainment, occupational prestige, and income. *Decreasers*, who had high early use but quit over time, showed resilience in economic well-being, performing similar to *Abstainers*. Groups did not differ on employment status or perceived workplace stress.

<http://dx.doi.org/10.1007/s11121-018-0904-7> .

In young adulthood, employment in a male-dominated occupation was associated with more cannabis use disorder symptoms for the low, but not the high SES group.

<https://doi.org/10.1177/1557988320908105>

6. **RELATIONSHIPS** Consistent with past literature, parent monitoring distinguished groups in adolescence, but monitoring was low and not significant in young adulthood. Levels of communication were consistently high at both age groups across trajectory groups. Peer influences were similar in adolescence and young adulthood, showing that deviant peer influences persist in their associations with high-risk use across this transition. (manuscript submitted for publication)
7. **DRIVING AND CANNABIS** Youth who reported consistently high levels of cannabis use from adolescence to young adulthood (*Chronic users*) and youth who reported increasing levels of use across this period (*Increasesers*) were more likely to engage in risky impaired driving behaviours compared to the other three user groups (*Occasional users*, *Decreasers*, and *Abstainers*). Frequency of cannabis use was associated with impaired driving risks after controlling for individual characteristics (age, sex, socioeconomic

status, age of onset of cannabis use), frequency of other substance use (heavy episodic drinking and illicit drug use), and simultaneous use of cannabis and other substances (alcohol and illicit drugs). By young adulthood, youth who use cannabis more than once a week are more likely to simultaneously use alcohol and engage in heavy episodic drinking. They are also more likely to take driving risks. Co-use of alcohol and cannabis while driving is common. <https://doi.org/10.1080/15389588.2019.1622097>

8. NEXT STEPS and PREVENTION We have undertaken work to evaluate the impact of a Canadian adaptation of “E-CHECK-UP” an online motivational interviewing program for youth who would like to learn about or reduce their cannabis use. Ongoing work also focuses on increasing understanding of the motivations for cannabis use, protective factors against early onset use, and association between mental health and cannabis use.

Recommendations to reduce harms of cannabis use in youth across the transition from adolescence to young adulthood.

- Expect differences in patterns of cannabis use among adolescents and promote more research on best practices for education to avoid high-risk use.
- Expect an increase in cannabis acceptance, use, disorders, and dependencies in adolescents and young adults.
- Youth also need to understand risks for and signs of cannabis dependence.
- Increase early identification and treatment of high risk cannabis use (once a week or more) in adolescence
- Monitor statistics for use and harm in young adults (ages 19 to 25) separately from older adults.
- Make age 21 the legal age for cannabis use in all provinces to disentangle the legal age of substance use with the time when most young adults are inexperienced drivers to reduce co-occurring risks for car crashes.
- Take account of the co-use of alcohol and co-morbid externalizing problems in approaches to education, harm reduction, early identification, and treatment of cannabis related problems.
- Widely disseminate *accurate* information about harms so that youth can make informed choices about their cannabis use.
- Warning signage on packaging should indicate that cannabis is addictive and should not be used to self-treat depression, anxiety, or sleep problems.
- Consider the diverse needs of youth and be prepared to provide a wide range of services that include educational opportunities, relationship counselling, and career development to reduce high-risk substance use patterns.
- Preventing substance use disorders among individuals employed in male-dominated jobs through public health messages and increased screening efforts by health practitioners.

- Promoting self-assessment of problematic substance use and motivation to change may be particularly important for young workers.