ASAP

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Dear Council Members:

Thank you for the opportunity to comment on Bill C-45, An Act respecting cannabis and to amend the Controlled Drugs and Substances Act, the Criminal Code and other Acts, which provides legal access to cannabis and seeks to control and regulate its production, distribution and sale. As a Developmental Behavioral pediatrician and addiction medicine specialist I have served as chair of the American Academy of Pediatrics' national Committee on Substance Abuse and I have been the Director of the Adolescent Substance Abuse Program (ASAP) at Boston Children's Hospital since its inception in 2000. In this capacity, I have evaluated and treated hundreds of teens with cannabis use disorders. I have personally witnessed the toll of addiction on these young lives as well as on the lives of countless friends, parents and siblings. I am concerned about the potential impact of these changes on the health of children and adolescents, and I hope my comments will be useful.

As you know, "cannabis" refers to the cannabis sativa plant, leaves of which contain biologically active molecules known as cannabinoids that can be smoked or eaten for their often pleasureable psychoactive effects. Cannabis use is often portrayed as "harmless", though a growing body of literature refutes this claim.[1–3] Cannabis is recognized as addictive in the current Diagnostic and Statistical Manual of Psychiatry (DSM-5) and it has been estimated that 1 in 6 adolescent users will ultimately develop addiction[4–6] – a chronic, relapsing neurological disorder resulting from changes in the part of the brain known as the nucleus accumbens.[7] The earlier a young person begins to use marijuana the higher the likelihood of developing addiction – children who start smoking by age 16 are 4 times more likely to develop addiction than those who begin at age 21.[8] Furthermore there is no known "safe" limit of consumption. A study done in Sweden found that army recruits categorized as "heavy marijuana users" were 4 times more likely to develop a psychotic disorder compared to non-users. The definition of "heavy users" in this study included anyone that reported 50 or more lifetime usages at the time of induction into the army. That translates into as little as once a month use during the four years of high school.[9]

Because it is stored in the body's fat tissue for several weeks before it is completely eliminated cannabis is not associated with withdrawal symptoms often considered the sine qua non of addiction by the lay public.[10] While cannabinoid overdose has been described it is relatively rare and, much like nicotine, cannabinoid overdose is not associated with lethal respiratory depression.[11] This does not mean that cannabis use is medically "safe" any more than tobacco use is. Individuals who develop cannabis use disorders have poorer "life outcomes" than their peers on a number of measures.[12] We see this every day in the clinic – adolescents struggling in school, grades dropping, losing interest in other activities, particularly when cannabis use becomes heavy. The scientific data confirms our anecdotal experience: cannabis use is associated with poor educational achievement;[13,14] a relationship which holds even when controlling for confounding variables.[15] At age 29 individuals that have never used cannabis have the best behavioral, socioeconomic, and health outcomes, while earliest and heaviest users consistently have the poorest outcomes.[16] A 21-year longitudinal study of adolescents found that regular or heavy use was associated with increased rates of adjustment problems, including other illicit drug use, crime, depression and suicidal.[17]

Cannabis use during the adolescent years is associated with a 4 fold increase in the risk of developing a thought disorder such as schizophrenia and the relationship is thought to be bi-directional.[18] In otherwords individuals with thought disorders like schizophrenia tend to use more cannabis and regular cannabis users tend to develop more thought disorders. Individuals with genetic risk factors, such as those with a family member with schizophrenia,who expose themselves to cannabis may actually precipitate a disease that otherwise could have remained dormant. Imaging research has demonstrated that individuals that use cannabis during adolescence have changes in the same parts of the brain as patients with schizophrenia.[19] Cannnabis use in adolescence has also been associated with increased risk for developing anxiety disorders and mood disorders.[20,21] A longitudinal study found an association between marijuana use during adolescence and cognitive changes over time, including significant impairment on working memory, an essential part of the brain that allows for the processing of complex information – a skill that is particularly useful in college and university.[22] In this study, reserachers also documented functional impairment in heavy marijuana users by interviewing key adults in their lives who were blind to their history of marijuana use.

As the director of an adolescent substance use disorders program serving youth ages 12 to 25, I regularly work with children and young adults who use cannabis and my experience mirrors the research findings. More than 90% of patients referred to our program have a cannabis use disorder, regardless of the reason for referral. Our program has treated a number of teen cannabis users who developed thought disorders like schizophrenia right in front of our eyes, and who will be unable to ever care for themselves or live independently. We do not know what would have happened to them if they had not used cannabis, but knowledge of the statistics always makes us wonder if any of these youth might have had a different life had it not been for a completely preventable risk factor. More commonly, we see again and again adolescents whose cannabis use seems to be more subtely impeding them. Two recent patients with similar histories of cannabis addiction paint a clear picture - both were good students in high school and accepted to elite colleges where they began using marijuana heavily and ended up failing out. Both blame their changing academic status on heavy marijuana use. All four of their parents are devastated. One father recently confided that he recently had to come to terms with adjusting his own hopes and expectations for his son. While a few short years ago he envisioned his son becoming a professional, he now simply hopes he will be able to function well enough to support himself. The list goes on with many adolescents that we care for falling short of their own educational goals, under-employed and struggling with mental health disorders while their families watch and wonder about their future.

Bill C-45 would prohibit the sale or marketing of cannabis to adolescents and young adults under the age of 18 and legalization is often proposed as a mechanism to *reduce* youth access by taxing and regulating cannabis, raising the price, eliminating the black market and making shop owners gatekeepers. This approach has failed with other substances in the past. Marketing restrictions have historically been of limited utility when tested against the potential for substantial profits. While it is illegal for tobacco companies to market cigarettes to youth under age 18, the familiar story of Joe Camel is a good example of how pernicious advertising can be. The retail sale of cannabis serves to normalize use, further reducing barriers to youth initiation.

The empiric data reflecting the impact of legalization on youth marijuana use in the US is limited and should be interpreted with caution. The full effects are predicted to lag after policy changes as the industry matures, which is still an ongoing process. The evidence to date indicates that cannabis use by minors has indeed increased after legalization in states with more liberal cannabis policies. The experience in Colorado, one of the first two states to legalize cannabis, is instructive. Current youth cannabis use (defined as use in the past 30 days) increased by 20% over a two year period immediately following legalization; during this time period current youth cannabis use fell by 4% nationally. In the most recent survey, Colorado had the highest rates of current youth cannabis use in the nation, up from 4 (of 50) in 2011 and 14 in 2005. The number of drug related school suspensions in Colorado spiked after

legalization. In 2015, cannabis violations accounted for 35% of student expulsions in Colorado while by comparison, alcohol accounted for just 1.3%. In 2016, 45% of Colorado students that use cannabis reported getting it from a friend that had obtained it legally, 22% from a parent and 24% from the black market,[23] which still functions despite legalization. These findings suggest that policy changes in Colorado were indeed associated with increases in youth cannabis use, and they confirm a basic and familiar principle – adolescents are responsive to the cultural attitudes around them; those who live in areas that condone cannabis use are more likely to use cannabis themselves. It is simply unreasonable to speculate that a policy that increases use of cannabis by adults would not also increase adolescent use.

Beyond the potential increase in youth interest in and access to cannabis, a significant concern is the potential for the products to change in ways that make them both more attractive but also more harmful. Commercialization of addictive substances within a free market system has historically been problematic as product developments that boost sales tend to also make them more addictive.[24] Market driven innovations have made both alcohol and tobacco substantially more health-harming.[25,26] The same pattern is underway with cannabis. In the US, states with medical marijuana laws have higher potency and more addictive cannabis in their illegal markets compared to states where cannabis remains illegal.[27,28] In common language, cannabis refers to the dried leaves and stems of the cannabis plant. In 1995 the typical plant contained roughly 4% delta-9-tetrahydrocannabinol, the compound most closely associated with both euphoria and also many of the untoward psychiatric side effects of marijuana use. This potency has consistently risen over the past 20 years, reaching 12% in 2014.[29] In Colorado the fastest growing part of the market is "edibles" [30] - candies and pastries laced with highly potent cannabis oil – that are attractive to children and poorly understood in terms of health risk. Nearly pure THC extracts called "dabs" are also available and often referred to as "marijuana". In our clinical practice the expansion of the array of products has led to an evolving presentation of adolescents with marijuana problems. As we see the exposure to THC increase, psychiatric symptoms have become common. In one recent study that we are conducting in our adolescent primary care program, more than 25% of marijuana users report experiencing hallucinations and more than 30% report experiencing paranoia.

As a pediatrician who is concerned about youth health and devoted to the treatment of drug problems, I urge you to consider this testimony in regard to the federal government's position on marijuana policy. In conclusion, I offer these summary comments and suggestions:

1. **Deliver clear messages to youth that avoiding cannabis use is best for their health.** The American Academy of Pediatrics and the Canadian Paediatric Society both oppose marijuana legalization and encourage parents, health care providers, teachers and other adults to give clear and unambiguous guidance to children.[31,32]
2. **Campaigns that educate the public in an attempt to prevent use, or delay initiation could be beneficial.** The TRUTH campaign that targeted tobacco use was remarkably successful in shifting the public perception of tobacco from glamorous to repulsive; rates of tobacco use plummeted over the past 20 years as negative trends in social tolerance accelerated the stigmatization of smoking.[33,34] Cannabis is well known to be a psychoactive substance that is particularly detrimental to the developing adolescent brain. Although misconceptions that cannabis is "healthy because it's natural" or "safe because it's legal" have cultural traction, they are false, and require ongoing, strong messaging of evidence to the contrary.
3. **Age restrictions are effective at reducing youth substance use.** In the US, enactment of the National Minimum Drinking Age Act, which effectively raised the drinking age to 21 in all 50 states, resulted in a 16% reduction in motor-vehicle accidents.[35] Canada, which has a lower drinking age also has the highest rate of problem alcohol use in the Americas.[36] These facts support higher minimum age limits as a good public health strategy.

4. **Innovations to cannabis based product present public health risks, particularly to adolescents who are more likely to seek novelty and try new products compared to adults.** It may be that addictive substances with known harms merit completely new policy approaches. Consideration of entirely novel regulatory schemes that eliminate profits, control prices, and conduct surveillance at both the individual and population levels may be warranted. This type of approach would require unprecedented collaboration between branches of government. History and current evidence suggest that simply legalizing cannabis, and giving free rein to the industry that it will engender would be to entrust private industry with safeguarding the health of the public — a role that industry is not designed to handle.

Sincerely,

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