



Review

The consequences of chronic cannabis smoking in vulnerable adolescents



Montaha Al Iede¹, Kenneth Nunn^{2,3}, Bronwyn Milne⁴, Dominic A. Fitzgerald^{1,3,*}

¹ Department of Respiratory Medicine, The Children's Hospital at Westmead, Sydney, NSW, Australia

² Department of Psychological Medicine, The Children's Hospital at Westmead, Sydney, NSW, Australia

³ Discipline of Child and Adolescent Health, Sydney Medical School, University of Sydney, Sydney, NSW, Australia

⁴ Department of Adolescent Medicine, The Children's Hospital at Westmead, Sydney, NSW, Australia

EDUCATIONAL AIMS

The reader will be able to:

- Understand the consequences of chronic cannabis use in vulnerable adolescents.
- Appreciate the co-dependencies of cigarette and cannabis smoking.
- Discuss practical interventions to reduce the pulmonary, social and mental health consequences of chronic cannabis use.

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SUMMARY

Cannabis, like the mythic shape-shifter, presents in various guises, morphing with the perspective and context of the observer. Arguments about cannabis are confused by a myriad of debates—medical, social, ethical and political—as if a single conceptual umbrella can capture the variety and granularity of marijuana-related issues. This paper responds to marijuana use as it is commonly practised by youth in Australia. It has little to say about synthetic cannabinoids, specific medicinal cannabinoids, or medicinal properties of marijuana. We address those adolescents genetically and environmentally vulnerable to mental illness, with specific emphasis on indigenous and neurodevelopmentally impaired young people who show patterns of usage and response very different to adults and more resilient members of the population. Specifically, the practice of mixing tobacco with marijuana by aboriginal youth, and the resultant coalition of dependencies, will likely presage a rise in pulmonary and central nervous system pathology over the coming decades. Aboriginal youth begin using earlier, persist longer, and take greater quantities of cannabis than non-indigenous youth. This paper recommends practical interventions to reduce the multiple health consequences of chronic cannabis use in young people, especially indigenous young people.

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INTRODUCTION

Using illicit drugs is one of the risk-fraught behaviours of adolescents, and cannabis is one of the common illicit drugs used

[1]. Furthermore, in the broader community there is the misconception that cannabis use is relatively harmless [2].

Cannabis has been used throughout the world for millennia and there is evidence that its use is increasing among adolescents at a global level [3]. What is difficult to determine from the international literature, despite strong and sometimes poorly substantiated assertions in contrary directions, are the health consequences of this use. There is a tendency for a roulette-like shift of focus in discussions from cannabis as a possible cause of mental illness to its use as a potential medicine, cannabis as a

* Corresponding author. Paediatric Respiratory and Sleep Physician, Department of Respiratory Medicine, The Children's Hospital at Westmead, Sydney, Locked Bag 4001, Westmead, NSW, Australia, 2145. Tel.: +61 2 9845 3397; fax: +61 2 9845 3396.

E-mail address: Dominic.fitzgerald@health.nsw.gov.au (D.A. Fitzgerald).

libertarian issue, a paternalistic call to arms to protect the vulnerable and a confusion of issues around synthetic cannabinoids. Antiquity and being 'natural' are used as signs of safety and likely efficacy by advocates, while correlations with disadvantage and disability are seen as causation by abolitionists. These flawed inferences make any sustained scientific evaluation of evidence for clinicians very difficult when dealing with children, young people and worried parents.

There are three different sub-species of the cannabis plant: *cannabis sativa*, *cannabis indica* and *cannabis ruderalis*. Street cannabis is largely produced from one variety of cannabis, the *cannabis sativa* variety [4]. Cannabis is available in several forms:

- (1) Cannabis (herbal cannabis) which is a product of the plant dried leaves and female flower buds.
- (2) Hashish (cannabis resin) which is produced from the resins that are secreted from the leaves and flower heads.
- (3) Hashish oil.

Herbal cannabis is the most common form used among adolescents [1]. The most common method of cannabis use is inhalation of smoke produced by smoked cigarettes (joints) or pipes (bongs) [5]. This method of use relates to its poor water solubility (not suitable for drinking or injection), high lipid solubility (highly membrane permeable), efficient pulmonary absorption (bronchodilation is common) and its rapid transfer across the blood brain barrier within seconds to minutes of use [6]. It is usually not consumed and absorbed via the gut and therefore does not undergo first pass metabolism and detoxification in the liver before reaching the target organ, the brain.

Cannabis has around 400 bioactive molecules, over 60 of which are characteristic of cannabis and are therefore called cannabinoids [7]. Of these, the most psychoactive contribution is made by 9 delta tetrahydrocannabinol (9 Delta-THC), via CB1 receptors in the central nervous system. It is an hallucinogen because of its effect on the individual's perception, especially in high doses and those vulnerable to mental illnesses, such as schizophrenia and bipolar disorder [8]. Adolescents may be especially prone to the psychoactive effects of 9 Delta THC, because of their developing brain [1,9].

Cannabis use by adolescents has been associated with medical, cognitive and psychological sequelae [10], as well as psychosocial indices of disadvantage and social marginalization. Adolescents who are illicit drug users are more likely to be involved with sexual [11] and criminal behaviours [12], school related problems such as poor academic performance, school absence and have a greater chance of being expelled from school [1,13]. Illicit drug use by adolescents, including cannabis, increases the risk of car accidents, homicide, suicide and medical problems, which raise the mortality rate [1]. What is not clear is whether these are a direct effect of cannabis, a reverse effect upon cannabis use or that both psychosocial disadvantage and marginalization result from a third factor such as parental mental illness or genetic vulnerabilities shared by both.

Impacts of cannabis use on children and adolescents should be of special concern because of the duty of adults to protect young people from potential harm and the reliance of young people upon us to do so. Their vulnerability because of the rapid changes in their developing brains remains an unresolved concern [14].

EPIDEMIOLOGY OF CANNABIS USE

Cannabis rates of use are estimated between 2.8% and 4.5% of world inhabitants aged 15–64 years [4]. It is the most widely used illicit drug in developed countries after alcohol [15]. In the USA, according to a survey on drug use undertaken in 2013, cannabis

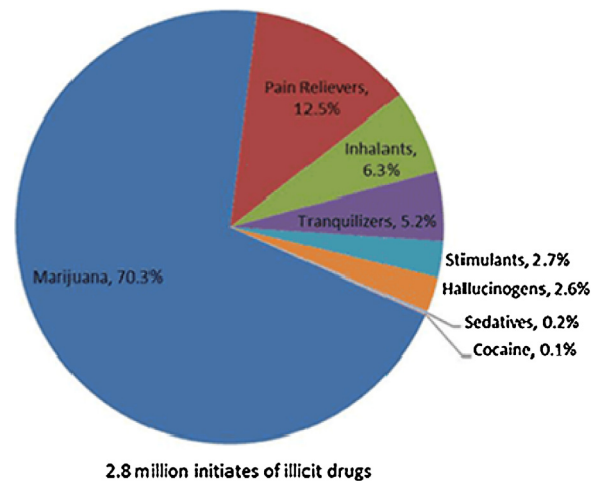


Figure 1. First specific drug associated with initiation of illicit drug use 2013 [derived from Johnston et al. [3]].

was the most commonly used illicit drug; 8.8% of adolescents were current illicit drug users and 7.1% of the adolescents were current cannabis users [16]. Another large American survey, the Monitoring the Future Study (MTF) which has studied trends in prevalence of cannabis among teens (8th, 10th and 12th graders) for the period 1975–2013, has shown that cannabis was the most prevalent illicit drug used by teens [3] (Figure 1). This finding was explained by the teens' perception that cannabis is safe. Figures 2 and 3 highlight the changing profile of illicit drug use and declining pattern of tobacco use.

According to a research report on cannabis abuse published in July 2005 by the National Institute on Drug Abuse (NIDA), more than 40% of the American population aged 12 years and older have tried cannabis at least once [17].

In New Zealand's well-known longitudinal childhood to adult study, the Christchurch Health and Development study (CHDS), cannabis use was very common among young people with 80% of young individuals using cannabis before the age of 25 years and 12.5% of the cohort met DSM-IV criteria for cannabis dependence [18]. Persistent cannabis users showed neuropsychological decline from childhood to midlife [9]. The rate of use has slightly increased in Australia [4]. It was recently reported (2014) that 34.8% of Australians aged 14 years and over have used cannabis at least once in their life [19]. Furthermore, 14.8% of 12–17 year olds have tried cannabis, such that it is considered the most commonly used illicit drug among this age group [20]. In 2005–2006, in 50.1% of young Australian substance users, aged 10 to 19 years, cannabis was the most prevalent drug of concern followed by alcohol (23.4%), while the least reported drug class used was opioids (5.9%) [21]. The prevalence of cannabis abuse and dependence among the cannabis users has been reported at 18% [22].

However, cannabis use in non-urban indigenous Australians has been found to be endemic, with over 70% of males and 20% of females being current users [23]. The preferred method of delivery is often a "locally fashioned bucket bong" which contains cannabis mixed with tobacco. It delivers a rapidly absorbed intense dose to the user. In the remote indigenous populations, heavy use, [defined as > 6 cones per day] was found in approximately 90% of users. Not surprisingly, around 90% of users reported symptoms of cannabis dependence which continued for over 5 years of follow-up. The cost of cannabis and tobacco dependence ranged between 30% and 60% of the median weekly income for these people. The chronic users were, as expected, less likely than non-users to participate in education or training, more likely to report psychiatric symptoms and more likely to have been imprisoned [23].

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