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Title:

Adolescent Cannabis Use and Risk of Mental Health Problems – The Need for Newer Data

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Recent high profile meta-analyses have reported that adolescent cannabis use is not a major risk factor for a number of previously linked mental health problems (e.g. 1, 2). For example, Gobbi and colleagues recently reported in a meta-analysis of longitudinal studies that adolescent cannabis use was not significantly related to anxiety in young adulthood, and modestly related to depression (1). However, their meta-analysis was based on studies using outdated data. For the seven studies included in their meta-analysis, the weighted average year of cannabis use measurement was 1997 (see Table 1). Six of these seven studies measured cannabis use before the year 2000, with some beginning as early as 1983.

While Gobbi et al. briefly acknowledged that cannabis potency has increased over the past several decades (1), it is important to quantify this change in order to provide proper context. Cannabis potency – measured by Δ^9 -tetrahydrocannabinol (THC) percentage – has risen dramatically. In the USA, average THC percentage of seized herbal cannabis has increased from <1% in 1975 (10), to 4% in 1996 (11), and 17% in 2017 (11). In Canada, average THC percentage also increased from <1% prior to 1980 (10), to 6% in the late 1990s (10), and roughly 15% in 2016 (12). Today, herbal cannabis sold from legal outlets in Canada and the USA can reach almost 30% THC content (13, 14). New evidence indicates that extremely potent cannabis concentrates (i.e. resins extracted from herbal cannabis), which averaged 55% THC content in the USA in 2017 (11), are also becoming more popular (11). Washington State provides an alarming example, where within two years of cannabis legalization, cannabis concentrates represented 21% of all legal sales and averaged 69% THC content (14).

Beyond the rise of THC levels, as technology and production methods improve, the chemical profiles of newly engineered cannabis strains may be becoming more harmful (11). For example, the ratio of THC to cannabidiol (CBD) – a cannabinoid thought to moderate the effect of THC – has increased in the USA from 23:1 in 2008 to 104:1 in 2017 (11).

Adolescence has been identified as a particularly vulnerable period for cannabis use, as the brain is still developing (15). Early evidence suggests that adolescents generally lack the capacity to titrate high-potency cannabis (i.e. self-regulate dosage; 16). Consequently, adolescent users are being exposed to more THC than ever before. If THC is suspected to explain the relationship between adolescent cannabis use and depression and anxiety (1, 15), then studies conducted in the 20th century are of little use.

Research regarding other mental health problems is similarly problematic. For example, a recent meta-analysis (17) regarding cannabis and risk of psychosis included numerous studies measuring cannabis use in the 20th century, including the landmark study of Swedish conscripts evaluated in 1969-1970 (18). This is concerning given new research suggesting that using high-potency cannabis increases risk of psychotic disorder significantly more than low-potency cannabis (19).

Understanding the mental health effects of adolescent cannabis use is critically important, especially as more jurisdictions move toward decriminalization and legalization of cannabis use. It is clear that longitudinal studies using more recent cannabis use data and better measurement of cannabis potency are required.

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Table 1: Summary of adolescent cannabis use measurement years for longitudinal studies included in the Gobbi et al. meta-analysis examining adolescent cannabis use and risk of anxiety and depression.

Included studies	Country(s)	n	Years of adolescent cannabis use measurement*
Brook et al., 2011 (3)	USA & Puerto Rico	837	1990, 1993-1997 [†]
Brook et al., 2002 (4)	USA	736	1983, 1986
Degenhardt et al., 2013 (5)	Australia	1,943	1993-1995
Gage et al., 2015 (6)	UK	4,561	2007-2008
Georgiades & Boyle, 2007 (7)	Canada	1,282	1983, 1987
Marmorstein & Iacono, 2011 (8)	USA	1,252	1989-1996
Silins et al., 2014 (9)	Australia &	2,443	1996, 1998
(3 cohorts)	New Zealand	1,265	1990-1992
		1,943	1992-1995
		Weighted average	1997[§]

*Years presented are when measurement occurred, but measurement was retrospective for all included studies (e.g. past 12-month use, cumulative frequency of cannabis use by age 16, etc.).

[†]Cannabis use was also measured in early adulthood from 1997 to 2007.

[§]Average year of cannabis exposure measurement was used in calculating the weighted average (e.g. 1992.5 for Marmorstein & Iacono).