

Use of Cannabis Concentrates by Adolescents

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In 1996, the state of California was the first state to legalize medical marijuana. Since then, the landscape has changed dramatically regarding the legalization of both recreational and medicinal marijuana. Currently, 10 states plus the District of Columbia have legalized recreational marijuana and 31 states have legalized medicinal forms of marijuana. In the wake of these state-level changes, clinicians, public health providers, and health policy planners have raised concern that greater availability and use of marijuana by adults along with decreased perception about the harms of marijuana use by adolescents will result in higher use rates and adverse consequences among adolescents. Thus far, these concerns have not fully materialized. Although rates of marijuana use among adolescents have remained relatively stable over the past 5 years, rates are still persistently high, with 5.8% of high school seniors reporting daily use of marijuana.¹ This is in contrast with declining rates of other substances such as alcohol, cigarettes, and prescription opioids.

The United States is also currently experiencing an unprecedented increase in the use of electronic cigarettes (e-cigarettes) and vaporizers by youth. Between 2011 and 2018, the rates of vaporizer (including e-cigarette) use by high school students increased from 1.5% to 20.8%.² Data from the Monitoring the Future study¹ reveal that of youth who have ever vaped (21%, 32%, and 34% of eighth-, 10th-, and 12th-graders, respectively), the majority report vaporizing “just

flavors only” (65%–66%). High numbers of “ever vapers” reported vaping nicotine (13% of eighth- and 20% of 10th- and 12th-graders).³ E-cigarette and vaporizing devices are highly appealing to youth, and products such as Juul are shaped like a flash drive and can be used discreetly. E-cigarettes and portable electronic vaporizers can also be modified to enable teens to vaporize dried cannabis leaves and buds as well as high-tetrahydrocannabinol-content concentrates and extracts. These cannabis concentrates are produced by using solvents such as butane to create products such as butane hash oil, wax, dabs, or shatter or with nonsolvents such as ice water to produce hash and/or hashish, bubble hash, or rosin. These can deliver amounts of tetrahydrocannabinol as high as 39% to 80%. Researchers have found that 8.9% of middle and high school students and 29% of college students report ever vaporizing cannabis products.^{4,5} However, we know little about the extent of overall use of cannabis concentrates by those youth who use marijuana.

The study by Meier et al⁶ in this month’s issue of *Pediatrics*, entitled “Cannabis Concentrate Use in Adolescents,” is the first report in which rates of use of these highly potent forms of marijuana by adolescents are described.⁴ Using a state-wide, ethnically diverse sample of 46 850 middle and high school students (grades 8, 10, and 12) in Arizona, Meier et al⁶ found that 33% of students reported lifetime use of any cannabis

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product, and of these lifetime users, almost three-quarters (72%) had also used concentrates. In addition, they found that those students who reported using concentrates were more likely than cannabis nonusers or cannabis concentrate nonusers to be women, to report using other substances, and to endorse risk behaviors such as rebelliousness and academic failure. Lower rates of protective factors were also reported by this subgroup.

There are many reasons why medical and public health providers should be concerned about the findings from this study, the recent increases in rates of both e-cigarette and vaporizer use overall, and cannabis product use in vaporizers, especially after we have seen such dramatic declines in the use of substances such as tobacco and alcohol by adolescents over the past 3 decades. The average potency of tetrahydrocannabinol in cannabis has increased from 3% to 4% in the 1980s to 17% to 20% currently, and up to 80% with concentrates and extracts. This increases the possibility that toxic and adverse effects may become more frequent and clinically significant. The medical and mental health consequences of cannabis use have been well described and include

respiratory complaints, intractable vomiting such as with cannabis hyperemesis syndrome, cognitive deficits related to learning and memory, and increased risk for developing psychosis. More recently, reports regarding cardiac complications such as arrhythmias and myocardial infarction have become more common and may be the result of the higher potency of tetrahydrocannabinol in available cannabis. These concerning trends argue for renewed efforts to provide better prevention and education regarding the consequences of both marijuana and e-cigarette and/or vaporizer use. Increased efforts to regulate tetrahydrocannabinol concentrates and the delivery systems that teens are using to vape nicotine, flavorings, and marijuana, increase the minimum mandatory age to purchase all e-cigarette products to 21 years, and restrict marketing and advertising aimed at adolescents are clearly warranted. Additional research and reports such as that by Meier et al⁶ may be the impetus needed to bring about much-needed oversight, education, and regulation.

ABBREVIATION

E-cigarette: electronic cigarette

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