What Psychologists Need to Know about Δ9-THC in Recreational Cannabis: Deciphering Science from Spin

by Susan D. Writer, Ph.D.

Recently, before I began a presentation about the science and clinical implications of today's cannabis, I asked my audience of mental health professionals about their perceptions of recreational cannabis. Some examples of the responses I received included, "I work with a lot of people who say that it helps their migraines, appetite, or insomnia, etc."; "I don't see what the big fuss is about; I mean, we've had medical marijuana for over a decade"; "It's no different from alcohol or cigarettes, so if those are legal, why shouldn't pot be legal too?"; "It's natural and organic, so it can't be all that bad for you"; "Marijuana is not as much of a problem as other drugs of abuse because it isn't as addictive or potent"; "I wouldn't want my kids using it, but it's fine for adults who just want to have a good time." In the group of over 100 clinicians, only a few articulated specific concerns: One addiction treatment provider expressed the concern about increased cannabis addiction (across all ages); another psychologist shared concerns about the adverse effects that marijuana has on symptoms such as rebound anxiety and increased flashbacks in people suffering from anxiety disorders or PTSD, which comprise the majority of his practice; another therapist who works at an inpatient psychiatric hospital expressed concern about the increases in cannabis-induced psychosis that they are seeing at the hospital. What was perhaps most interesting is that the no one in the audience delineated between different types of cannabis or different types of cannabinoid compounds and their differential effects.

I have found through my outreach, educational, and advocacy work in the community, and in concert with other clinicians, academicians, law enforcement professionals, advocacy groups, and judges from across the state of California that the group of clinicians from that presentation, albeit not randomly sampled for a research study, is actually a pretty decent representation of the average Californian's views and understanding of cannabis and recreational use. This understanding has informed voting, policy, and behavior in recent years. Where do we derive our views, beliefs, and opinions about cannabis use? Is our understanding of cannabis rooted in scientific facts, or is it rooted in "facts" that are delivered to us through savvy marketing campaigns, biased consumers, or industry propaganda?

Let's start by focusing on some of the specific "facts" which are often debated on social media, in journalism, "fake news," and across households, as well as some of the aforementioned comments made by colleagues. An internet search on facts about marijuana versus alcohol will yield dozens of hits including images such as the one below.

The websites from which such "facts" are derived will often be well designed and feature testimonials and "science" to support and substantiate their findings.

Before addressing these specific claims, it is important to clarify some of the terminology used in reference to marijuana. The industry has moved toward the use of the term "cannabis" instead of "marijuana". This, in part, is to help consumers make the association with active cannabinoid compounds that contribute to marijuana's effects. The flowers, leaves, stems, seeds, and extracts are derived from two plants, *Cannabis sativa* (plant strains with delta-9 tetrahydrocannabinol (Δ9-THC) dominance) and *Cannabis indica* (plant strains with cannabidiol (CBD) dominance), which contain over 500 chemicals, and over 80 phytocannabinoids that interact with the human endocannabinoid system. . Δ9-THC and CBD are the most widely researched compounds in the cannabis plant; they have similar effects on the body in some areas and opposing effects in others.

Δ9-THC has psychoactive properties that cause the "high" experienced by users that increases with potency (CBD does not have these psychoactive characteristics). The increased availability of and risk of psychoactive effects of Δ9-THC is the primary focus of concern among health care professionals. Ultimately, of all of the cannabinoids, Δ9-THC is the compound most associated with addiction, risk, and negative social, psychological, and/or health.

There has been a considerable shift in potency of Δ9-THC available to consumers over the last several decades. The amount of bioavailable Δ9-THC grown in *C. sativa* plants has increased from 3-5% in the 1960s and 1970s, to 10-12% Δ9-THC by the late 1990s. This statistic applied to both smoked cannabis and cannabis that is used to make baked goods like cookies and brownies. Today, the average amount of Δ9-THC in smoked products is 18-35% (available at any dispensary for both "medicinal" and recreational use), with Δ9-THC levels up to 90%+ in extracts. These extracts are consumed through vaporizers, injections, free-basing, snorting, used in edible baked goods such as gummy bears, brownies, and cookies, or infused in teas, sodas, and alcohol. Even "CBD products" contain as much as 6-12% Δ9-THC to provide a psychoactive effect in addition to whatever effects are experienced from the CBD alone.

It is these implications and ramifications of higher potency that we need to understand as clinicians, consumers, and competent conveyors of information in our community, especially when it comes to intelligently accessing and using cannabis, addressing myths or half-truths, and making comparisons across situations and circumstances.

With regard to comparative research, current NIDA and NIH-funded research on cannabis is strictly controlled with limitations on the amount of Δ9-THC in both cigarettes and bulk cannabis for use with human subjects. Until 2016, the highest available percentage of Δ9-THC available in cigarettes was <8% and the highest available Δ9-THC in bulk cannabis was <10%. In early 2018, NIDA began to release bulk Δ9-THC at 12-14% levels for the use of research in human subjects. The majority of cannabis research conducted prior to 2012 was with a Δ9-THC level of 5% or less, and research findings up until 2016, could only investigate the effect cannabis with 10% Δ9-THC or less. Hence, when marketing representatives and cannabis industry leaders point to the "evidence" from previous research studies that "proves" that cannabis has no deleterious effects on the brain or body, they are citing research that does not evaluate the Δ9-THC levels of the products that they grow, manufacture, or sell. Indeed, there are NO DATA on the effects of the higher, Δ9-THC potency cannabis (in part, because NIDA and NIH have not deemed the higher potency cannabis to be safe to test on human subjects).

Epidemiological data from the California Hospital Association, and San Diego Department of Emergency Management, and San Diego County Health and Human Services Agency's Medical Examiners' Office reveal that there has been an increase of 830% in Δ9-THC cannabis-related emergency department admissions in San Diego County between 2006 and 2014 (from 1,108 to 10,302 admissions). In 2016, the San Diego Medical Examiners' Office reported 462 deaths related to Δ9-THC cannabis. Individuals seek emergency medical attention for cannabis hyperemesis syndrome and cyclical vomiting syndrome (also called scromiting), chest pain, acute cannabis-induced psychosis, panic attacks, tachycardia, respiratory failure, and stroke-like symptoms. Cannabis and cannabis-drug interactions have also been implicated in motor vehicle accidents, suicides, and homicides. These data do not include those seeking treatment for cannabis withdrawal or cannabis addiction.

Referring back to the "fact sheet" in the figure above, it is important to look at the history of two high profile substances that have run the course from panacea to highly problematic. (1) Tobacco cigarettes were initially marketed using physician 'recommendations' and testimonials from consumers. Today, the dangerous effects of cigarette smoke are unequivocal. It took 50 years and over 7,000 scientific publications before the Surgeon General put warning labels on tobacco products. (2) When opiates were first introduced into the medical marketplace, they were touted as 'miracle drugs' that had little potential for addiction and a low threshold for problematic use or negative consequences; today we have an Opiate Epidemic because of our willingness to blindly trust what an industry was telling us over what our objective eyes were seeing. When individuals began dying from prescription opiate overdoses, those deaths were often as attributed to "respiratory failure" or "heart attack" without any mention of the medication or substance that the deceased had taken The medical community and the public simply did not believe that the average individual could die from prescription opiates and therefore, there was no further inquiry or investigation into cause. The (false) assumption was that an individual who died and happened to have opiates in their system, must have had some underlying health condition which made them vulnerable. Deaths related to prescription opiates continued to be under-reported or unreported for years, not because of an industry cover-up, but because of ignorance and an assumption of "lack of harm."

There is a sense of déjà vu when it comes to our recent attitude toward cannabis. Can history teach us to be more vigilant? Let's revisit our chart with some evidence-based edits:

Propaganda versus Science	
Alcohol	**Cannabis**
Propaganda: Addictive & Health-Damaging **Science:** Alcohol *can be* addictive and health-damaging but not all individuals who consume alcohol will become addicted and not all consumption will cause negative health outcomes. There are mixed findings surrounding the possible benefits to consuming small, regular amounts of some types of alcohol.	**Propaganda:** Non-Addictive & Healing **Science:** Δ-9 THC has psychoactive effects which can be addictive. There is evidence that many different types of cannabinoids can have health benefits and many studies are being conducted to research specific cannabinoid-related health outcomes. To date, three different forms of cannabinoid-based products are FDA approved for medical use: Epidiolex, Marinol, and Syndros, as well as Cesamet which has a chemical structure similar to THC.
Propaganda: Depressant **Science:** Depressant	**Propaganda:** Anti-Depressant **Science:** Hallucinogen. Some cannabinoids are also classified as: Anxiolytic, Anti-Inflammatory, or Antiemetic.
Propaganda: Causes cancer **Science:** Can cause cancer (specifically to the liver)	**Propaganda:** Cures cancer **Science:** Limited research currently. Studies underway to examine the possible effects of CBD on preventing cancer growth and the effects of Δ-9 THC and other cannabinoids on slowing cancer growth.
Propaganda: 1,000,000 + Annual Deaths **Science:** 1,000,000 + Annual Deaths	**Propaganda:** Zero deaths. Ever! **Science:** In San Diego County (and others where cannabis is legal for recreational use), just beginning to collect data about cannabis' role in causing death. Statistics available only on a county-by-county basis.

Propaganda: Costs (Wastes) billions **Science:** Raises billions in tax revenue but costs billions more in health care costs, property damage, regulation (e.g., ABC, ATF, etc.), enforcement (e.g., law enforcement for DUI, underage drinking, etc.) and associated legal costs, and social costs (vocational, familial).	**Propaganda:** Saves billions! Wastes nothing! **Science:** Will likely raise billions in tax revenue but will likely costs billions more in regulation, enforcement (e.g., law enforcement for DUI, underage use, etc.), property damage, and associated legal costs, already costs millions in health care costs and social costs (vocational, familial).
Propaganda: Deaths due to overdose daily **Science:** Deaths Due to Alcohol Poisoning and Alcohol-Related Injury/ Medical Condition Daily	**Propaganda:** Overdose is physically impossible! **Science:** Cannabis-poisoning physically possible and death due to cannabis poisoning recorded as well as deaths due to cannabis-related injury/medical condition. National statistics currently unavailable.
Propaganda: Destroys brain, liver, & other cells **Science:** Continuous or regular exposure over time can cause damage to brain, liver, and other cells. Fetal exposure to alcohol can cause lifelong brain damage and psychological effects.	**Propaganda:** Protects, grows, & repairs cells! **Science:** Continuous or regular exposure over time can cause damage to the brain with associated memory, intelligence, motor-coordination, and negative mood implications. Fetal exposure to cannabis can cause brain damage, stillbirth, and neonatal complications. Some cannabinoids may help to protect, grow, and/or repair cells – research is currently ongoing in this area.
Propaganda: Accidentally flammable **Science:** Accidentally flammable	**Propaganda:** Intentionally combustible **Science:** Intentionally combustible (why is this good?)
Propaganda: Toxic **Science:** Toxic and can be used to sterilize/clean.	**Propaganda:** Reparative **Science:** Δ-9 THC can be toxic. The reparative possibilities of Δ-9 THC and other cannabinoids currently under investigation.

Propaganda: Hangover & pain **Science:** Possible hangover and/or pain after use if dehydration occurs	**Propaganda:** Restful Sleep **Science:** Some cannabinoids have been shown to help with initial insomnia. Research indicates that individuals may develop tolerance to anti-insomnia effects.
Propaganda: Vomiting & nausea **Science:** Vomiting and nausea possible when intoxicated or experiencing alcohol poisoning	**Propaganda:** Laughter & "The Munchies" **Science:** Cannabinoids shown to improve appetite and are FDA approved for this purpose. Some individuals experience euphoric state when using Δ-9 THC; but Δ-9 THC intoxication and/or poisoning can also cause psychosis with paranoia or cyclical vomiting syndrome (scromiting)
Propaganda: Causes Domestic/Public violence **Science:** Intoxication may cause euphoria, emotional numbing, or exuberance. Intoxication may also cause sadness, depression, or aggression which can lead to relationship, sexual, or physical violence or self-harm	**Propaganda:** Causes DVD Rentals/ Pizza Orders **Science:** Intoxication can cause euphoria, decreased anxiety, or calmness. Intoxication may also cause panic, paranoia, psychosis, or agitation. For those who experience anxiolytic effects during inebriation, they often experience rebound anxiety once the effects have worn off.

Propaganda: Legal **California Law:** Legal for use in individuals over the age of 21. Illegal for use in individuals under the age of 21. Social Hosting Laws apply. Driving restrictions - .08 BAC considered DUI in adults, zero tolerance in those under the age of 21. Open container laws, public intoxication laws, and ramifications for service industry if they allow an individual known to be intoxicated to drive. FDA regulated, and alcohol by volume must be labeled on all containers for retail sale. Most workplaces have policies and procedures about working while intoxicated on alcohol, and may terminate an employee for alcohol intoxication on the job. Employees may be subject to pre-employment health examinations or random UA screens to determine eligibility for work.	**Propaganda:** Finally Legal in California! **California Law:** Legal for use in CA Residents over the age of 21. Illegal for use in individuals living in CA under the age of 21. Illegal Federally. Social Hosting Laws apply. Driving restrictions – currently an "impairment-based" protocol, if the officer can demonstrate impairment in someone at any age, the person can receive a DUI and all current DMV DUI laws apply as with alcohol. Public intoxication laws. Not-FDA regulated, so no quality assurance or control over dosing or labeling. Many workplaces have zero tolerance drug policies and procedures which include cannabis, and may terminate an employee for intoxication on the job or failing a random drug screen. Employees may be subject to pre-employment health examinations to determine eligibility for work. Cannabis may not be consumed in any fashion in HUD Housing or Veterans Housing, doing so may cause eviction and make the person ineligible for future housing. Smoked cannabis subject to all laws regulating cigarette smoking/vaping (e.g., not in public buildings, in school zones, smoke-free housing/offices, restaurants, etc.).

In conclusion, today's cannabis isn't your grandmothers' marijuana! Cannabis products that are available in the marketplace at dispensaries are far more potent than before and individuals who are using these products are often unaware of what they are purchasing or consuming. The purpose of this article is to give the reader a glimpse of some of the issues that we see in the areas of prevention, intervention, and treatment with cannabis, and what emergency medical providers are experiencing daily in their emergency rooms. Please join us at the SDPA Fall Conference to learn more about the biochemical composition of cannabis and to examine specific clinical ramifications of cannabis intake so that we can competently assess, evaluate, diagnose, and treat, in the context of widespread recreational cannabis use post-legalization in California.