

# Association Is Not Causation in Cannabis Research

By Jahan Marcu, PhD, Editor in Chief

“There is no research on cannabis” is a myth conception frequently encountered. Yet, while stating there is no research on cannabis, many sources are still willing to infer causality and contend that cannabis is both the cause of and answer to various health problems.

A search for “cannabis” on the Web of Science yields more than 100,000 articles; thus, the first part of our mythic tale is a nuanced misconception. Although it is true that cannabis research in the United States is restricted, it would take a lifetime to read all the studies published over the past 100 years. The studies that have been approved are largely observational studies and case reports (Figure). Thus, they are limited due to lack of control and the potential influence of confounding variables, and typically are not appropriate for the purposes of inferring causation.<sup>1</sup> However, these studies are useful as foundational information, hypothesis generation, and when enough of them exist around a particular subject, the data can be mined to shed light on potential causal relationships.

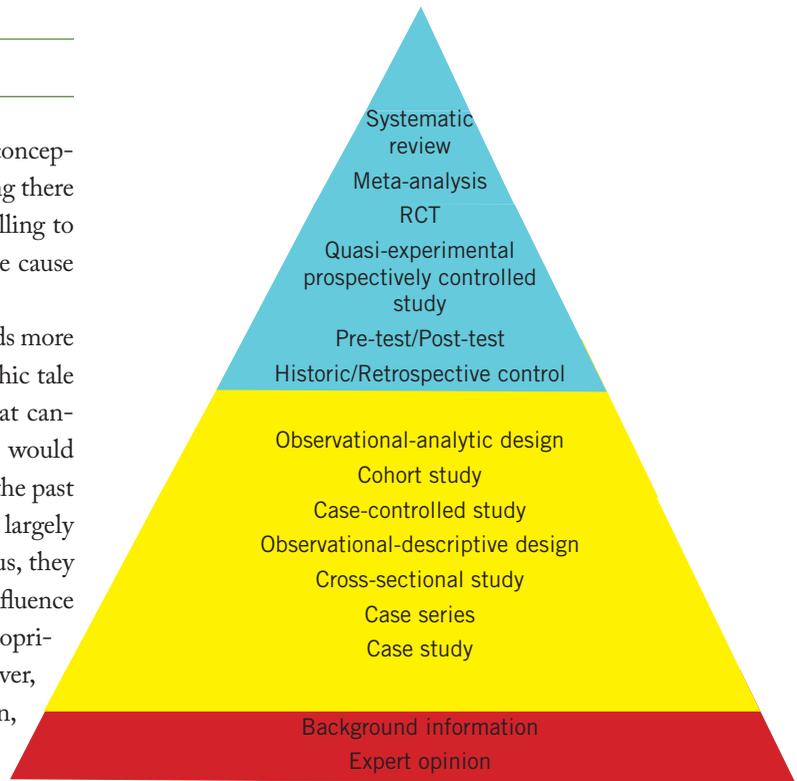
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—Jahan Marcu, PhD

Due to the nature of observational studies, much of the data presents as associations or correlations with cannabis. So, event A and event B can be linked to each other, but not causally. For example:

*“Case in point: Are you aware that there’s a 95% correlation between cheese sales and the number of people who’ve strangled themselves by their own bed sheets in the past 10 or 20 years? There’s also the classic example that links ice cream sales and drowning. These examples may demonstrate an association or link but perhaps are better explained by secondary correlations. ...*

*One can say that coffee causes people to be jittery if they drink too much. But no one contends that drinking a cup of coffee will give you attention-deficit hyperactivity disorder (ADHD). Similarly, too much THC, while not fatal, can trigger transitory*



**Figure.** Studies on cannabis are primarily observational; limitations include lack of control and confounding variables.

*anxiety or paranoia, but that doesn’t mean THC causes mental illness. If a drug immediately triggers an experience or has an effect that mimics the symptom of a disease, it doesn’t necessarily mean that the drug causes that disease.”<sup>2</sup>*

Many sources confuse association with causation when assessing the risks and benefits of cannabis. A handy strategy for navigating cannabis and hemp claims is to mentally replace all references to causal effects with references to associations. Causal questions in an observation study are difficult to formulate; hence, randomized controlled trials provide more experimental control and can infer causality. An observational study cannot prove causation unless painstakingly designed to do so.

## References

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2. Marcu J. Channeling Anslinger: cracks in a crackpot book about pot. Published March 1, 2019. Accessed September 23, 2019. <https://www.projectcbd.org/culture/channeling-anslinger-cracks-crackpot-book-about-pot>.