Do cannabis users reduce their THC dose when they use more potent cannabis products?

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The US cannabis market after legalisation

• Cannabis potency has increased since legalisation

• More potent cannabis products
  • More potent cannabis flower (16-20%)
  • Cannabis extracts and concentrates (59-90% THC)

• Who uses the more potent products?
  • Younger males adults
  • daily users with a lower socioeconomic status ES

• Do these users titrate their doses of higher THC products
  • Can they titrate?
  • Do they in fact titrate their doses?
Reasons for concern

• Acute harms of cannabis use could potentially increase:
  • Accidents
  • Acute adverse reactions
  • Psychotic symptoms

• Chronic adverse outcomes that could potentially increase:
  • Cannabis dependence
  • Psychosis
  • Depression
  • Cognitive impairment
  • Educational underachievement
Relevant evidence on dose titration

• Experimental laboratory studies of dose titration

• Observational studies of patterns of use of high potency cannabis

• Surveys of cannabis users’ reports when using high THC cannabis

• Ecological associations between THC content and adverse outcomes
Experimental studies

• Samples of relatively experienced cannabis users

• Under double blind conditions asked to smoke or vape
  • cannabis that differed in THC content and
  • to titrate their doses of cannabis that differed in potency

• These studies report:
  • Fewer, shallower puffs when smoking more potent cannabis
  • In some studies, higher blood THC after using more potent cannabis
  • Self-reported larger effects from more potent cannabis in some studies
Naturalistic observational studies

• Regular cannabis users observed using in their usual surroundings

• Observed when using more and less potent cannabis
  • Obtained self-reports on the effects of cannabis
  • Some studies measured THC levels

• Evidence of incomplete dose titration
  • Different smoking topography when using more potent cannabis
  • No difference in self-reported effects of cannabis
  • But higher THC blood levels when using more potent cannabis
Surveys of cannabis users self-reported behaviour

• Survey of users in San Francisco reported that they titrated doses
  • 2/3 used smaller amounts of more potent cannabis
  • No measures of cannabis effects or observations of behaviour

• Survey of users in Netherlands on how they use more potent cannabis
  • Small group preferred to use lower dose cannabis
  • Younger, more dependent users used more high potency cannabis
  • Older users with long careers of use did not adjust their use
More problems in high potency cannabis users

• Higher rates of psychoses in users of higher potency cannabis
  • Di Forti et al, 2014

• More symptoms of dependence in users of high potency cannabis
  • Chan et al (2017)

• More psychological distress in users of high potency cannabis
  • Freeman and Winstock (2015)

• Potency a cause or an effect e.g. a user preference?
Ecological associations between cannabis potency and problems

- Cannabis potency in Netherlands and treatment entrants for cannabis dependence (Freeman et al, 2018):
  - Incidence increased as potency of cannabis flower increased
  - Incidence decreased when flower potency decreased below 15%

- Cannabis potency and ED attendances in Ontario (Myran et al, 2022)
  - Prevalence increased as access to cannabis extracts increased

- Limitations: not individual level data so causal inferences uncertain
Ontario, Canada ED visits for adults and youth following loosening of strict regulations on number of retail stores


![Graph showing the association between recreational cannabis legalization, commercialization and cannabis-attributable emergency department visits in Ontario, Canada.](image-url)
A provisional synthesis of the evidence

• In laboratory studies users can titrate when asked to do so
  • But adjustment may be incomplete

• Too few naturalistic studies to assess if users do in fact titrate their THC doses

• Suggestive survey evidence that users may not fully titrate their doses:
  • users of higher potency cannabis report more symptoms of cannabis dependence, psychoses and distress

  • Ecological associations between population use of higher potency cannabis and treatment seeking for dependence and psychoses

• Too few studies of uncertain relevance to new cannabis products

• Better data on the role of cannabis potency should be a public health priority
What sort of research do we need?

• More laboratory and observational studies with larger samples
  • Of higher potency cannabis flower, oils and concentrates
  • In more naturalistic settings
  • Measuring THC doses received by users

• Large scale surveys of consumers of different cannabis products
  • Characteristics of users
  • How they use these products
  • Measures of tolerance and cannabis dependence
  • Indicators of cognitive performance
  • Symptoms of depression and anxiety
  • Performance in everyday life
Policy implications

• Do we have to wait for better research before responding?

• Who bears the burden of proof?
  • Should the cannabis industry show that these products do not increase harm?
  • Must policy makers show that more potent cannabis do increase harm?

• Arguments for more restrictions on higher potency products:
  • Not what the WA and other US citizens voted for in legalising cannabis
  • If we regulate cannabis like alcohol, stricter policies are required:
    • 90% ethanol is not allowed be sold
    • States restrict where spirits can be sold
    • Governments impose higher taxes on higher alcohol beverages
Regulatory options

• A ban on the sales of high potency cannabis extracts:
  • Concerns: DIY cannabis extraction and fires and residues
  • Illicit production and supply of concentrates

• A cap on the THC content of legal cannabis products:
  • Where should the level of THC be set?
  • Costs for producers and regulators in enforcing the cap
  • Illicit production and supply of cannabis concentrates

• Graduated cannabis taxes based on THC content
  • Like alcohol taxes
  • Regulatory costs similar to labelling requirements
Key references cited


- Myran, D. T. et al. (2022). The association between recreational cannabis legalization, commercialization and cannabis-attributable emergency department visits in Ontario, Canada: an interrupted time-series analysis. *Addiction*