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Associations between drug use and well-being in the period of young adulthood:

Insights from hair analysis in a community sample

Lydia Johnson-Ferguson

ziReN 2022

Outline

- **Hair data:** updates
- **Background:** frequent teenage cannabis use in z-proso
- **Research question 1:** Can hair data yield new insights?
- **Research question 2:** What are the developmental patterns within young adulthood, up to age 24?

Hair data

We assayed about 100 substances in the hair samples!

Steroids

Cortisol

Cortisone

Testosterone

Cannabinoids

THC

CBN

CBD

Stimulants

Cocaine

Benzoyllecgonin*

Norcocain*

Cocaethylen*

OH-Cocain*

OH-Benzoyllecgonin*

Amphetamin

Methamphetamin

MDMA

MDA*

MDEA

Methylphenidat

Modafinil

Atomoxetin

4-FA

Opiates/Opioids

Morphine

Acetylmorphin

Hydromorphon

Acetylcodein

Codein

Hydrocodon

Dihydrocodein

Oxycodon

Oxymorphon

Fentanyl

Norfentanyl*

Pethidin

Tapentadol

Tilidin

Tramadol

N-Desmethyltramadol *

Dextromethorphan

Hallucinogens

2C-B

Ketamin

Norketamin*

*Metabolites

Associations of different hormonal contraceptive methods with hair concentrations of cortisol, cortisone, and testosterone

under review, Comprehensive Psychoneuroendocrinology

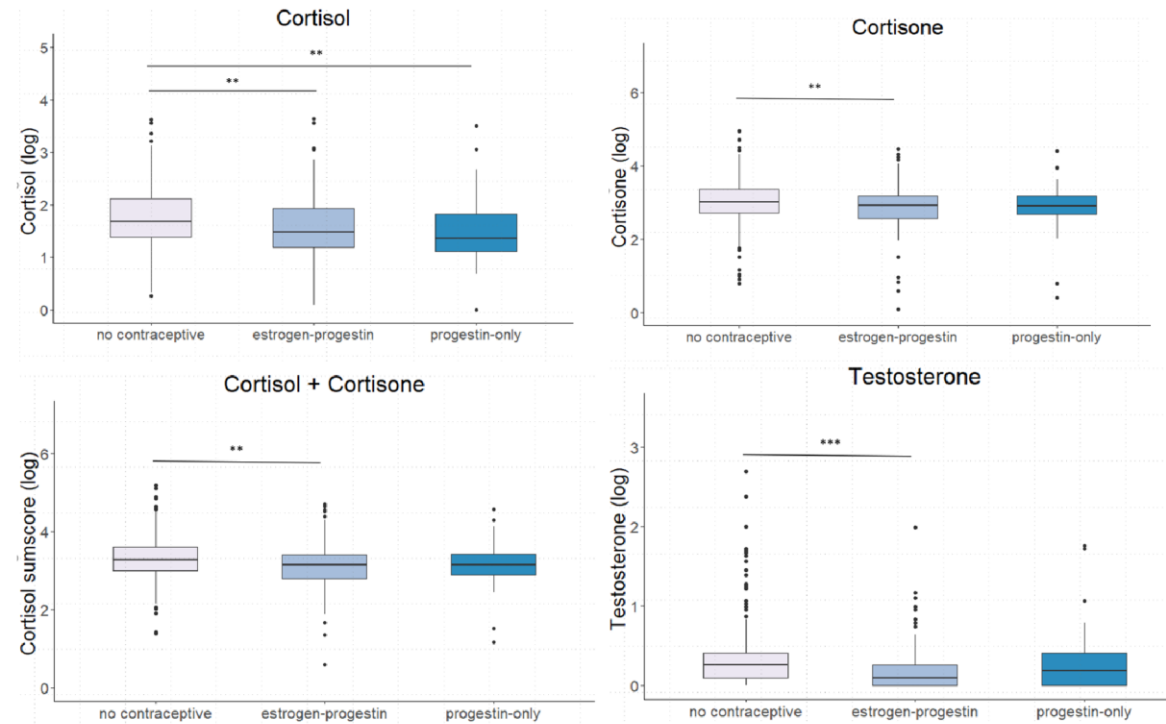
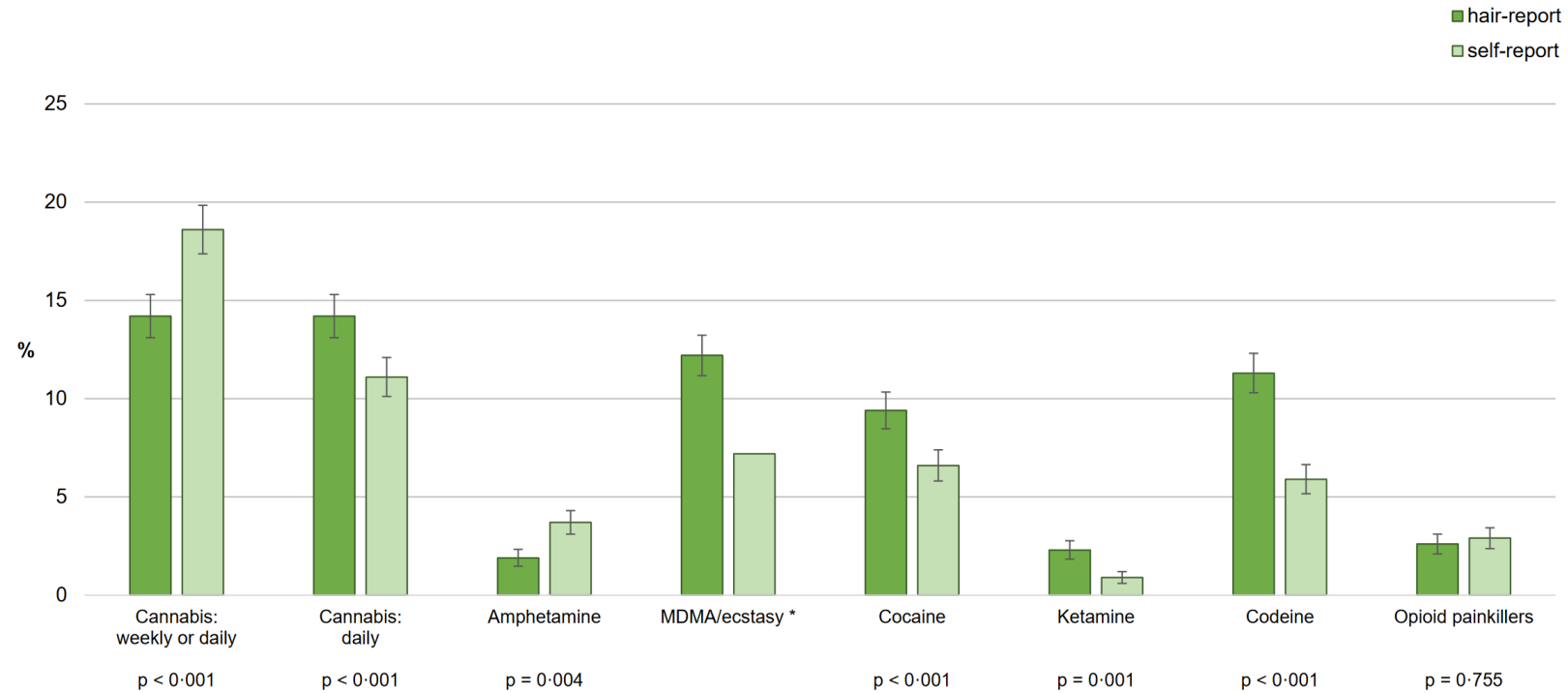


Figure 1: Interquartile range and median level for each steroid hormone by general contraceptive group. Asterisks indicate significant differences in steroid hormone concentrations between groups in multiple regression models controlling for covariates, with *no contraceptive* as the reference group (* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$).

Steinhoff, A., Shanahan, L., Bechtiger, L., Zimmermann, J., Ribeaud, D., Eisner, M., Baumgartner, M., & Quednow, B. B. (in press).

When substance use is underreported: comparing self-reports and hair toxicology in an urban cohort of young adults.

Journal of the American Academy of Child and Adolescent Psychiatry.



Substances and p values for difference between prevalence estimates from self-report vs. hair test

Prevalence of substance use: hair data vs. self-reports

- **Self-reports underestimate** young adults' exposure to illicit substances and non-medical use of prescription drugs
 - by 30-60%, depending on substance (av. = 50%)
 - More frequent users are pretty accurate reporters, sporadic users tend to be more likely to misremember.
- Underreporting could **bias associations between self-reported substance use and other variables (e.g., risk factors, outcomes).**

“Conclusion: Our study suggests that self-reports underestimate young adults’ exposure to illicit substances and non-medical use of prescription drugs. Consequently, estimates of associations between substance use and risk factors or outcomes are likely biased. **Combining self-reports with hair tests may be most beneficial** in study samples with occasional substance use.”

Background

frequent teenage
cannabis use in z-proso

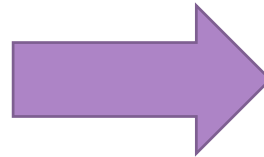
Frequent teenage cannabis use: Prevalence across adolescence and associations with young adult psychopathology and functional well-being in an urban cohort

Lilly Shanahan ^{a, b, c, d}, Annekatrin Steinhoff ^a, Laura Bechtiger ^a, William E. Copeland ^c, Denis Ribeaud ^a, Manuel Eisner ^{a, d}, Boris B. Quednow ^{e, f}

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**Frequent teenage
cannabis use
(ages 13, 15, 17)**



Age 20 psychopathology

Psychosis symptoms

Problematic substance use

Physical aggression

Internalizing symptoms

Age 20 functional wellbeing

Delinquency

General well-being

Financial difficulties

Perceived social exclusion

Not being in education and
employment

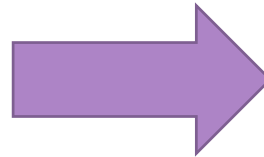
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Importance/relevance

- Almost **one in five adolescents** used cannabis frequently between ages 13 and 17
- At age 17 + **>50%** reported previous year cannabis use
→ + under-reporting? (Steinhoff et.al., in press)
- Frequent teenage cannabis use showed stronger associations with poor functional outcomes than nicotine and alcohol
- Possible **legalization** of cannabis in Switzerland: these findings underline the need to **dig deeper into associations between drug use and well-being in the period of young adulthood**

Research question 1

Can hair data yield new insights into associations between frequent cannabis use and adverse outcomes?

Can hair data help us gain new insights?

Wievielmals hast du das in den letzten 3 Monaten konsumiert?

nie einmal 2-5-mal wöchentlich (fast) täglich

Haschisch, „Gras“, Cannabis, Marihuana

Cannabidiol (CBD-Hanf; z.B. «Heimat»-Zigaretten, «Black Widow»-Hanf)

Cannabisersatzprodukte (synthetische Cannabinoide, legale Räuchermischungen; z.B. Dutch Orange, Spice, K2, Ganja Style)

Frequent teenage cannabis use (ages 13, 15, 17)

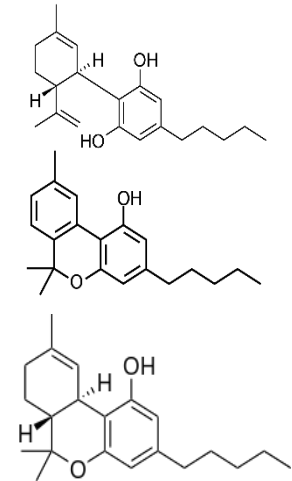
age 20 cannabis use self-report

age 20 cannabis use hair data

?

?

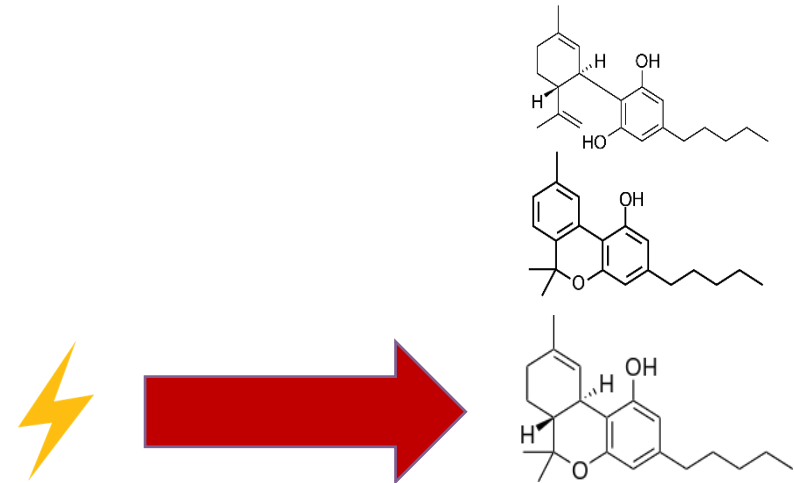
Age 20 psychopathology and functional wellbeing



Can hair data help us gain new insights?

Δ^9 -THC is the main psychoactive component of cannabis. High concentrations are associated to:

- Psychosis symptoms
- Cognitive impairments
- Cannabis dependence severity



Hypotheses

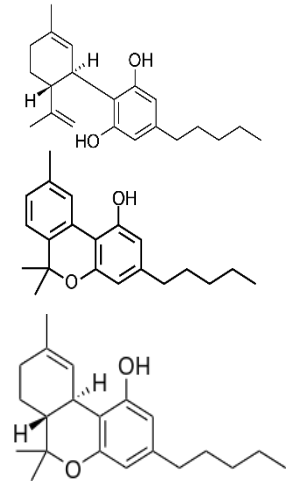
- THC concentration in hair will be the strongest predictor of adverse outcomes

(D'Souza et al., 2004, 2005, Freeman et al., 2018)

- Self-reported and pg/mg in hair cannabidiol will be the weakest predictor

(Englund et al., 2013; Niesink & van Laar, 2013).

- High CBD to THC ratio may even be a protective factor (Colizzi et al., 2020)



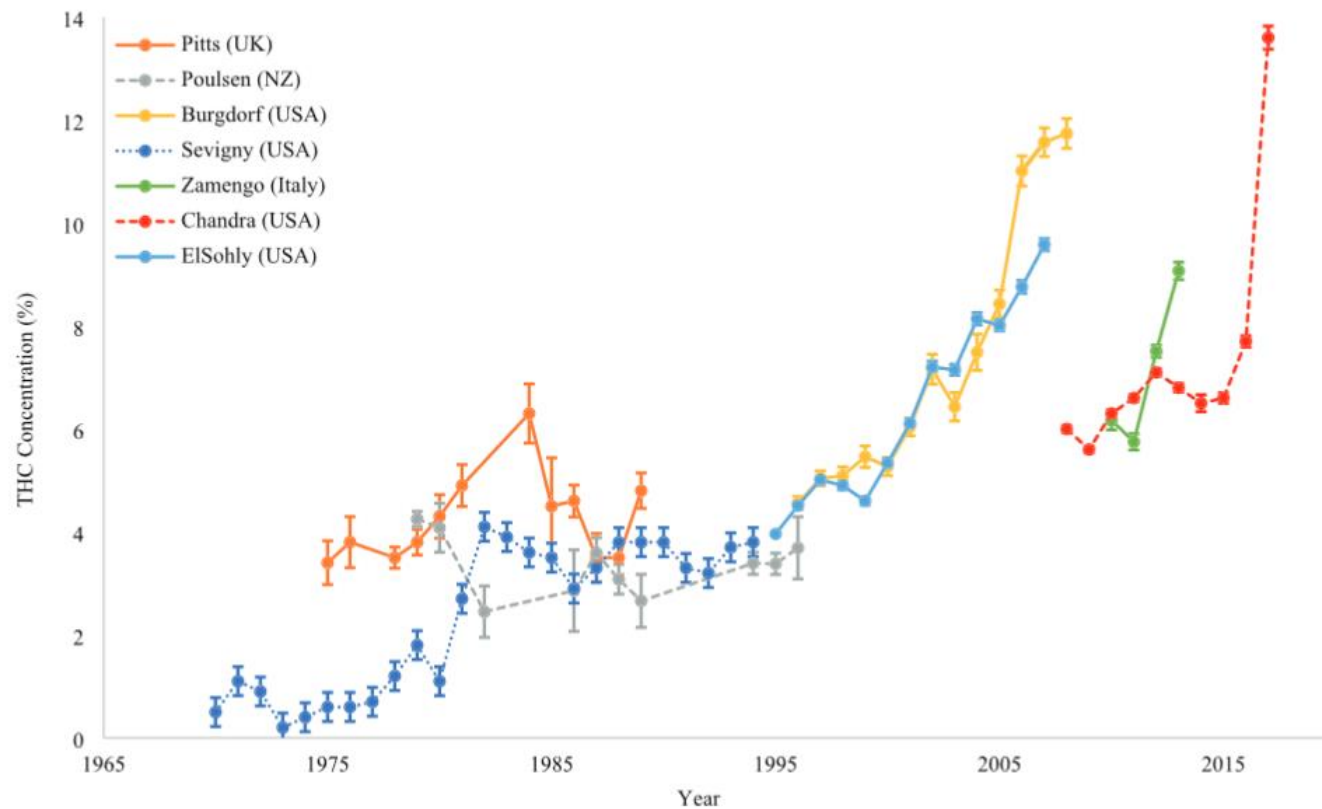


Figure 2 Mean (standard error) concentrations of delta-9-tetrahydrocannabinol (THC) in all herbal cannabis over time. [Colour figure can be viewed at wileyonlinelibrary.com]

Freeman, T. P., Craft, S., Wilson, J., Stylianou, S., ElSohly, M., Di Forti, M., & Lynskey, M. T. (2021). Changes in delta-9-tetrahydrocannabinol (THC) and cannabidiol (CBD) concentrations in cannabis over time: systematic review and meta-analysis. *Addiction*, 116(5), 1000-1010.

Monday, August 22, 2022

Marijuana and hallucinogen use among young adults reached all-time high in 2021

NIH-supported study also found past-month vaping levels rebound after early pandemic drop.




Marijuana and hallucinogen use in the past year reported by young adults 19 to 30 years old increased significantly in 2021 compared to five and 10 years ago, reaching historic highs in this age group since 1988, according to the Monitoring the Future (MTF) panel study. Rates of past-month nicotine vaping, which have been gradually increasing in young adults for the past four years, also continued their general upward trend in 2021, despite leveling off in 2020. Past-month marijuana vaping, which had significantly decreased in 2020, rebounded to pre-pandemic levels in 2021.



Psychosis, Addiction, Chronic Vomiting: As Weed Becomes More Potent, Teens Are Getting Sick

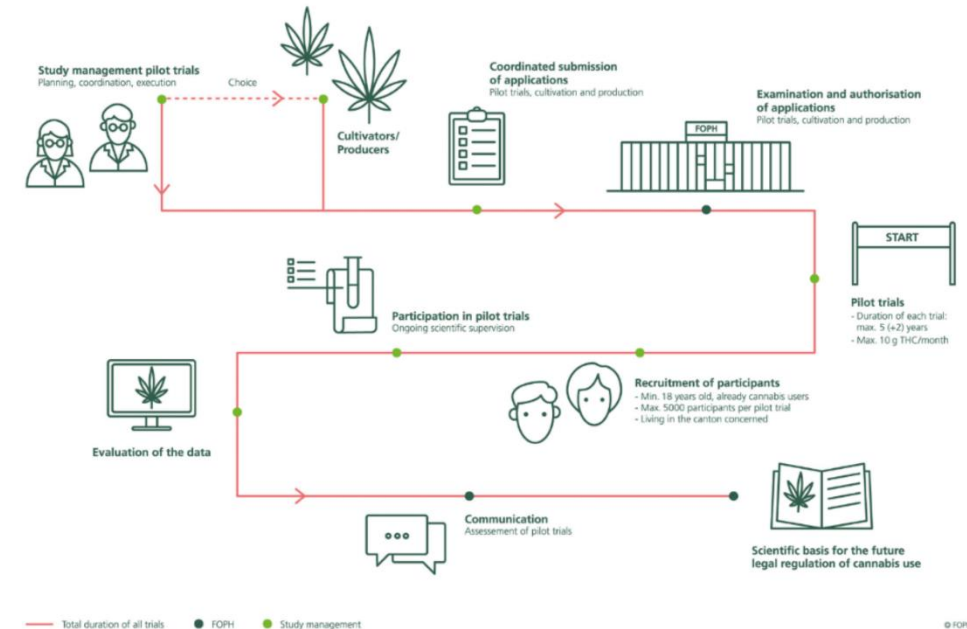
With THC levels close to 100 percent, today's cannabis products are making some teenagers highly dependent and dangerously ill.

Pilot trials with cannabis

 Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

On 15 May 2021 an amendment to the Federal Narcotics Act has come into force allowing pilot trials involving the dispensing of Cannabis for non-medicinal purposes. These trials are intended to create the basis for the future legal regulation.

Procedure for cannabis pilot trials



Research question 2

What are the developmental patterns within young adulthood, up to age 24?



Young adult sequelae of adolescent cannabis use: an integrative analysis

*Edmund Silins, L John Horwood, George C Patton, David M Fergusson, Craig A Olsson, Delyse M Hutchinson, Elizabeth Spry, John W Toumbourou, Louisa Degenhardt, Wendy Swift, Carolyn Coffey, Robert J Tait, Primrose Letcher, Jan Copeland, Richard P Mattick, for the Cannabis Cohorts Research Consortium**



Original Paper | [Full Access](#)

A prospective study of the substance use and mental health outcomes of young adult former and current cannabis users

Edmund Silins , Wendy Swift, Tim Slade, Barbara Toson, Bryan Rodgers, Delyse M. Hutchinson

First published: 20 March 2017 | <https://doi.org/10.1111/dar.12512> | Citations: 10

Associations of Cannabis Use across Adolescence and Early Adulthood With Health and Psychosocial Adjustment in Early Adulthood and Midadulthood in Men

Deborah M Capaldi , Stacey S Tiberio, David CR Kerr, Lee D Owen

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First Published June 3, 2022 | Research Article | [Check for updates](#)

<https://doi.org/10.1177/11782218221096154>

Developmental patterns from adolescence to age 24?

Frequent teenage
cannabis use

age 20 cannabis use
self-report + hair

Age 24 cannabis use
self-report + hair

Age 20
psychopathology and
functional wellbeing

Age 24
psychopathology and
functional wellbeing

As the cannabis landscape is changing (new, more potent forms), it is important to update findings with the additional information of cannabis profile (Freeman et al., 2021, Di Forti et al., 2019)

Additional factor: global pandemic

Frequent teenage
cannabis use

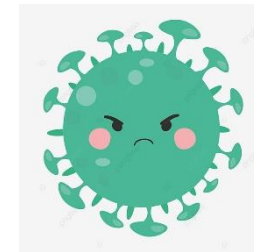
age 20 cannabis use
self-report + hair

Age 24 cannabis use
Self-report + hair



**COVID-
19**

Age 20
psychopathology and
functional wellbeing



Age 24
psychopathology and
functional wellbeing

Covariates and moderators to consider

- Covid-19 pandemic
 - Changes in substance use?
 - Feeling worse or better?
- Other drug use
- Role of coping style as a moderator between substance use and adverse outcomes (e.g. cognitive reappraisal Wang et al. 2021)

Importance and practical implications

- **Methodological:**

- Can **hair** help us **better understand** associations between drug use and well-being in the period of young adulthood?

- **Risk and resilience:**

- Which patterns of use are **most dangerous**/what are possible **protective factors**?

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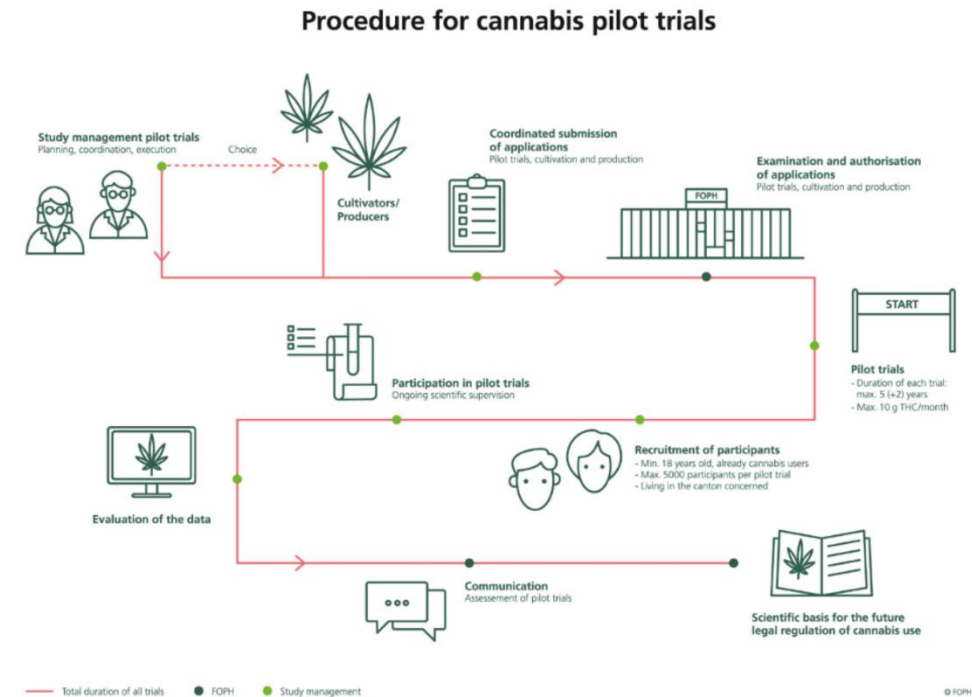
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Thanks for listening and thanks to all involved



**Universität
Zürich**^{UZH}



PhD student at the Jacobs Center under the supervision of Prof. Lilly Shanahan and Prof. Boris B. Quednow

Topic:
Stress and Substance use in Young Adulthood

