Stadt Zürich
Soziale Einrichtungen
und Betriebe

Cannabis Evaluation

Drug Checking at the Drug Information Center Zurich 2021

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1 Introduction

1.1 Initial situation

At the beginning of 2020, cannabis samples treated with synthetic cannabinoids appeared in Switzerland for the first time. These represent an additional health risk for users that is difficult to assess.

Cannabinoid receptor agonists (cannabimimetics), also known as synthetic cannabinoids, are similar in action to that of THC. Cannabimimetics mimic the effects of THC. These substances dock at the same sites in the brain as THC, but with up to more than 100 times stronger binding. This leads to a significantly more intense effect.

Physical symptoms often appear immediately after consumption, ranging from nausea, vomiting, sweating, rapid heartbeat, dizziness and motor difficulties to paralysis or unconsciousness. The latter poses the risk of accidents, such as falls. Undesirable psychological side effects include panic attacks, hallucinations or dissociative sensations.

Until September 2020, cannabis samples at the DIZ could only be qualitatively analyzed for synthetic cannabinoids in cases of suspicion. Since October 2020, cannabis samples can also be analyzed quantitatively for the most important cannabinoids (THC, CBD, CBN). This report presents the results of all cannabis samples tested in 2021 and offers insight into the findings from the consultation of cannabis users.

1.2 Risk assessment

Cannabis products (grass, hashish, pollen, oils, etc.) are extracted from the hemp plant. The main active ingredients are THC (tetrahydrocannabinol) and CBD (cannabidiol). THC is responsible for the majority of the psychoactive effects, while CBD has a calming, neuroprotective (protecting nerve and brain cells), antispasmodic and depressant effect.

The higher the THC content, the greater the risk of adverse effects. With high-dose cannabis (high THC content), circulatory problems up to circulatory collapse, or anxiety, panic and paranoia can occur.

When consuming cannabis products ("edibles"), the dosage is even more difficult to estimate, making the risks and side effects unpredictable.

Many of the cannabis samples analyzed by DIZ in 2021 (mainly cannabis flowers containing THC) have a very unbalanced THC-CBD ratio. Most of these samples contained hardly any CBD, a substance that has a noise-attenuating and neuroprotective effect. These cannabis products therefore pose a greater health risk than those containing CBD.

Scientific research[1] indicates that cannabis products with an unbalanced THC-CBD ratio (high THC content and low CBD content) pose a higher risk for the development of psychosis.

Cannabis products cannot be visually and/or tastetested for their ingredients. Synthetic cannabinoids in cannabis products as well as the exact active ingredient contents (potency and THC-CBD ratio) can only be determined by precise chemical analysis. Furthermore, cannabis products are repeatedly stretched with organic and inorganic products to increase profits.

[1] https://pubmed.ncbi.nlm.nih.gov/34467598/

2 Analyzed samples

In 2021, a total of **447 cannabis samples** were submitted for analysis at the Drug Information Center (DIZ) in Zurich. 313 samples were cannabis flowers, 98 samples were hashish and 36 samples were other cannabis products such as oils, liquids and edibles.

281 of these samples were submitted without specific suspicion of synthetic cannabinoids. Synthetic cannabinoids were detected in 27 of these samples, i.e. just under 10%.

In the case of the remaining 166 samples, the users suspected, based on concrete negative experiences, that their substance had been mixed with synthetic cannabinoids. In a total of 33 of these suspicious cases, synthetic cannabinoids could actually be detected. In the second half of 2021, isolated samples also turned up in which delta-8-THC was additionally detected.

2.1 Results Active ingredient content: THC and CBD

395 samples were analyzed for their **THC and CBD content in** cannabis drug checking. In 52 additional samples submitted, it was only possible to determine whether the flower or the hashish had been treated with synthetic cannabinoids.[2]

The results regarding THC content are roughly in line with data from other black market studies, such as the figures from the Swiss Society of Forensic Medicine (SGRM)[3] . Completely new[4] are data on CBD content in cannabis samples. These have not been systematically collected in any other context to date. Thus, it could be proven for the first time that mainly cannabis with a very low CBD content is traded on the black market.

The THC and CBD values of the flower and hashish samples analyzed at the DIZ are given below. All samples belonging to the so-called CBD type were not taken into account[5] .

Active ingredient content in cannabis flowers

– The average active ingredient content was 12.2 % **THC.** It varied greatly with between 1 % and 23.7 % THC.
– The average active ingredient content was 1.6 % **CBD.** It varied greatly and ranged from 0% to 15.1% CBD.

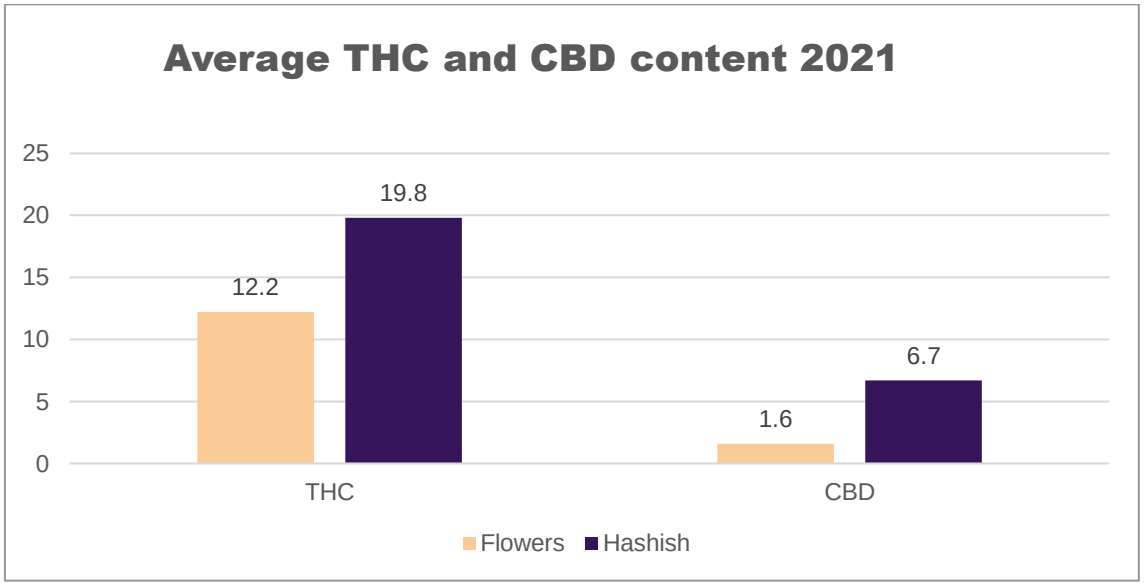
[2] These 52 samples were not submitted in the context of cannabis drug checking but regular drug checking. In such cases, only if synthetic cannabinoids are suspected, it can be determined whether the sample was sprayed with synthetic cannabinoids; in this case, no THC/CBD analysis is performed.
[3] https://www.sgrm.ch/de/forensische-chemie-und-toxikologie/fachgruppe-forensische-chemie/statistiken-thc/
[4] Since forensic analyses are limited to THC, which is relevant under criminal law, CBD, which is not covered by the Narcotics Act, is not quantified there.
[5] Samples with a THC content of less than one percent THC and/or a very noticeably higher CBD than THC content.

Active ingredient content in hashish

– The average active ingredient content was 19.6 % **THC.** It varied greatly and was between 4.2 % and 49.5 % THC.
– The average active ingredient content was 6.7 % **CBD.** It varied greatly and ranged from 0% to 35.8% CBD.

Due to the low sample numbers for liquids, oils, edibles, etc., no meaningful information can be drawn. For this reason, it will not be discussed in more detail.

Graph 1 shows the average THC and CBD content of cannabis samples analyzed in 2021 that were declared as THC samples, broken down into flower and hash samples, as a percentage:



Graph 1: Average THC/CBD content of analyzed cannabis samples with declaration THC flowers, 2021, in %, (n=313).

The highest measured THC level in the **flower samples** was **23.4% in** the **hashish 49.5%**

2.2 Extenders and impurities

THC and CBD are naturally occurring cannabinoids in the cannabis plant. Since the beginning of 2020, an increasing number of **synthetic cannabinoids** have been detected at the DIZ in Zurich. This sudden and frequent occurrence of such samples suggests that various traffickers have acquired cheap, legal CBD cannabis on a large scale due to overproduction and the associated price collapse and have added synthetic cannabinoids to it in order to subsequently resell it deceptively as illegal cannabis with a high profit margin.

Since mid-2021, a total of 9 samples containing **delta-8-THC** have also been submitted to the DIZ. This psychoactive substance occurs naturally, if at all, only in very small quantities in the cannabis plant. It can, on the other hand, be produced from a CBD extract that is chemically treated using acid in a solvent. It has a similarly intoxicating effect to the **delta-9-THC** known by the short name "**THC**", but is slightly less potent. The conversion of CBD to delta-8-THC also produces the well-known del-ta-9-THC, as well as numerous synthesis byproducts whose effects are unknown. One assumption is that - similar to the synthetic cannabinoids - this phenomenon is CBD cannabis, which is legal in Switzerland, or Delta-9-THC-poor industrial hemp and, after the application of the aforementioned chemical mixture, is sold as Delta-9-THC-containing, "natural" cannabis. The goal is to produce psychoactive material to induce intoxication, maximize profits, etc.

It has been known for some time that cannabis products are sometimes stretched with different substances (e.g. **Brix, lead, sand,** etc.) in order to optimize profits (more weight). Furthermore, **mold** can form due to improper drying/storage. These substances are sometimes visually recognizable on the blossoms. In the case of sand, a visible layer sometimes forms at the bottom of the storage vessel. With Brix, a small amount of the bloom may be burned. Such samples burn very poorly, the ash is rather hard and feels greasy and oily when rubbed. Further, **fertilizers** are often used in cultivation to promote growth, and if not handled properly, they remain as residues in the plant.

Consumption of all these substances poses an increased risk to the health of the user. These extender substances cannot be detected by analysis at the DIZ. However, apart from fertilizer residues, most extenders are relatively easy to detect by eye or by smell. A detailed list of the most common cannabis extenders can be found on the website of the German Hemp Association.[6]

In the case of illegally purchased liquids, there are known cases in which **thickening agents** such as vitamin E acetate have been added, which according to a study[7] are extremely harmful to health and have already led to several deaths in the USA. These cases have become known as EVALI (e-cigarette, or vaping, product use associated with lung injury). However, no further deaths associated with EVALI have been reported since the publication of this study. Nevertheless, it is recommended to use cannabis drug checking when possible with illicit e-liquids or, if this is not possible, to test cautiously.

[6] https://hanfverband.de/inhalte/streckmittel-in-marihuana-wie-man-sie-erkennt-und-welche-risiken-von-ihnen-ausgehen
[7] https://www.nejm.org/doi/full/10.1056/NEJMoa1916433

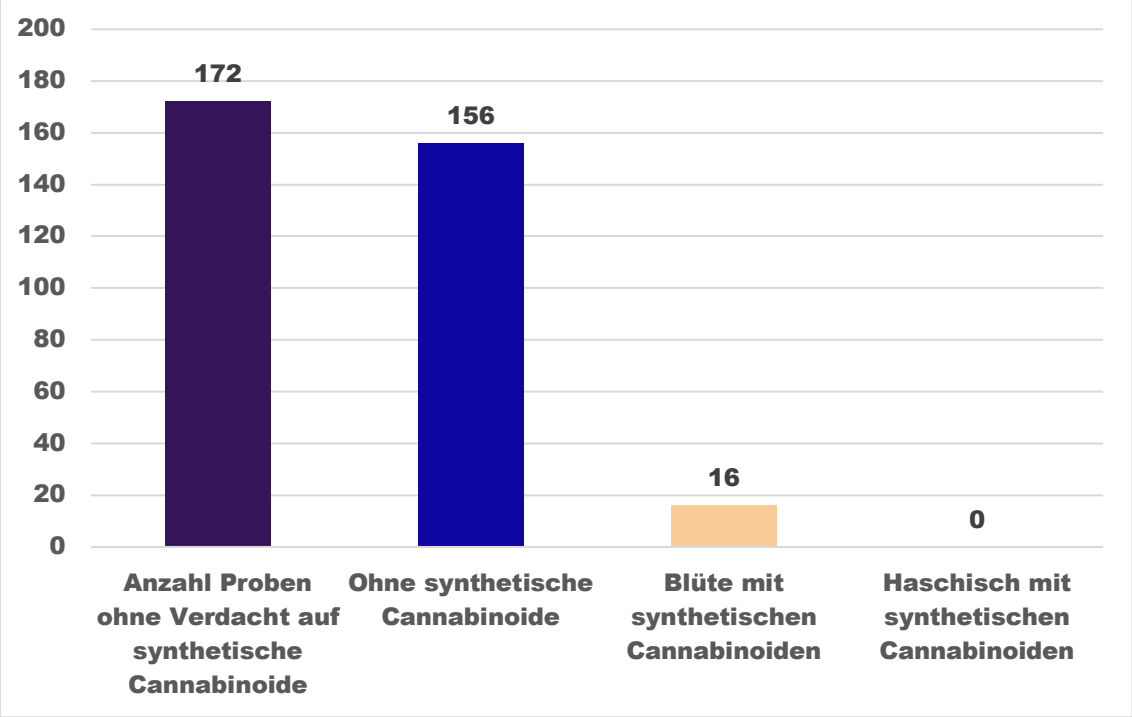
2.3 Synthetic cannabinoids and other ingredients in cannabis samples

49 samples (10%) of all cannabis samples submitted for analysis at the DIZ were spiked with at least one **synthetic cannabinoid.** 11 of the samples were spiked with two or more synthetic cannabinoids.

Of the samples for which suspicion of synthetic cannabinoids was expressed at the time of dispensing, 33 samples (20%) actually contained them. Even in samples without suspicion, contrary to expectations, synthetic cannabinoids were detected in 15 cases: MDMB-4en-PINACA most frequently followed by ADB-BINACA, 5F-MDMB-PICA, and 4F-MDMB-BINACA.

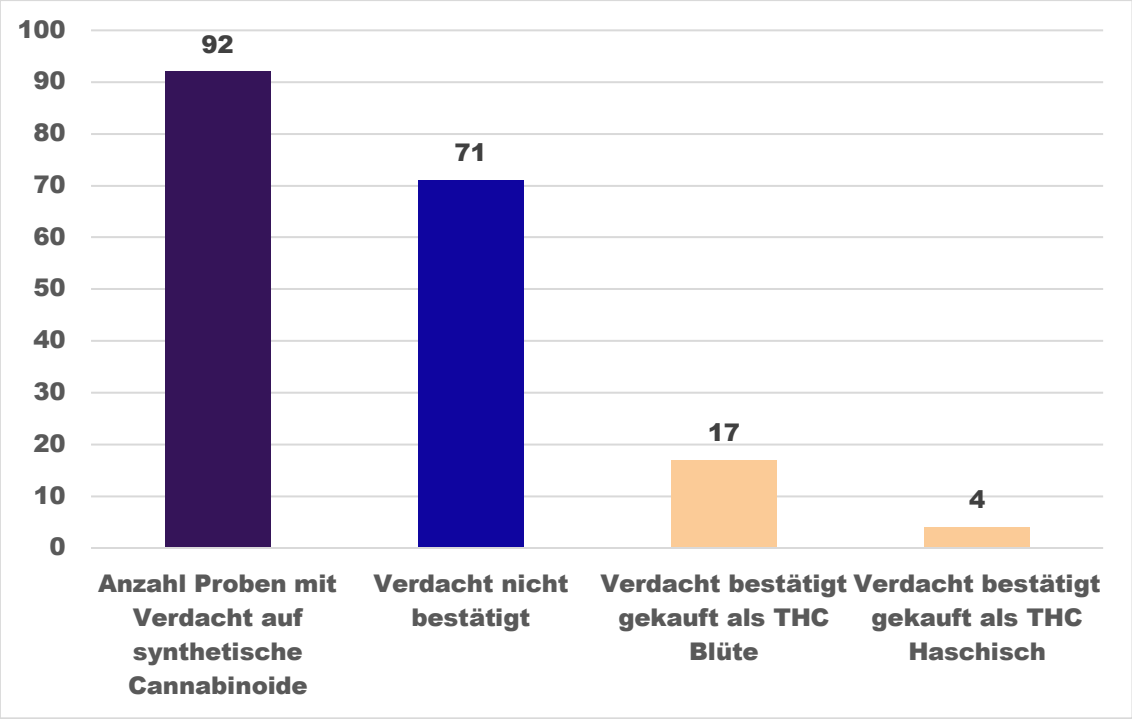
Compared to the previous year, the number of samples testing positive for synthetic cannabinoids has decreased. At the same time, the number of samples submitted as suspected cases remained stable. This is presumably related to the fact that last year, among other things through harm-reduction offers as well as the media, a broad education on the topic of synthetic cannabinoids and their effects took place. Consumption of high-dose cannabis products in large quantities leads to undesirable side effects that can easily be confused with the effects of synthetic cannabinoids. Thus, these samples are then dispensed with suspicion of synthetic cannabinoids, although they are high-dose THC cannabis products.

Graph 2 shows all analyzed cannabis samples **without** suspected synthetic cannabinoids in 2021 (n=172):



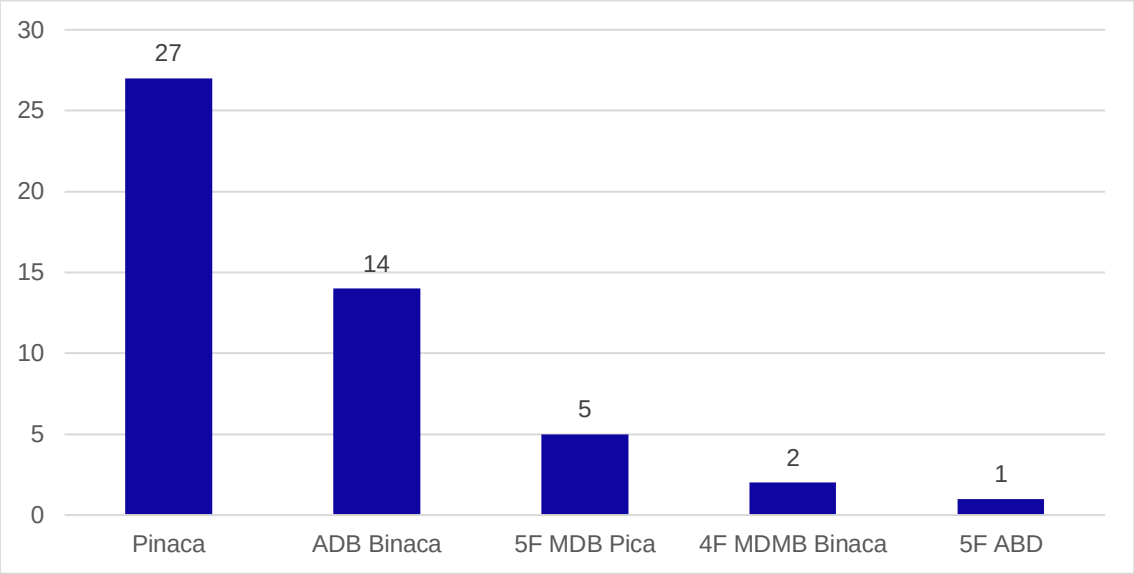
Graph 2: Number of cannabis samples with no suspicion of synthetic cannabinoids, 2021 (n=172).

Graph 3 shows all cannabis samples **with suspected** synthetic cannabinoids in 2021 (n=92):



Graph 3: Number of cannabis samples with suspected synthetic cannabinoids, 2021 (n=92).

Graph 4 shows the number of different synthetic cannabinoids by their abundance on flowers or in hashish 2021 (n=49). This graph includes all synthetic cannabinoids, including samples where multiple substances were detected:



Graph 4: Synthetic cannabinoids analyzed by frequency, 2021 (n=49).

3 Insights from the consultation

3.1 Introduction

A specific questionnaire was designed for cannabis drug checking, which was newly created in October 2020, to structure the counseling sessions and provide insights into the consumption realities of cannabis users. As part of a pilot project in cooperation with the Addiction Prevention of the City of Zurich and the OJA, Saferparty Streetwork specifically sought out cannabis users in public spaces during the reporting year, sensitized them to the dangers of synthetic cannabinoids and conducted so-called THC typing tests together with predominantly adolescent users.

3.2 Results of the survey

3.2.1 Sociodemographic characteristics

2021, a total of 166 persons fully completed the voluntary questionnaire as part of cannabis drug checking. The average age of the respondents was around **29 years**. The youngest person was 14 years old and the oldest was 49. Around nine out of ten respondents were male (n=142). Eight out of 10 respondents were either employed or in education. As can be seen in chart 5, about half of the respondents had a vocational apprenticeship as their highest educational qualification.

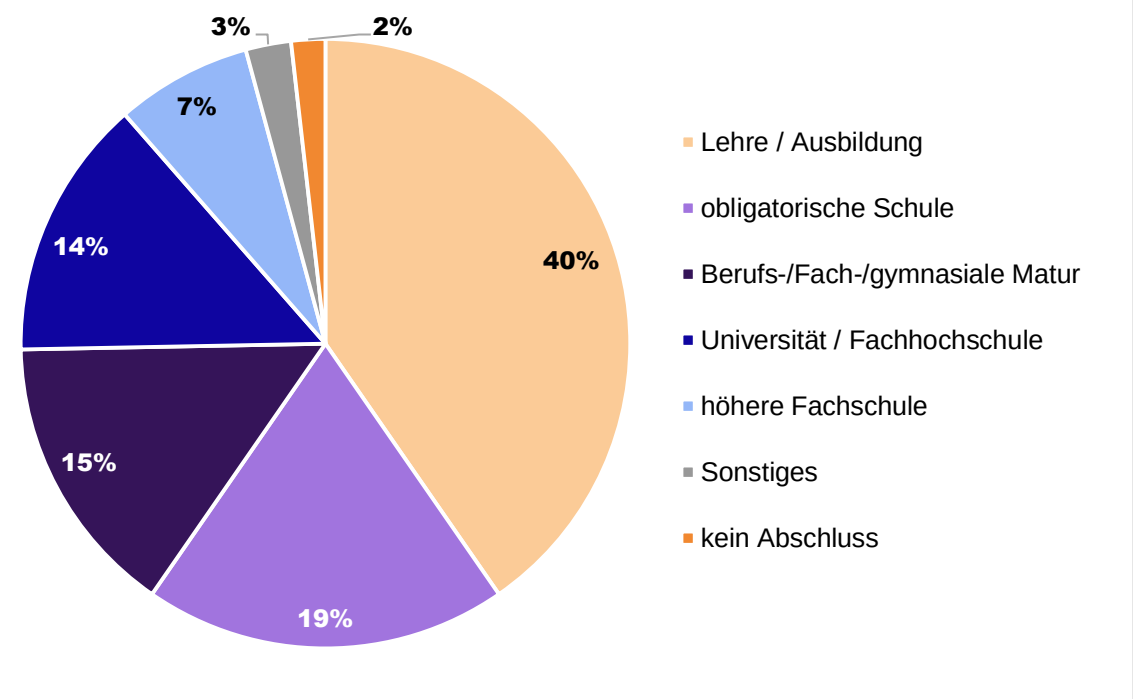


Figure 5: Education level of respondents (n=166)

3.2.2 Consumer Behavior

On average, the respondents used cannabis for the first time at the age of 14. The use of cannabis in adolescence is thus a reality despite intensive prevention efforts. Since regular cannabis use in middle and late adolescence is particularly risky and, according to recent findings, can be associated with altered development of the cerebral cortex[8] , harm-reduction offers should also focus more on adolescents, especially in the case of cannabis.

Tobacco smoking poses an additional and preventable health risk. The accompanying substances of tobacco smoke are responsible for the known health consequences of smoking such as the increased risk of heart and lung diseases (asthma, chronic bronchitis, heart attack, stroke, thrombosis, lung cancer) and damage to the stomach lining (risk of stomach ulcers). Nevertheless, smoking cannabis mixed with tobacco still represents the most common form of use, with 8 out of 10 respondents (n=127) indicating a preference for this form of use. Almost every second person also uses unsuitable filter methods such as cardboard filters (n=77). Less harmful forms of consumption such as vaporizers/vaporizers (n=10) or edibles (n=3) are much less common. The consultations in the context of the planned pilot trials on the regulated sale of cannabis should accordingly focus on motivating users to use cannabis without tobacco.

A large proportion of respondents use cannabis regularly. Every fifth person uses several times a day (n=34), every fourth respondent daily (n=41) or several times a week (n=44). As the frequency of use tends to increase, so does the risk of developing cannabis-related problems.[9] Cannabis is most frequently used by respondents in private settings (8 out of 10 respondents indicated this as the most frequent use setting). Mixed-use, especially with alcohol, is also widespread. Around every second person surveyed (n=86) stated that they had used cannabis and alcohol at the same time in 2021.

3.2.3 Consumption motives, problems and risk reduction strategies

As can be seen from chart 6, cannabis is most often used by respondents to relax or because the feeling after cannabis use is perceived as pleasant. Every fifth person interviewed has already used cannabis for medical reasons, i.e. for self-medication (n=30).

[8] https://jamanetwork.com/journals/jamapsychiatry/fullarticle/2781289
[9] https://www.suchtmonitoring.ch/docs/library/marmet_yzymdlgacrpp.pdf

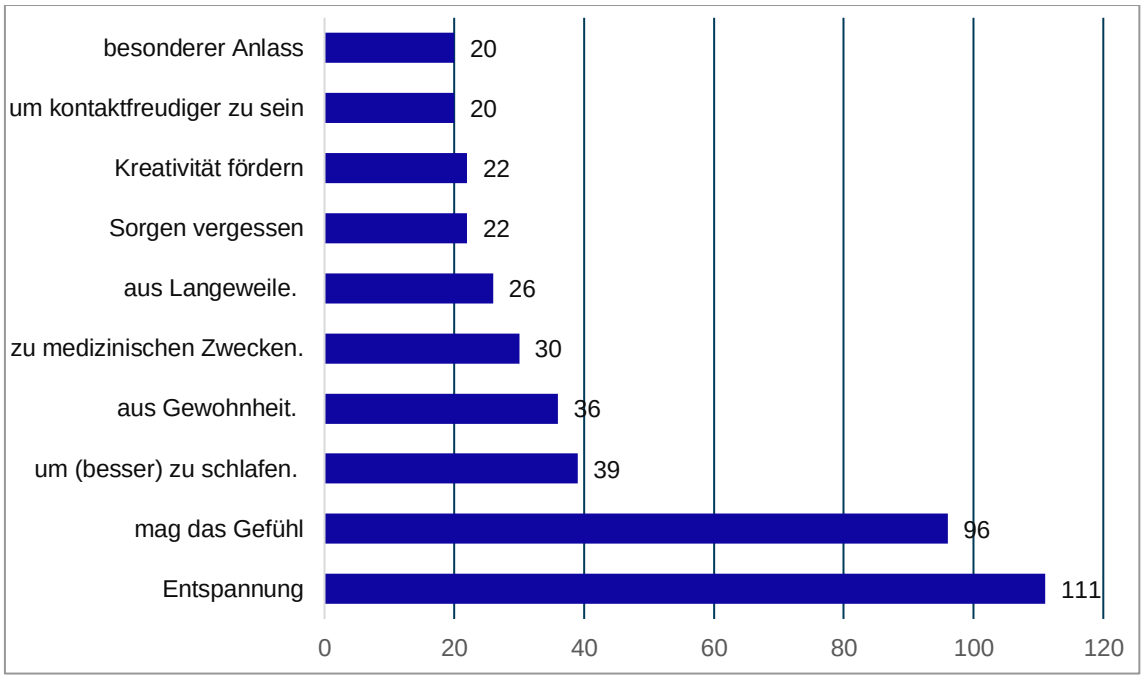
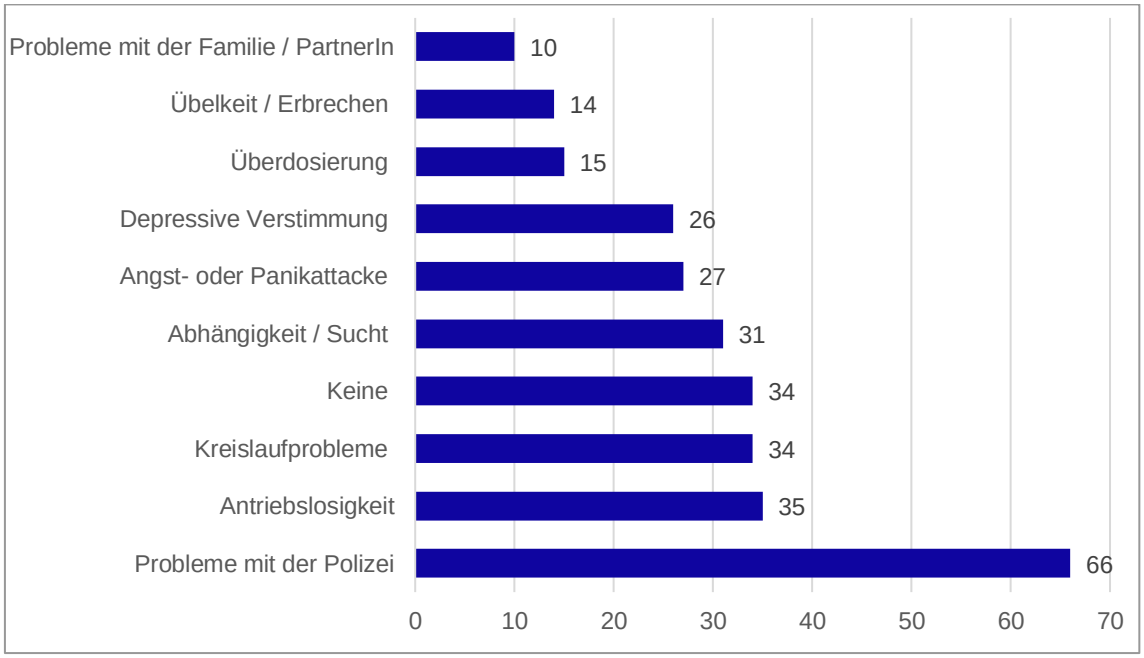


Figure 6: Motives for cannabis use

The most frequent problem mentioned by respondents in connection with cannabis use was problems with the police (fines, reports, withdrawal of driving license, etc.). Lack of drive/motivation difficulties or heart palpitations/circulatory problems also occurred relatively frequently. One in five respondents did not mention any problems in connection with consumption (cf. chart 7).



Graph 7: Problems related to consumption

The interviews showed that cannabis users often implicitly or explicitly use strategies to reduce the risks associated with their use. The most frequently mentioned strategies are not to use before school/work, to take regular breaks from use or not to drive after use (see Figure 8).

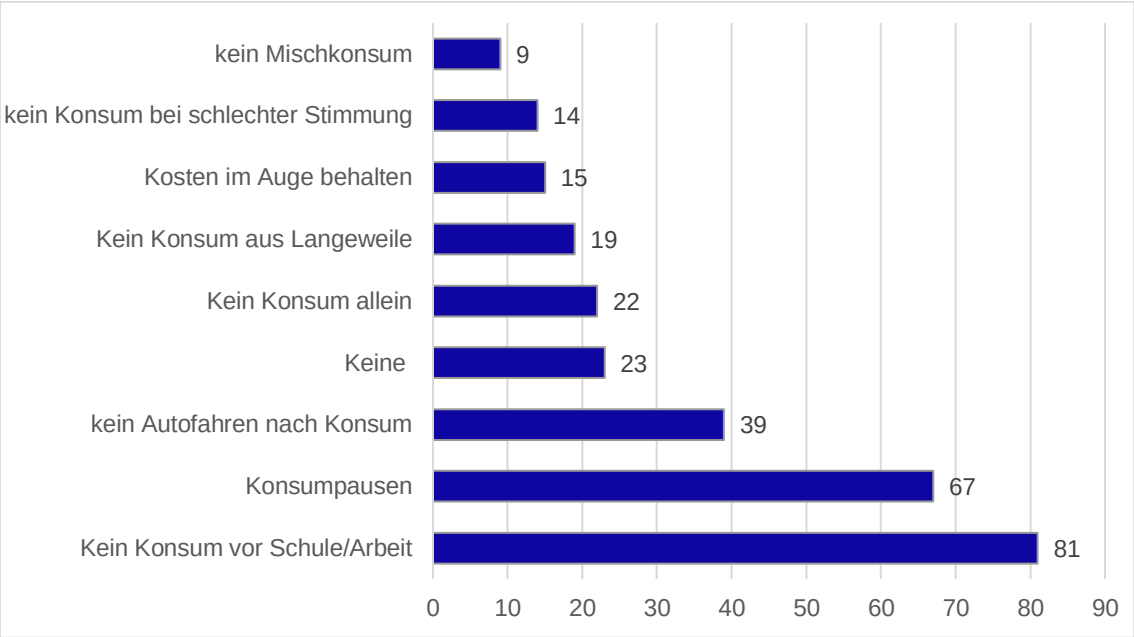


Chart 8: Risk reduction strategies

4 Conclusion

- Cannabis laced with synthetic cannabinoids is still circulating on the black market. Therefore, whenever possible, cannabis should be analyzed for its ingredients at the DIZ. If this is not possible, it is essential to observe the safer use rules.
- Black market cannabis has a very low CBD content on average. Since CBD is thought to have a protective effect (reducing the adverse effects of THC), this is problematic from a harm reduction perspective. It is recommended, especially for cannabis with very high THC content, to mix it with CBD cannabis.
- Safer use is still relatively weak in the context of cannabis compared to other illicit psychoactive substances. In particular, the frequent smoking of cannabis with tobacco and insufficient filtering methods are problematic.

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