CANNABIS USE:

It is not totally harmless, but it has a very low risk level*

Edited by Giovanni Trovato & Carla Rossi

MORA

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[*]Umberto Veronesi (https://www.ordineinfermieribologna.it/2016/veronesi-le-sigarette-fanno-molti-piu-danni-delle-canne.html)

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Forward

Cannabis is the most commonly used illicit drug in Europe. Consequently, the majority of drug-related offences are associated with the wholesale and retail distribution of cannabis. According to conservative estimates, around 27 % of adults in the European Union (EU) aged 15 to 64 have used cannabis at least once in their lifetime, and almost 20 % of young people aged 15 to 24 have used it in the last year. In 2020, around 1.5 million drug offences were reported in the EU. Cannabis accounted for more than three-quarters of offences involving use or possession where the drug was known. In 2020, approximately 93,000 offences involving the supply of cannabis were reported, accounting for more than half of all drug supply offences. This figure is actually an underestimate, as the use and sale of cannabis is more than double that of all other substances.

Although these data provide an indication of the scale of the challenges posed by this drug, estimated rates of consumption, the size of the illegal market and the nature of policy responses to cannabis vary considerably across European countries. Rapid changes have occurred, including the creation of legal recreational cannabis markets in the Americas and, in many parts of the world, the emergence of legal products such as cannabis soft in commercial markets. This highlights the importance of assessing the potential health and social impacts of these developments and supporting evidence-based drug policy development.

Since 2012, the supply and use of cannabis for recreational purposes, in addition to medical or industrial purposes, has been legalised in many countries: starting with Uruguay (2012), Canada (2018) and some states in the US. The policy models for cannabis supply adopted by jurisdictions in the Americas are diverse and include, among others, private commercial sale, state-managed sale, non-profit municipal cultivation (such as cannabis social clubs, now also present in Germany) and personal cultivation. The impact of these regulatory models is being closely monitored, following concerns that they may lead to an increase in cannabis use and possible harm. Meanwhile, many advocates of legalisation have argued that a regulated supply of the drug could actually mitigate some of the social and health harms associated with cannabis use and illegal cannabis.abis markets.

All this is happening at a time when scientific knowledge about the effects of cannabis potency on mental health (e.g. psychosis, anxiety and cannabis use disorders) is still evolving. Overall, the use of **high-potency cannabis** has been associated with an increased risk of mental health problems. (Synthesis from EUDA)[1].

This website sinthetically concludes with a reference to the dangers of high-THC cannabis, which, in reality, legalisation based on appropriate scientific evidence and effective monitoring would eliminate. As will be seen below.

Giovanni Trovato and Carla Rossi
20th February 2026

Preface

Both the title and the forward were taken from important quotations. The title comes from a statement by Professor Umberto Veronesi, Professor of Oncology and Minister of Health, who, as often happens with geniuses, shows himself to be ahead of his time in what has since been verified and published in articles assessing the dangers associated with the use of psychotropic substances, which equate essentially the level of harm caused by cannabis and nicotine, as can be seen in the tables in the following. Of course, the greater harm associated with cigarettes, as said by Veronesi, also depends on the fact that those who are addicted to tobacco smoke many cigarettes a day, while far fewer joints are smoked in the same period.

The material included in the Forward was taken from a publication by EUDA, formerly EMCDDA, which can be downloaded from the website indicated and which generally concerns the issues analysed in the project and included in this book.

This book is the final product of a national PRIN project, which also involved foreign researchers. A summary of the programme is included at the end of this preface.

The book is divided into four sections. The first contains chapters summarising various cannabis legalisation projects around the world and two projects analysed in detail: the first chapter is a synthesis of the arguments linked to cannabis legalisation in general with references to the various countries that have legalised, two chapters relating to legalisation in Canada and the fourth chapter relating to legalisation in Germany.

The second section contains chapters explaining the risk factors for starting substance abuse in adolescence from psychological and socio-economic factors in the first chapter. The other two chapters report analyses conducted on adolescents and socio-economic factors influencing the level use of psychotropic substances on the basis of data from surveys on school students, who are aged between 15 and 19, and on minors entering in a Community for therapy and help.

The third section regards the health of users of psychoactive substances, both adolescents and adults. The first chapter is related to the analysis of a dataset from the emergency department, the second one to comorbidity analysis of hospitalized subjects data set.

The last section contains two chapters on the repressive measures adopted by current policy and the effects of this approach. The first chapter deals with ineffectiveness of repressive policy and interventions and unexpected consequences and the last one on incarceration and corruption linked to repression. Prior to this book, another book was published entitled '**Regulation of narcotic substances, with particular regard to so-called soft drugs: interdisciplinary analysis and prospects for reform**' edited by the central coordinator of the project, Professor Antonio Cavaliere, a summary of which is provided below.

"Project summary":

The project will begin with an analysis of the legitimacy and effectiveness of the current Italian legislation on psychotropic substances, with particular attention to so-called soft drugs (cannabis and its derivatives). This assessment will be conducted through an interdisciplinary research approach involving criminal and administrative law, criminology, social and health statistics, and economics.

The analysis of legitimacy will address the theoretical compatibility of existing drug legislation with the constitutional principles of criminal law, with particular reference to the harm principle and the limits of paternalism. Legal research will also examine European Union law and relevant international conventions, with the aim of identifying the scope for reform at the national level. In addition, a comparative analysis will be carried out with other legal systems in Europe and beyond, especially in countries where the legalisation of cannabis is currently underway or has already been implemented.

The assessment of the legitimacy of the law in force is closely linked to its effectiveness, which will be examined from both a criminological and an economic perspective. In particular, the project will investigate the social consequences of criminalisation, including the profits accruing to organised crime from control of the illegal drug market, the increase in incarceration rates among street-level dealers and consumers, the labelling of specific social groups as deviant, and the

resulting burden on the criminal justice system and its loss of efficiency.

In the second stage of the research, possible alternatives to the current Italian legislation will be evaluated, taking into account existing domestic proposals for the legalisation of soft drugs as well as foreign legalisation experiences. On this basis, a proposal for law reform will be developed and its potential impact assessed from legal, criminological, and economic perspectives.

Any reform proposal must, first, be consistent with the principles of the Italian Constitution and with international and EU law. It must also define the administrative law framework governing the authorisation of production, sale, purchase, and use of soft drugs. From an economic standpoint, the analysis will measure the costs and benefits—namely, the net impact—of the creation of a regulated legal market for soft drugs. Expected outcomes include effects on healthcare expenditure, changes in rates of drug-related violent crime, reductions in enforcement and incarceration costs, and the potential reallocation of public resources toward combating organised crime.

All evaluations, including cost-effectiveness analyses and forecasts under both current and proposed legal regimes, will be based on institutional datasets covering the period 1990–2018, to be obtained from public authorities, as well as on appropriate survey data, partly already available and partly to be collected within the project.

As regards databases, all of them originate from Italian institutions and associations, but only the database relating to law enforcement also depends on the law in force and is used to assess the effectiveness of law enforcement measures in Italy. In that chapter, the results of the analysis are applicable only in Italy, while the methodology is universal. The other databases used and the results obtained are essentially independent of the law and policies and are therefore universally valid.

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Introduction

This book is the result of a research project funded under the **PRIN 2022 (Progetti di Rilevante Interesse Nazionale)** programme of the Italian Ministry of University and Research. The project brought together scholars from different disciplines—statistics, economics, law, criminology, epidemiology, psychiatry, and public health—to examine one of the most debated public policy issues of our time: the regulation of cannabis and other so-called soft drugs.

The title of this volume reflects the balanced position that guides our work. Cannabis is not totally harmless. No psychoactive substance is. At the same time, the level of risk associated with cannabis use—especially when compared with substances such as alcohol, tobacco, or opioids—is relatively low. Recognizing both aspects is essential. Public debate often oscillates between two extremes: trivialization ("it is harmless") and alarmism ("it is extremely dangerous"). Neither perspective is supported by the best available evidence. Sound policy must instead be grounded in careful empirical analysis, institutional data, and interdisciplinary reasoning.

Across Europe, cannabis remains the most widely used illicit substance. According to the European Union Drugs Agency (EUDA, formerly the European Monitoring Centre for Drugs and Drug Addiction), a significant share of adults have experimented with cannabis at least once, and a substantial proportion of young people report recent use. Cannabis-related offences still represent the majority of drug-law violations in many European countries. These figures illustrate not only the diffusion of consumption but also the scale of criminal justice involvement associated with current prohibition regimes.

At the same time, the global landscape is changing rapidly. Since 2012, several countries have legalized cannabis for recreational purposes, beginning with Uruguay, followed by Canada in 2018, and numerous states within the United States. More recently, regulated models such as cannabis social clubs have emerged in countries

including Germany. These reforms differ significantly in design—ranging from state-controlled systems to commercial private markets and non-profit cultivation associations—but they share a common feature: they replace criminal prohibition with regulation.

These developments raise fundamental questions. Does legalization increase use, particularly among adolescents? Does it exacerbate mental health problems? Or does a regulated market reduce the harms associated with illegal trade, such as organized crime, incarceration, and social marginalization? The answers are complex and often context-dependent. Evidence from countries that have legalised suggests modest changes in adult consumption, mixed results regarding youth use, and measurable reductions in criminal justice burdens. Meanwhile, research on cannabis potency—particularly high-THC products—indicates that heavy and frequent use may be associated with increased risks of anxiety disorders, psychosis, and cannabis use disorder. The crucial point, however, is that these risks are dose-dependent and concentrated in vulnerable subpopulations.

From a public health perspective, cannabis occupies an intermediate position in the hierarchy of psychoactive substances. It does not produce the acute lethality associated with opioids, nor the long-term mortality burden linked to tobacco. Dependence can occur, but at rates lower than those observed for nicotine or heroin. Traffic accidents and cognitive impairment are real concerns, especially with early and intensive use. Yet when evaluated in comparative risk frameworks—considering toxicity, dependence potential, and social harm—cannabis generally scores far below alcohol and tobacco. The overall picture is therefore nuanced: not harmless, but low risk relative to many legal substances already embedded in our societies.

This nuance is central to the approach adopted in this volume. The project begins by questioning the legitimacy and effectiveness of current Italian drug legislation, especially with regard to cannabis. From a constitutional perspective, the criminalization of personal use raises issues related to the harm principle and the limits of state paternalism. If a behavior generates limited external harm and relatively low social cost, does criminal law represent a proportionate response? Comparative legal analysis shows that many jurisdictions are moving toward administrative regulation rather than penal sanction.

Effectiveness is equally important. Criminal prohibition aims to reduce supply and demand. However, decades of enforcement have not

eliminated cannabis markets. Instead, prohibition has contributed to the expansion of illegal networks, the involvement of organized crime, and the incarceration of low-level dealers and users. The economic costs are substantial: policing, judicial proceedings, imprisonment, and lost productivity. These costs must be weighed against the potential risks of regulated legalization.

The interdisciplinary structure of this book reflects the complexity of the issue. The first section reviews legalization models around the world, with detailed analyses of Canada and Germany. These case studies highlight how regulatory design matters: age limits, taxation, marketing restrictions, product potency caps, and monitoring systems all influence outcomes. Legalisation is not a single model but a spectrum of policy choices.

The second section focuses on adolescents and socio-economic determinants. School survey data and community-based samples show that experimentation with psychoactive substances is influenced by family background, peer networks, educational trajectories, and social disadvantage. Criminalization alone does not eliminate these drivers. Preventive strategies grounded in social policy, information, and harm reduction appear more promising than purely repressive approaches.

Instead, they reveal identifiable risk groups and modifiable factors such as early onset of use and high-potency consumption that can be addressed through targeted prevention and education.

The third section turns on health outcomes. Using institutional datasets emergency department admissions, hospitalization records, and epidemiological surveys the chapters assess patterns of acute intoxication, comorbid psychiatric conditions, and broader public health indicators. The results do not support the claim that cannabis is risk-free. Episodes of anxiety, psychotic symptoms, and problematic use are documented. At the same time, the data do not suggest a public health catastrophe.

Finally, the book examines the consequences of repression itself. Incarceration, selective enforcement, and the stigmatization of users have measurable social costs. Criminal records can limit access to employment and education, reinforcing marginalization. Moreover, illegal markets generate corruption and violence that extend beyond cannabis consumption per se. These findings challenge the assumption that prohibition is a neutral or costless policy baseline.

The overarching message of this volume is therefore pragmatic

rather than ideological. Cannabis use carries risks, particularly with high potency, early initiation, and frequent consumption. These risks should not be minimized. At the same time, the aggregate level of harm appears relatively low when compared with other widely used substances. A rational policy debate must consider both sides of the equation: the harms of use and the harms of prohibition.

The PRIN 2022 funding made possible the integration of legal analysis, statistical modeling, economic cost–benefit evaluation, and clinical research. By combining these perspectives, we aim to move beyond slogans and toward evidence-based reform. Whether one ultimately supports legalisation, decriminalization, or improved enforcement, policy choices should rest on transparent data, comparative evaluation, and proportionality.

Cannabis is not totally harmless. But neither is it the existential threat sometimes portrayed in public discourse. Between complacency and alarmism lies a space for informed judgment. It is in this space that this book situates itself—seeking to contribute empirical clarity and analytical balance to a debate that affects millions of citizens and the functioning of our legal and health systems.

Giovanni Trovato & Carla Rossi

LEGALISING CANNABIS: THE AMERICAS BETWEEN MYTH AND REALITY

Leonardo Fiorentini
National Secretary of Forum Droghe (Drugs Forum)

Introduction

Which countries have legalised cannabis, why have they done so, and what are the consequences of this new approach to the most widely used illegal substance in the world? These are the three questions that have most focused international debate on drug policy over the last 15 years, since legal regulation began to be considered a truly viable option for getting out of the quagmire of the war on drugs. In this short essay, we will attempt to answer the last of these questions, leaving the reader with an extensive bibliography on the origins of the prohibitionist approach, its obvious ineffectiveness, and the reasons for supporting an alternative approach to the repression of substance use. This text is the result of a civil society perspective, specifically that of an association that has been working for 30 years to reform drug policies. Forum Droghe, founded in 1995, deals with drug policies at national and international level. It is a member of the International Drug Policy Consortium and the Italian Coalition for Civil Rights and Freedoms and participates in the European Commission's Civil Society Forum on Drugs. Since 2017, it has been an accredited organisation with consultative status at the UN.

It is therefore a biased, somewhat "partisan" point of view, but one that bases its reflections on study and research. It is a view that is far removed from ideology and aims to demystify substances and destigmatise drug use in order to arrive at policies based on scientific evidence and respect for human rights, starting with the right to health of people who use substances. Limiting the use of criminal law in relation to drugs to what is strictly necessary.

To illustrate the effects of legal regulations on cannabis for all uses,

it is useful to look at the findings from experiments carried out over the last decade in the Americas. We will essentially report on what has happened in Uruguay (2013), the United States (2014) and Canada (2018), drawing on data from official sources, international literature and sector studies. It should be noted that we are talking about three profoundly different models: the first with strong state control, the second based on the principles of free enterprise in the American tradition, albeit regulated, and finally the Canadian model, which can be considered essentially a middle ground.

Uruguay: the state replaces the black market

Let's start with Uruguay, which was the first national model for cannabis regulation. The government of then-President Pepe Mujica did so without relying on widespread public support: in 2013, polls showed that a large majority was opposed to the legal regulation of cannabis. The stated objectives of the reform were twofold: to crack down on large-scale trafficking and, at the same time, to limit access to the substance and control its quality by establishing a differentiated system for therapeutic and recreational use. The illegal cannabis market in Uruguay was flooded with so-called prensado paraguayo, a low-quality product[1] that was not particularly safe and was used mainly by the poorest sections of the population because of its low cost.

Leaving aside the regulatory framework for medicinal cannabis, let us focus our analysis on non-therapeutic use. Uruguayan law regulates three methods of access: self-cultivation, membership of a consumer association (cannabis social club) and purchase from a pharmacy.

The system provides for a national register: in order to cultivate, create and join a Social Club or purchase from a pharmacy, in addition to being of legal age, one must be registered in this register, which is kept by the Instituto de Regulación y Control del Cannabis (IRCCA). This has certainly been one of the problems in expanding the market,

[1] Prensado is a pressed mass of cannabis plants, full of branches, seeds and various impurities, made very cheap both by the method of preparation and by the ease of transport. The main health risk identified is contamination by fungi, due to unsanitary drying and storage practices: whole branches are left to dry in pits in the ground covered with plastic, promoting the formation of mould and the proliferation of insects. The material is then compacted into 1 kg “bricks” without being cleaned and transported in 30 kg bags.

given that the country experienced a dictatorship until not too long ago: registering in a register in which one's data remains – although not disclosed – therefore remains a high barrier to entry for many. But that's not all: although the sale of cannabis in pharmacies was provided for in the legislation from the outset, it only began in 2017, a full four years after approval, and with very few pharmacies participating, at least in the early years. In addition to being able to purchase a 5-gram bag (maximum 40 grams per month) at the pharmacy, it is possible to grow up to six plants at home, thus allowing for a maximum production of 480 grams at home. Finally, you can join a collective cultivation association, a Cannabis Social Club, which can grow a maximum of 99 plants, the harvest of which is distributed to members, who cannot exceed the limit of 45 grams.

The most recent data[2] show that there are 80,804 people registered to purchase cannabis in pharmacies, a number that has been growing steadily over the years. The number of domestic growers, on the other hand, is declining, at 11,036. Cannabis Social Clubs are on the rise, now numbering 532 with 16,693 members. In total, there are almost 110,000 people formally registered with legal channels. It should be noted that the latest estimate of prevalence of use in Uruguay reports that approximately 230,000 people have used cannabis in the last year[3]: it is therefore assumed that approximately 50% of the market is now covered by legal channels.

Over the years, the number of affiliated pharmacies has grown to 54, but, as already mentioned, for many years there were only a few – initially just over ten, concentrated in the capital Montevideo – making it difficult to find a place to legally purchase cannabis. In addition, there are now four varieties available, with different ratios of THC/CBD[4] active ingredients (up to a maximum of ~20% THC). Until recently, there were only two, and they were not very competitive in terms of

[2] Data as of 30 November 2025 (Source: IRCCA) Data as of 30 November 2025 (Source: IRCCA)

[3] *VIII Encuesta Nacional sobre Consumo de Drogas en Población General*, https://www.gub.uy/junta-nacional-drogas/datos-y-estadisticas/encuestas/viii-encuesta-nacional-sobre-consumo-drogas-poblacion-general

[4] THC, Delta-9-tetrahydrocannabinol, is the main psychoactive active ingredient in cannabis. CBD, cannabidiol, on the other hand, has no psychotropic effects and, with its properties, particularly its anxiolytic properties, helps to mitigate the effects of THC. This makes it important when evaluating the effects of a product to consider not only the absolute content of the two active ingredients but also the ratio between them.

quality compared to the types offered by dealers. This made it more difficult, initially, to erode the illegal market and justified a greater propensity for self-cultivation, which now appears to be declining. It is a strictly controlled market: it is the state, through the IRCCA, that issues licences – currently seven for the so-called "recreational" market and 15 for the therapeutic market – and distributes to pharmacies (except, of course, for domestic and collective self-production).

IRCCA estimates that around 40% of consumers turn directly to the legal market (slightly more if prevalence data is cross-referenced with the regulatory authority's records). According to the latest Encuesta Nacional sobre Consumo de Drogas en Población General[5] (National Survey on Drug Use in the General Population), consumption increased at the beginning of legalisation but then levelled off, if not actually decreased in some age groups.

In the general population, while lifetime consumption continues to increase (from 23.3% in 2014 to 32.9% in 2024), use in the last year and in the last 30 days, after an initial increase in the last survey, has reversed the growth trend for the first time in over 20 years. For adolescents (aged 15–17), there has even been a collapse in prevalence: adolescents who have used cannabis in their lifetime have fallen from 18.3% in 2014 to 8.8% in 2024. The average age of first use has risen (from 19.1 to 20.1 years), although this substantial "ageing" of the consumer base is due to two phenomena that are also found elsewhere: first-time use of the substance in adulthood, out of curiosity or for para-therapeutic needs, and a return to use by those who had consumed it in their youth. Whereas in a regime of illegality, the onset of use is more typically linked to social dynamics among young people who are more inclined to take risks and engage in forbidden activities.

As far as problem users are concerned, consumption screening places 16.9% of users in the last 12 months in the "at risk" category, i.e. approximately 2% of the general population. These assessments are based on responses to specific questions in the questionnaires (use in the morning before going to school or work, use several times a day, interference with activities, etc.). However, it should be noted that having an "at risk" profile does not automatically mean using cannabis in such a way as to cause health problems, be unable to fulfil one's work or family duties, or experience other impediments to a peaceful life. In

[5] See note 4.

any case, this percentage is comparable to that prior to legalisation.

With regard to risk perception, it is very interesting to analyse the data from this latest national survey. It shows that the decline in the perception of risk associated with cannabis use, which began in the early 2000s, came to a halt after legalisation, rising for the first time this century. This is a sign that when information is provided without resorting to scare tactics[6] — i.e. when the effects and risks are explained in a clear, realistic and understandable way — the perception of risk associated with use also rises again. This is because people, especially younger people and those who use or have used cannabis, recognise that information as credible. When, on the other hand, adolescents are presented with messages such as "if you smoke a joint, you will inevitably end up in the drug tunnel", the message is not only unreliable but sometimes even counterproductive.

The final note concerns Paraguayan pre-rolled joints, the excessive spread of which was identified as a target for reform. Their consumption has plummeted from 58% to 6% of the market: faced with a legal, high-quality and relatively low-cost alternative, consumers inevitably prefer the legal route, whether that be cultivation or purchase from a pharmacy.

United States: the green wave from below

Moving on to examine the United States, it is striking that, although very diverse, it is the largest experiment in terms of numbers: today, more than half of the US population, approximately 180 million people, live in a state where adult cannabis use is regulated even for non-therapeutic purposes. Twenty-four states have legalised cannabis: each of them, in the true spirit of federalism, has implemented different legislation. The process of legal regulation of recreational use began with the victory in the first referendums in 2012 (Colorado and Washington, with legalisation then effectively starting in 2014) and has gradually expanded, with regulations that have progressively evolved, learning from previous experiences.

[6] On this subject, see the reflections and educational proposals of Rodney Skager and Marsha Rosenbaum in Skager, R. Beyond Zero Tolerance. A Reality-Based Approach to Drug Education and School Discipline, Drug Policy Alliance, 2007 and Rosenbaum, M. Safety First. A Reality-Based Approach to Teens and Drugs, Drug Policy Alliance, 2014.

Most states legalised it through a popular referendum: Colorado and Washington in 2012; Alaska and Oregon in 2014; California, Maine, Massachusetts and Nevada in 2016; Michigan in 2018; Arizona, Montana, New Jersey and South Dakota (the result was later overturned by the state Supreme Court) in 2020; and finally, in 2022, Maryland and Missouri, and in 2023, Ohio. Vermont, Illinois, New York, New Mexico, Virginia, Connecticut, Rhode Island, Delaware and Minnesota have legalised it through state law. Only possession and cultivation for personal use were legalised by referendum in Washington D.C. in 2014. Cannabis is also legal in various forms in three US territories in the Pacific Ocean: in the Northern Mariana Islands in 2018, on the island of Guam in 2019 and in the Virgin Islands in 2023.

This is, in fact, a political reform process that began long ago and from the bottom up. Its beginnings can be traced back to the referendum on medical marijuana in California, won by the anti-prohibitionist movement in 1996. Today, only Idaho and Nebraska have not legalised even the therapeutic use of CBD. The federal ban remains in place, even though a federal regulation bill (the so-called MOREact) has been passed by the House of Representatives for two consecutive legislative sessions, without ever making it to a Senate vote. It is therefore not possible to transport cannabis from one state to another, and companies involved in the markets, although legal in individual states, cannot have bank accounts because they are engaged in an activity that is illegal at the federal level. The sector is therefore essentially cash-intensive and resorts to cryptocurrencies, with all the problems that this entails, including the risk of cash theft from cannabis shops.

The process of reclassifying cannabis, initiated by President Biden in October 2023, has not yet been completed. In December 2025, President Trump issued an executive order to expedite the proposal by the Department of Health and Human Services, which was more or less openly opposed by the DEA, to move cannabis from Schedule I (along with the most dangerous substances, such as heroin and cocaine) to Schedule III of the federal drug law enacted by Nixon. Schedule III in the US includes substances with recognised medical use and a risk of abuse considered moderate or lower than substances listed in Schedules I and II. These include, for example, ketamine, buprenorphine, testosterone and other anabolic steroids, certain limited-dose codeine formulations in combination, and dronabinol (synthetic THC). If cannabis were reclassified as Schedule III, it would not automatically

become “legal” at the federal level: it would remain a controlled substance and therefore the conflict with the markets regulated by individual states would continue. There would be two main concrete changes: on the one hand, the fiscal impact, because reclassification would remove the penalty for cannabis companies, allowing them to deduct normal operating expenses (currently not deductible under Section 280E) and significantly improving margins, investments and market structures; on the other hand, a potential easing of bureaucratic obstacles to research, making clinical studies and product standardisation more feasible. On the criminal side, federal penalties for trafficking and distribution tend to be less severe than under Schedule I, but criminalisation does not disappear, and while medical use is favoured at the federal level, it has no effect on state dispensaries.

Returning to state legal regulations, the system, although varied, is essentially capitalist in nature: even though it is the state authority that issues licences, the supply chain is entrusted to private companies that produce and trade in a regime of substantial competition. While each state has its own specific regulations, they all set the minimum age at 21, impose different limits on possession in public and private places, and require packaging that cannot be confused, particularly by children. Apart from a few cases, it is possible to grow cannabis for personal use. Only in some states are there premises where cannabis can be consumed. All regulatory systems are based on paid licences and specific taxes, both as excise duties on production and as state and local surcharges on ordinary sales taxes. The taxes collected are allocated primarily to addiction prevention and treatment services, and then to educational, social and health services.

The most recent legislation has addressed the issue of both expunging cannabis offences from criminal records and repairing the damage to the communities and neighbourhoods most affected by the war on drugs, with incentives and facilities to ensure market entry and diversity in the sector.

It is estimated that the legal market now accounts for about a quarter of the total demand for cannabis in the entire US. In the more “mature” states, over 80% of the market has been captured. Retail sales of cannabis in 2024 were estimated at over $32 billion (one-third of that of wine and one-quarter of that of beer), while full-time employment in the entire legal cannabis sector in the US exceeded 500,000. From a fiscal perspective, cannabis taxes account for approximately 2% of the

total tax revenue of states that have legalised it, for a total of £4.4 billion in 2024. In the United States, as in Uruguay, the most recent surveys show an overall decrease in consumption among adolescents, even in states that have legalised it.

Canada: a middle ground between public health and the market

In 2015, Justin Trudeau, who had included the legalisation of cannabis in his government programme, won the Canadian general election and became Prime Minister. The explicit aim of the reform proposal was to better control the substance, limit access to it by young people, remove the market from criminal organisations and make communities safer.

It was not until 2016 that the government commissioned a task force to launch a consultation process involving institutions, civil society and citizens. Taking all positions into account, it drew up recommendations for the government, which combined the scientific rigour necessary for such a reform with the various sensibilities present in society. This participatory process led to the Cannabis Act, which was approved by Parliament in 2018. On 17 October of that year, legal cannabis sales officially began across the country.The Canadian government has reserved for itself the criminal classification and authorisation of cannabis production, while local governments manage the distribution and sale of cannabis, subject to federal conditions common to all provinces. Some of these have opted for a public monopoly model, while others have implemented a regulated market system open to private initiative.

To purchase cannabis, you must be of legal age (but provinces and territories may raise this age). You can possess up to 30 grams of cannabis and up to four plants per household. While selling to minors is severely punished, as is international trafficking, minors found in possession of up to five grams are not punishable in order to prevent them from entering the criminal justice system. Products that mix cannabis with other substances (alcohol, tea, coffee or tobacco) are prohibited, while packaging must be anonymous with strict labelling requirements. Taxation is initially low to discourage the black market, and penalties for driving under the influence of substances have been strengthened.

The great shadow of the Canadian reform has certainly affected justice and social equity, which were absent from the objectives of the law. Procedures for removing criminal records were introduced late and proved inadequate. Furthermore, it was not a case of actual cancellation: records are only shielded, remaining accessible in certain specific cases. Even from the point of view of market structure, nothing has been done to promote fair access to the new legal cannabis economy. This has allowed it to be taken over by companies that have become large corporations, thanks to a financial bubble that first favoured their expansion and then, once it burst, their concentration into a few large groups. As has happened elsewhere, the increase in consumption in the early months was followed by a levelling off of previous trends. The legal market has been expanding steadily, reaching a total value of $4 billion in 2024. Over 80% of consumers now obtain their supplies through legal channels, only 3% from illegal sources, and the rest from the grey market (such as the "social market", buying or exchanging among friends and acquaintances). The initial difficulties in intercepting the market were also linked to the small number and limited distribution of points of sale; as the sales network expanded and availability, products and prices became competitive with the black market, it gradually became easier to transfer consumers to the legal market. The average age of first use is also increasing in Canada, for the reasons already mentioned: in particular, most new consumers are over 50, while consumption among adolescents is also declining here. With legal regulation, risky behaviour is also decreasing: 40% fewer Canadians report driving after using the substance than before legalisation. Information and advertising bans, combined with portion control (such as edible products limited to 10 mg of THC per unit), encourage self-regulation of use.

Beyond the myths: what the data says

The legalisation process in the Americas has finally provided data and studies on the effects of cannabis legalisation, definitively debunking some of the myths that lie at the heart of the narrative on which the global drug control system is based.

The legalisation of cannabis is often evoked as synonymous with

"trivialisation", but the data and experience of countries that have chosen to legalise it tell a different story. When there are clear rules, controlled products and reliable information, the risks are better understood and the perception of risk does not decrease, but rather tends to increase. The average age of first use rises because the appeal of the "forbidden" for adolescents disappears. In this context, there is no evidence of the "uncritical normalisation" effect that is so feared in public debate.

Another recurring fear is that legalisation will cause consumption to skyrocket, especially among young people. In reality, in countries that have regulated the market – such as Uruguay, Canada and several US states – there is often a short-term increase, partly because it is easier to declare the use of a legal substance in surveys. Subsequently, however, consumption stabilises or declines. Above all, there is no evidence of an increase in use among young people: the idea that legalisation "pushes" adolescents towards cannabis is not supported by the available evidence.

Even the old argument that cannabis is a gateway drug, a gateway to more dangerous substances, is not supported by scientific literature. In the United States and Canada, there is a serious epidemic of overdoses from synthetic opioids such as fentanyl, and numerous studies have found no causal link between increased cannabis use and increased use of other drugs. In some cases, frequent cannabis use is even associated with less use of other substances. As always, the principle of drug, set & setting[7] applies: those who use cannabis are looking for certain effects, just as those who choose between coffee and barley know what they want to achieve; it is unlikely that simply trying cannabis will automatically lead to seeking cocaine or other drugs the next day.

On the crime front, regulation first and foremost shifts entire behaviours from the criminal to the legal sphere: "typical" offences such as possession and sale on the black market disappear, and disputes shift from guns to lawyers. Several studies show decreases in violent crime in some contexts after legalisation. Furthermore, in the first few years after legalisation, there has been an improvement in clearance rates, i.e. the ability to solve other crimes, because law enforcement agencies can reallocate time and resources to truly serious crimes,

[7] Norman E. Zinberg, Drugs, Set and Setting – The Basics of Controlled Psychoactive Substance Use, Edizioni Gruppo Abele, 2019, ISBN 9788865793350

rather than pursuing small-scale users.

Another issue concerns road safety and safety at work. Here, the results of studies are mixed: some historical data on medical cannabis show reductions in accidents, while a large meta-analysis concludes that the overall effect on accidents is not statistically significant. As far as work is concerned, insurance data do not indicate any increase in accidents related to recreational use. At the same time, in some age groups – particularly among the over-50s – there is greater participation in the labour market, consistent with "functional" use (for sleep, pain, etc.) that can improve quality of life.

Finally, there is the issue of "uncontrolled potency" and alleged "holes in the brain". For decades, there has been a belief that today's cannabis is "10–20 times stronger" than that of the 1960s. The reality is more prosaic: we are not talking about mythical GMO cannabis (synthetic cannabinoids are a different matter, but they are a direct result of the prohibition of natural substances), but rather the result of agronomic research and improved cultivation techniques, which have led to higher average THC levels. However, there are biological limits: concentrations above 30% in flowers are exceptional cases.

The decisive point is that only with legal regulation is it possible to set THC limits, test and control products, impose maximum dosages in edibles, and require clear and understandable labels. Furthermore, not everyone wants products with very high THC levels: consumers have different preferences and needs, and when possible, they choose. In a regulated market, these choices can be governed, informed and made safer for everyone. Below is a brief collection of myths and facts, as a useful tool for analysing and deconstructing the narratives and misrepresentations that attempt to justify a purely repressive approach to cannabis[8].

Cannabis as a gateway drug. Cannabis is not a gateway substance to potentially more dangerous drugs such as heroin. There is no empirical or scientific evidence to support this claim. Moreover, if this were really the case, given the millions of cannabis users, we would expect to find a much higher prevalence than is currently the case of people using other substances: however, usage trends appear to be

[8] This collection of myths and facts about cannabis is an updated text, originally taken from the book L'Onda Verde. La fine della Guerra alla Droga. (The Green Wave. The End of the War on Drugs) by Leonardo Fiorentini, Officina di Hank, 2021.

completely unrelated. Furthermore, cannabis use is often preceded by alcohol and/or tobacco use, which, being more culturally acceptable, are not considered by the prohibitionist narrative. Numerous studies[9], confirmed even more recently[10], have shown that cannabis use does not facilitate the transition to more dangerous substances; on the contrary, frequent use inhibits it[11]. Studies show that cannabis is rather a potential substance for overcoming addiction, particularly to opioids[12]. In practice, according to a study published in 2014 in JAMA (Journal of the American Medical Association)[13], states that have legalised medical cannabis have an average annual opioid mortality rate that is 24.8% lower than states that have not regulated it. The only real link between substances that have different personal and social uses therefore remains the dealer.

Cannabis and holes in the brain. Cannabis, as a psychoactive substance, certainly affects brain function and its use, like any other psychotropic substance, including alcohol, is not recommended during adolescence. Due to its psychoactive effects, particularly thanks to the presence of THC, changes in neuron function cannot be ruled out. For several years, neuroscientists have been trying to find evidence of the famous "holes in the brain" without much success[14]. There have always been fears about the long-term effects of use in adolescents, particularly in relation to psychosis, but recent studies minimise this, noting that 'the associations between cannabis use and cognitive functioning in cross-sectional studies of adolescents and young adults are small and may be of dubious clinical relevance for most individuals[15].

[9] L. Zimmer e P. Morgan, Marijuana. I miti e i fatti, Vallecchi, 2005, pp 67-74.

[10] C. Jorgensen, J. Wells, "Is marijuana really a gateway drug? A nationally representative test of the marijuana gateway hypothesis using a propensity score matching design", J Exp Criminol (2021). https://doi.org/10.1007/s11292-021-09464-z

[11] Reddon et al. "Cannabis use is associated with lower rates of initiation of injection drug use among street-involved youth: A longitudinal analysis", in Drug Alcohol Rev. 2018 Mar; 37(3):421-428. doi: 10.1111/dar.12667. Epub 2018 Feb 12

[12] Powel et al. "Do medical marijuana laws reduce addictions and deaths related to pain killers?" in Journal of Health Economics. Volume 58, March 2018, Pp. 29-42

[13] Bachhuber MA, Saloner B, Cunningham CO, Barry CL. "Medical Cannabis Laws and Opioid Analgesic Overdose Mortality in the United States", 1999-2010. JAMA Intern Med. 2014 Oct;174(10):1668-73. doi: 10.1001/jamainternmed.2014.4005. Erratum in: JAMA Intern Med. 2014 Nov;174(11):1875. PMID: 25154332; PMCID: PMC 4392651.

[14] V. & F. Crestani, 'I buchi nel cervello sono una bufala' "Fuoriluogo" in Manifesto, 16, May 2018. www.fuoriluogo.it/mappamondo/i-buchi-nel-cervello-sono-una-bufala

[15] J. C. Scott, PhD; S. T. Slomiak, MD; J. D. Jones, PhD; et al." Association of Cannabis

Furthermore, abstinence for more than 72 hours decreases the cognitive deficits associated with cannabis use‘ Similar results have been obtained from other studies conducted on ’discordant" twins with regard to cannabis use: no reduction in IQ, damage to executive functions or reduction in educational performance has been demonstrated[16].

Legalisation and trivialisation. Legal regulation allows for clearer and more effective information to be provided, without trivialising the substance, but making the information more realistic, objective and therefore credible. Proof of this is that – where serious information and risk prevention policies are implemented – the perception of risk increases among the general population, as in Canada[17] and Uruguay[18]. The trivialisation of substances, on the other hand, occurred in Italy with the Fini-Giovanardi law which, by legally equating all substances, spread the perception that substances with very different effects and health risks could be managed by the consumer with the same ease.

Cannabis is not what it used to be. First of all, it should be clarified that the cannabis available on the market today is not genetically modified. There is no doubt that cannabis, thanks to modern agricultural techniques, indoor cultivation and genetic selection (the same used for vegetables), can achieve higher THC levels than many years ago. However, not all cannabis on the market reaches these peaks, which in turn have certainly not increased tenfold compared to the 1960s. Suffice it to say that the average THC levels in seized flowers, i.e. those actually circulating on the Italian market, reported in the Department's annual report, have remained more or less stable for many years between 10% and 15% (14% in 2024, 10% in 2012)[19]. These

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with Cognitive Functioning in Adolescents and Young Adults A Systematic Review and Meta-analysis” in JAMA Psychiatry. 18 aprile 2018.
doi:10.1001/jamapsychiatry.2018.0335.

[16] Mocrysz e coll., Psychopharmacol 2016, Jackson e coll. PNAS 2016, Meier e coll. Addiction 2018.

[17] Canadian Cannabis Survey 2018 – 2024

[18] See note 4.

[19] Dipartimento Politiche Antidroga, Relazioni sulle tossicodipendenze in Italia, years 2024 (https://www.politicheantidroga.gov.it/it/notizie-e-approfondimenti/relazioni-annuali-al-parlamento/relazione-annuale-al-parlamento-sul-fenomeno-delle-tossicodipendenze-in-italia-anno-2024-dati-2023/) and 2013 (chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://antidroga.interno.gov.it/wp-

average levels are higher than before, but there has been no change in scale, and they are comparable to those of a US study from around 1975, which reported figures ranging from 1% to 14%[20]. The theory – which was already in vogue as the "16% theory" in the 1980s and 1990s and again in the 2000s[21] – is based on the fact that the comparison is made between a few samples seized by the DEA in the 1970s and those collected from the 1980s onwards, which are more numerous and reliable[22]. For example, a 2012 Italian study[23] found an increase in THC values (which never exceed 20%) compared to the 1970s, but the meta-analysis cited refers to a small number of samples for those years, twenty-eight in 1970 and fifteen in 1971 (which were stored and analysed using the methods available at the time), compared to 2,752 in 2008. Having clarified this, it should be emphasised that only with legal regulation can consumers be sure of what they are buying and therefore consume it safely. Furthermore, only with legalisation can regulatory limits be introduced: in the US, for example, products are generally limited to 10 milligrams of THC, and strict labelling requirements stipulate that labels must include a warning about the duration of the product's effect. None of these protections exist in the illegal market.

Legalization and consumption among the general population. Consumption will certainly increase in the short term, partly due to the novelty effect and a greater propensity for honesty. In the medium term, it appears to return to previous trends. An increase is likely in the short term, due both to the availability of the substance through legal channels, which allows people to try it (mainly those over 40, who increase the average age of first use) or return to using it, and to the factor of legality, which makes it easier for people who use substances to come out in questionnaires that detect the prevalence of use of

content/uploads/2019/01/relazione-annuale-2013.pdf)

[20] D.C. Perry, "Street Drug Analysis and Drug Use Trends 1969-1975. Part II" in PharmChem Newsletter Vol. 6(4): 1-3.

[21] L. Fiorentini, "Neanche la canapa è più quella di una volta", V° Libro Bianco sulla Fini Giovanardi, 2014 pp. 55-57. https://www.fuoriluogo.it/wp-content/plugins/download-attachments/includes/download.php?id=15474

[22] L. Zimmer e J.P. Morgan, Marijuana. I miti e i fatti, Vallecchi 2005, pp. 202-203.

[23] F. Cascini, C. Aiello &eG. Di Tanna, "Increasing Delta-9-Tetrahydrocannabinol (Δ-9-THC) Content in Herbal Cannabis Over Time: Systematic Review and Meta-Analysis"in National Library of Medicine. https://pubmed.ncbi.nlm.nih.gov/22150622/

substances that were previously illegal to consume. However, in the medium and long term, thanks in part to policies to prevent abuse and promote self-regulation, as well as the advertising ban contained in the vast majority of cannabis regulations, consumption will stabilize, essentially returning to previous trends. Quite simply, it is difficult for legislation to influence social phenomena[24], which, as such, behave and move independently of legal norms[25] (and national borders), as the Dutch experience demonstrates[26]. Moreover, with regard to problematic use (which is what should be of greatest concern), experience, including in Italy[27], with alcohol shows that when it comes to substances, context is more significant than prevalence of use, and it is by no means certain that higher consumption prevalence leads to an increase in problematic use.

The legalization and adolescent consumption of cannabis. Data from Canada and the US show no increase in adolescent consumption. In Uruguay, after an initial increase, there has been a downward trend in recent years, with consumption among 15-17 year olds halving compared to pre-legalization levels. Data from US states that have legalized cannabis, as well as the Dutch experience of tolerance, show that where it is legal for both[28] therapeutic[29] and recreational[30] use, cannabis use among adolescents is not only not increasing but in many cases is actually decreasing, reaching its lowest level since 1991[31]. The

[24] G. Zuffa, "Le molte strade della legalizzazione" in Leopoldo Grosso (edited by) Questione Cannabis, Edizioni Gruppo Abele, 2018.

[25] P.D. Cohen e H.L.Kaal, The Irrelevance of Drug Policy. Patterns and Careers of Experienced Cannabis Use in the Population of Amsterdam, San Francisco, and Bremen, CEDRO, University of Amsterdam, 2001.

[26] D.J. Korf, "Dutch Coffee Shops and Trends in Cannabis Use". Addict Behav. 2002 Nov-Dec;27(6):851-66.

[27] F. Beccaria, "La conoscenza e la ricerca sociologica tra teoria e spendibilità dei servizi" in P. Ugolini (edited by), Alcol e buon prassi sociologiche, Franco Angeli, Milano, p. 16.

[28] A.L. Sarvet , M.M. Wall, D.S. Fink, E. Greene, A. Le, A.E. Boustead, R.L. Pacula, K.M. Keyes, M. Cerdá, S. Galea, D.S. Hasin, "Medical Marijuana Laws and Adolescent Marijuana Use in the United States: A Systematic Review and Meta-Analysis" in Addiction, John Wiley & Sons Ltd on behalf of Society for the Study of Addiction, 2018.

[29] Leung, Janni, et al. "Has the Legalisation of Medical and Recreational Cannabis Use in the USA Affected the Prevalence of Cannabis Use and Cannabis Use Disorders?" Current Addiction Reports, September 2018.

[30] Association of Marijuana Legalization With Marijuana Use Among US High School Students, 1993-2019" September 2021, Journal of the American Medical Association

[31] Centers for Disease Control and Prevention, "Youth Risk Behavior Survey: Data

director of the National Institute on Drug Abuse, Nora Volkow (who has often collaborated with the Italian Anti-Drug Department), stated in a hearing on March 23, 2022, before the US Senate Committee on Health, Education, Labor, and Pensions that "in the United States, the legalization of marijuana by some states has not been associated with an increase in marijuana use among adolescents." These data are also accompanied by a reduction in behavioral problems, including fights, property crimes, weapon use, and drug dealing. Researchers have found that the two trends are linked, as young people who have become less "prone" to deviant social behavior (or who have had certain behaviors removed from the sphere of punishability by legislation) are also less likely to fall into problems related to marijuana use[32]. As researchers from four US universities who analyzed data from the Youth Risk Behavior Surveys (YRBS) from 1993 to 2017 wrote in JAMA Pediatrics: "estimates showed that cannabis use among young people may actually decrease (an average of -8% in occasional use, -9% in frequent use, Ed.) after legalization for recreational purposes. This latter finding is consistent with the findings of Dilley et al. and with the argument that it is more difficult for adolescents to obtain marijuana because dealers are being replaced by licensed dispensaries that require proof of age.[33]"

Legalization and crime. Not only does crime related to cannabis trafficking decrease, but violent crimes also decline as a result of regulation. The ability of police to solve [other] crimes also increases. The myth that the legal availability of cannabis may increase crime is disproved by studies that have followed in the wake of the first legalizations in the US. In fact, leaving aside the obvious decline in crimes directly related to the now legal substance, there has been a significant decrease in violent crimes in particular. For example, it has

Summary and Trends Report," February 2023, p. 22.; "Trends in the Prevalence of Marijuana, Cocaine, and Other Illegal Drug Use National YRBS: 1991—2019," CDC.

[32] R.A. Grucza, A. Agrawal, M.J. Krauss, J. Bongu, A.D. Plunk, P.A. Cavazos-Rehg, L.J. Bierut. "Declining Pevalence of Marijuana Use Disorders Among Adolescents in the United States, 2002 to 2013" in Journal of the American Academy of Child & Adolescent Psychiatry, vol. 55 (6). June 2016. http://dx.doi.org/10.1016/j.jaac.2016.04.002.

[33] D. Mark Anderson, PhD; Benjamin Hansen, PhD; Daniel I. Rees, PhD; et al., "Association of Marijuana Laws With Teen Marijuana Use. New Estimates from the Youth Risk Behavior Surveys". https://www.fuoriluogo.it/mappamondo/cannabis-adolescenti-legalizzazione-non-aumenta-consumi/

been found that in the early years of legalization in Washington State, crimes have fundamentally decreased across the board, with rapes down 30% and thefts down 20%[34]. This decrease is more pronounced near the state's borders. For example, US states bordering Mexico that have legalized cannabis for medical (but not recreational) use have seen an average decrease in violent crime of 13%, with peaks of 15% in California[35] and 7% in Arizona. Some studies have also found that the police are more likely to solve crimes following legalization and the freeing up of resources from cannabis enforcement[36].

Legalization and interception of the illegal market. Legal regulation certainly does not immediately eliminate the illegal market, but it has been shown that more mature legal markets gradually exceed the 80% threshold. Given that even particularly mature legal markets such as those for alcohol and tobacco are unable to fully intercept demand for those substances, there is no doubt that the ability of legal regulation to progressively intercept demand for cannabis is – even in the case of less efficient legislation – greater than that of repression, which, after decades of the war on drugs and investment in law enforcement, struggles to seize 10% of illegal drug production and 1% of the money laundered by drug trafficking.

Legalization and road accidents. There is no evidence to show statistically significant differences in road accidents between countries that have legalized cannabis and those that have not. Road accidents do not appear to have been affected by the legalization of cannabis. This is demonstrated by numerous studies comparing accident rates in US states that have legalized recreational and therapeutic use with those that have not[37]. The authors of a recent meta-analysis concluded that

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[34] D. Dragone, G. Prarolo, P. Vanin, G. Zanella "Recreational Cannabis Reduces Rapes and Thefts: Evidence from a Quasi-Experiment. Bologna: Dipartimento di Scienze economiche, 2016. DOI 10.6092/unibo/amsacta/5416. In Quaderni – Working Paper DSE (1078). ISSN 2282-6483.

[35] E.Gavrilova, T. Kamada, F. Zoutman, "Is Legal Pot Crippling Mexican Drug Trafficking Organisations? The Effect of Medical Marijuana Laws on US Crime" in https://doi.org/10.1111/ecoj.12521.

[36] Makin, D.A., et al. (2018). Marijuana Legalization and Crime Clearance Rates: Testing Proponent Assertions in Colorado and Washington State. Police Quarterly. Accessed from https://doi.or/10.1177/1098611118786255

[37] [28] V. J. D. Aydelotte et al. 'Crash Fatality Rates After Recreational Marijuana Legalization in Washington and Colorado' in American Journal of Public Health, August

"the overall effect size for DUIC (driving under the influence of cannabis) on UTEs (unfavorable traffic events) is not statistically significant[38]." Statistics on cannabis detection in drivers are also subject to bias, as traces of cannabis consumption remain for weeks after use and are therefore not in themselves proof of an impaired state at the time of the accident.

Legalization, workplace accidents, and productivity. Recreational cannabis use is not associated with any increase in workplace accidents[39] or any decrease in workplace productivity, unlike use before or during work[40]. On the contrary, in states that have legalized cannabis use, there has been a sharp decrease in claims for workplace accidents (-20%) among adults, particularly among older workers. Researchers also observed "an increase in labor supply following the adoption of RMLs (recreational marijuana laws), which is further consistent with the improvement in work capacity among older adults following the adoption of RMLs.[41]"

Legalization and neighborhood degradation. The opening of places for the sale of legal cannabis is not linked to any increase in crime[42], which in fact tends to decrease. In fact, according to a 2019 study on Denver[43], crime decreases by 19% in the vicinity of

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2017.

[38] S. Hostiuc, A. Moldoveanu, I. Negoi, E. Drima. – "The Association of Unfavorable Traffic Events and Cannabis Usage: A Meta-Analysis" in Front Pharmacol, 2018. Feb 12;9:99. doi: 10.3389/fphar.2018.00099. eCollection 2018.

[39] S. Hostiuc, A. Moldoveanu, I. Negoi, E. Drima. – "The Association of Unfavorable Traffic Events and Cannabis Usage: A Meta-Analysis" in Front Pharmacol, 2018. Feb 12;9:99. doi: 10.3389/fphar.2018.00099. eCollection 2018.

[40] J. C. Zhang, N. Carnide, L. Holness, P. Cram, "Cannabis use and work-related injuries: A cross-sectional analysis", Occupational Medicine, 2020
https://pubmed.ncbi.nlm.nih.gov/33108459

[41] R.Abouk, K.M. Ghimire, J. C. Maclean & D. Powell, "Does Marijuana Legalization Affect Work Capacity? Evidence from Workers' Compensation Benefits", National Bureau of Economic Research, 2021. https://www.nber.org/papers/w28471

[42]P. Hunt, R. Liccardo Pacula, G. Weinberger, High on Crime? Exploring the Effects of Marijuana Dispensary Laws on Crime in California Counties, IZA, Institute of Labor Economic, 2018, http://ftp.iza.org/dp11567.pdf.

[43]J. Brinkman, D. Mok-Lamme, "Not in my backyard? Not so fast. The effect of Marijuana Legalization on Neighborhood Crime", Regional Science and Urban Economics, Volume 78, September 2019, 103460.
https://www.sciencedirect.com/science/article/abs/pii/S016604621830293X#!

dispensaries. Further studies have verified the opposite: when dispensaries close, crime increases[44]. Neighborhoods where drug dealing takes place are very often also subject to property devaluation: this process seems to be reversed in a legal regime, where the presence of dispensaries actually increases property values. This was verified by economists in two different studies in 2017[45] and 2018[46] in Colorado, which showed an increase of about 8% in the value of homes near a store. Furthermore, a team of economists from the University of Oklahoma identified "a large positive effect on the real estate market after legalization." In particular, they reported "a 5% increase in home prices following the passage of the RML (recreational marijuana laws) and an 11% increase once sales began.[47]" The public services implemented as a result of the new tax revenues from legalization, and the very presence of dispensaries, considered to be commercial amenities on a par with any other commercial establishment, "create largely positive effects following the legalization of recreational marijuana.

The shadows of legalization: fairness, environment, concentration

The legalization of cannabis currently underway around the world is certainly not all roses and sunshine. Alongside the benefits—reduction of the illegal market, greater protection for users, tax revenues—limitations, contradictions, and new inequalities have emerged. This is precisely why many civil society organizations[48] have begun to

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[44] T.Y. Changa, M. Jacobson, "Going to pot? The impact of dispensary closures on crime", Journal of Urban Economics, Volume 100, July 2017, Pages 120-136. https://www.sciencedirect.com/science/article/abs/pii/S0094119017300281

[45] J. Conklin, University of Georgia, M. Diop, University of Wisconsin-Madison, H. Li, California State University, Sacramento, "Contact High: The External Effects of Retail Marijuana Establishments on House Prices", 30 August 2017. https://wsbfiles.wsb.wisc.edu/digital/mdiop/intellcont_journal/contact_high_public-1.pdf

[46] J. Burkhardt, M. Flyr, "The Effect of Marijuana Dispensary Openings on Housing Prices", in Contemporary Economic Policy, 29 November 2018 https://doi.org/10.1111/coep.12414

[47] D. Kim, S. O'Connor & B. Norwood, Retail Marijuana Deregulation and Housing Prices June 9, 2020. http://dx.doi.org/10.2139/ssrn.3537860.

[48] IDPC, Principles for the responsible legal regulation of cannabis. https://idpc.net/publications/2020/09/principles-for-the-responsible-legal-regulation-of-cannabis

question how to legalize[49] and improve existing models, identifying a series of critical issues that need to be addressed if we want regulation to be truly oriented towards rights, health, and social justice.

A first issue concerns the idea that 'the market' alone is enough to solve everything. Experiences in the United States and experiments in Europe, as well as the markets for substances such as alcohol and tobacco, show that a purely liberal approach certainly does not guarantee a reduction in the harm and risks associated with the use of a psychotropic substance. On the contrary, models such as cannabis social clubs point to another way forward: not only places of production and distribution, but also spaces for socializing, peer discussion, information exchange, and self-regulation practices. Qualitative research conducted by Forum Droghe[50] a few years ago also highlighted how these collective forms can strengthen people's ability to use substances more consciously, limiting risky behaviors.

There is also a question of global justice: regulations in consumer countries, which are largely rich countries, tend to exclude traditional producers in poorer countries from the economic benefits of the new legal market. After decades of repression, these actors now find themselves marginalized from the profits of the new legal regime. The challenge, including for the convention system, is to devise mechanisms that allow them to re-enter the regulated system: certified supply chains, inter se agreements[51], fair trade, reserved quotas, support for the transition to legal and sustainable production.

The issue of social justice also lies at the heart of societies that legalize. The people and communities that have borne the brunt of repression cannot simply be 'shelved' when the market becomes legal. Concrete tools for redress are needed: streamlined procedures for expunging convictions and records for non-violent cannabis-related offenses; reinvestment of tax revenues in neighborhoods historically

[49] Transform, How to Regulate Cannabis
https://transformdrugs.org/publications/how-to-regulate-cannabis-3rd-ed

[50] Forum Droghe, L'autoregolazione nel consumo di cannabis. Raccomandazioni verso un nuovo approccio ai modelli di consumo di cannabis e per una efficace politica alternativa. https://www.fuoriluogo.it/wp-content/plugins/download-attachments/includes/download.php?id=27047

[51] Jelsma, M.; Boister, N.; Bewley-Taylor, D.; Fitzmaurice, M.; Walsh, J.; Balancing Treaty Stability and Change Inter se modification of the UN drug control conventions to facilitate cannabis regulation, 2019
https://www.tni.org/en/publication/balancing-treaty-stability-and-change

most affected by drug dealing, repression, and incarceration; training programs, facilitated authorization processes, and reserved licenses to allow those who have been personally affected to play a role in the new market. Some US laws have begun to move in this direction, but much remains to be done.

Finally, there is the climate issue. High-quality cannabis is a crop that requires a lot of water and nutrients, and its large-scale production, if unregulated, can have a significant environmental impact. In contexts where outdoor cultivation is possible, there is a risk of deforestation, diversion and intensive exploitation of water resources, and massive use of fertilizers and pesticides, resulting in contamination of rivers and reservoirs and poisoning of wildlife. Indoor cultivation, on the other hand, involves enormous energy consumption and a disproportionate carbon footprint. It is therefore essential that regulation includes strict environmental and energy standards, incentives for sustainable cultivation, and financial resources to support producers in the transition to less impactful practices. Only in this way can legalization be consistent with the global challenge posed to humanity by the climate emergency.

Breaking out of the prohibitionist dead end

The experiences of Uruguay, the United States, and Canada show that regulating cannabis is not a magic wand that suddenly solves all problems, but a tool that has a more or less effective impact at different speeds depending on the model chosen and the context of application. It is an approach that reduces the space for the illegal market, shifts conflicts from the streets to the rules, raises the age of first use, and makes it easier to protect the health of users. The data refute many of the warnings: there is no ‘boom’ among teenagers, the perception of risk tends to increase rather than decrease, the quality of products is controllable and, in various contexts, crime and indirect costs are also falling because law enforcement agencies can focus on truly serious crimes. Critical issues remain unresolved—from social justice to environmental issues to the risk of markets dominated by big capital—which require continuous monitoring and correction.

But the broader lesson goes beyond cannabis. More than fifty years after the start of the ‘war on drugs’, the global toll is grim: according to

the UN Office on Drugs and Crime (UNODC), in 2023, 316 million people (about 6% of the population aged 15-64) used at least one controlled substance[52]; with cannabis alone affecting 244 million people. These figures reveal a mass social phenomenon, not an exception to be governed solely by criminal law. The disaster of the repressive approach is also evidenced by the irrelevance of supply reduction policies, both in terms of converting illegal crops (which simply move elsewhere) and seizing substances and dismantling criminal organizations, which, on the contrary, seem to increase in power every decade in economic and social terms, but also in political and military terms. In this context, it is useful to recall the well-known Darwinian drug trafficker's dilemma[53]: when repressive pressure increases, it is the small fish and the less efficient and solid criminal organizations that are wiped out first, leaving room for the more powerful, experienced ones, which are more capable of corrupting and protecting their interests. And often more violent. Prohibition does not eliminate supply, making it substantially stronger. Nor does it eliminate demand: it shifts it, drives it underground and thus too often, it also makes it more dangerous, with the proliferation of synthetic substances and adulterations designed to circumvent controls and prohibitions. All too often, it also makes it more dangerous, with the proliferation of synthetic substances and adulterations designed to circumvent controls and prohibitions.

That is why developing an alternative approach to the legalization and regulation of cannabis—one that is rigorous and focused on public health and rights—is not an ideological whim: it is a policy of harm reduction, safety, and justice. It means limits and controls on quality and potency, bans on aggressive marketing, reinvestment of revenues in prevention and services, expungement of past minor offenses, and fair opportunities in the new market. It also means finally opening a credible breach in the wall of prohibitionist thinking: a necessary step to take resources away from crime, reduce stigma, and return to politics the governance of what today, in fact, governs the black market.

[52] World Drug Report 2025, UNODC

[53] Skolnick, J.H., 7 Crack Dilemmas in Search of an Answer, New York Times, 22 maggio 1989

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BIG PERCENTAGES, SMALL NUMBERS? UNDERSTANDING CANNABIS-RELATED HARMS UNDER CANADA'S CANNABIS ACT

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1. Introduction

The legalization of non-medical cannabis in Canada represents a landmark policy shift with significant implications for public health, safety, and social norms. Enacted on October 17, 2018, the Canada Cannabis Act (Bill C-45) (CCA) sought to regulate the production, distribution, and consumption of cannabis for non-medical purposes, while aiming to reduce youth access, curb illicit markets, and protect public health (Bill, 2018). The CCA introduced a complex regulatory framework involving federal oversight of licensing and production, coupled with provincial authority over distribution, retail systems, and age limits for consumption.[54]

The introduction of the CCA represents a profound shift in the social, economic, and legal landscape surrounding cannabis use. Prior to legalization, cannabis consumption and commerce in Canada existed within an ambiguous legal space, with a combination of criminal penalties, medical exemptions, and widespread informal access (Bear, 2017). The legalization process has sparked substantial debate regarding its potential benefits and risks. Proponents argue that regulated markets allow for safer products, more effective public health

[54] In Québec, the minimum age for cannabis use was set at 21 years, accompanied by a state-run retail system, reflecting the province's historically cautious approach to psychoactive substances. (Lévesque & Benoit, 2020).

messaging, and reduced criminalization (Matheson & Le Foll, 2020). Critics, however, have raised concerns about the normalization of cannabis use, the potential for increased consumption, particularly among vulnerable populations, and the broader societal consequences, including impaired driving and interaction with alcohol (Fischer et al., 2019; Jablonska & Negura, 2024). Understanding the effects of the CCA on health, behavior, and safety requires careful empirical investigation, particularly given the novelty of legalized cannabis markets and the evolving consumption trends post-2018.

A growing body of literature has sought to assess the impact of the CCA and comparable jurisdictions (Hall et al., 2023; Imtiaz, et al., 2025 ; McDonald et al., 2025; Mital et al., 2024; Vingilis et al., 2021; Windle et al., 2022). Epidemiological studies have documented changes in prevalence, frequency, and patterns of cannabis use among the general population. Some studies indicate modest increases in overall cannabis consumption, with particularly notable changes among young adults and pregnant women (Corsi et al., 2019; Lachance et al., 2022; McDonald et al., 2025). Simultaneously, concerns about cannabis-related harms have prompted investigations into cannabis use disorders (CUDs) (Martínez et al., 2024), adverse health outcomes (Martínez et al., 2025), and social consequences (Bahji et al., 2024; Myran, Roberts, et al., 2023). Existing research highlights both the promise and limitations of legalization: while regulated markets may reduce exposure to illicit substances, the absolute number of individuals experiencing cannabis-related harms may remain relatively small compared to the total population. This notion however underscores the challenge of translating statistically significant effects into meaningful public health implications.

In particular, “small-scale” studies have relied on limited numbers of cases or observations (the “small N problem”), which risks overstating causal relationships or overlooking important interactions among variables. Assumptions of determinism, lack of measurement error, and single-cause explanations rarely capture the complexity of social behaviors, particularly in the context of psychoactive substance use. As a result, comparative studies without adequate sample sizes may produce conclusions that fail to generalize across populations, raising critical questions about the validity and policy relevance of their findings. In response, research with large datasets (large N studies) offers a more robust approach by accounting for multiple causes,

interactions, and sources of variability, thereby providing a more nuanced understanding of cannabis-related outcomes in the post-legalization environment (Lieberson, 1991).

The Canadian context provides a unique opportunity to study the effects of legalization due to the availability of high-quality, population-level administrative and health data. For example, the Québec Integrated Chronic Disease Surveillance System (QICDSS) includes diagnostic information for more than 98% of the province's population, allowing researchers to track, among other outcomes, cannabis use disorders over time (Blais et al., 2014). By combining these data with sales volumes from the Société québécoise du cannabis (SQDC) and national Health Canada estimates of legal and illegal consumption (Canada, 2017; Health Canada, 2024; Société québécoise du cannabis, 2024), it is possible to examine changes in both exposure and outcomes in a quasi-experimental framework. These datasets enable the assessment of incidence rates of cannabis-related disorders, with stratification by age, sex, and specific populations such as pregnant women, thereby capturing both the absolute and relative changes in cannabis-related harms before and after the CCA.

Despite the availability of administrative and surveillance data, challenges remain in interpreting cannabis-related outcomes. Absolute numbers of new diagnoses of cannabis use disorder are relatively low compared to the prevalence of consumption, creating a discrepancy between the percentage increase in incidence and its practical impact on public health. For instance, while legalization is associated with a statistically significant increase in monthly rates of cannabis-related diagnoses, the actual number of additional cases per month may be small in absolute terms (Nazif-Munoz et al., 2024). This observation is particularly salient in specific populations such as pregnant women, where even a modest increase in prevalence warrants attention due to potential health risks for both the mother and the developing fetus, yet the overall numbers remain low relative to the population size. Understanding this distinction between relative risk and absolute burden is critical for developing targeted interventions, public health messaging, and policy responses that are proportionate to the magnitude of the risk.

In addition to individual health outcomes, cannabis legalization has implications for broader societal harms, including traffic safety. Driving under the influence of cannabis presents challenges for law

enforcement and public health, as impairment detection and regulation are complex (Donnan et al., 2022; Marcotte et al., 2023). Canadian provinces, including Québec, have implemented strict regulatory frameworks for drug-impaired driving, with defined thresholds for tetrahydrocannabinol (THC) levels and combined alcohol-cannabis offences under the CCA. Despite these measures, studies indicate that legal and illegal cannabis sales are associated with increases in alcohol-related crashes, suggesting that cannabis legalization may influence risk behaviors through interactions with other substances (Nazif-Munoz & Ouimet, 2025). These findings underscore the importance of examining complementary effects rather than assuming substitution or isolated impacts, highlighting the interconnectedness of cannabis consumption, alcohol use, and societal harms.

Moreover, the COVID-19 pandemic introduced an additional layer of complexity, influencing mobility patterns, social interactions, and substance use behaviors. Pandemic-related restrictions, changes in daily routines, and psychological stressors may have contributed to shifts in cannabis consumption and associated harms (Mielau et al., 2022). Disentangling the effects of the CCA from pandemic-related factors requires rigorous statistical methods, including interrupted time series analyses, which account for underlying trends, seasonality, and population-level changes (Bernal et al., 2017). By incorporating these methodological approaches, research can more accurately estimate the causal effects of legalization on cannabis-related disorders and traffic-related outcomes, providing evidence that is both scientifically robust and policy-relevant.

In summary, the CCA represents a transformative policy experiment with implications for public health, social behavior, and regulatory practice. While large-scale datasets provide unprecedented opportunities to assess the effects of legalization, interpreting these findings requires careful attention to methodological challenges, the distinction between relative and absolute risks, and the complex interplay of social, behavioral, and environmental factors. The present research focuses on Québec as a case study, given its strict regulatory environment, comprehensive surveillance systems, and state-run retail structure, which together provide a controlled context to assess cannabis-related harms (Nguyen & Mital, 2022). By examining cannabis use disorders in the general population and specific subgroups, as well as changes in drug- and alcohol-related traffic

collisions, this study aims to provide a nuanced understanding of the consequences of the CCA and inform future public health and regulatory policies.

This introduction establishes the context, rationale, and significance of the research, highlights gaps in existing knowledge, and outlines the objectives of the study: to quantify the impact of the Cannabis Act on problematic cannabis use and related harms, to explore absolute versus relative changes in outcomes, and to investigate interactions with other risk factors, including alcohol consumption and societal disruptions such as the COVID-19 pandemic. The following sections will describe the most important aspects of the CCA, and a comprehensive assessment of cannabis-related harms in Québec in the post-legalization era in two domains: cannabis use disorders and road safety outcomes.

2. The Federal Cannabis Act Framework and its Provincial Differences

The legalization of cannabis for non-medical use at the federal level with the adoption of the CCA (Bill C-45) in October 2018, marked a landmark transformation in the governance of psychoactive substances. The CCA established the overarching legal framework for the production, distribution, sale, possession, and consumption of cannabis for non-medical purposes. Its central objectives include protecting public health, restricting youth access, reducing the influence of the illicit market, and creating a strictly regulated environment for adult consumers. A defining feature of the legislation is its multilevel design: while the federal government sets national standards for production and product safety, provinces and territories retain the authority to implement complementary regulations (Government of Canada, 2023). This division of responsibilities has resulted in substantial variation in retail models, consumption rules, and enforcement practices across jurisdictions. This implies that effects within the same country will not necessarily be homogeneous, as political designs and approaches reflect the distinct trajectories of provinces and territories, as is the case in Canada.

More broadly, the CCA is recognized as one of the world's most comprehensive national regulatory frameworks for legal non-medical cannabis. Its implementation marked a decisive shift away from

prohibition toward a public-health–oriented model aimed at mitigating the harms associated with criminalization while providing a controlled legal supply (Fischer et al., 2019). The CCA sought to balance competing policy goals—displacing illicit markets, safeguarding youth, and promoting public safety—within a rapidly evolving social and commercial landscape. Since 2018, the framework has been adapted in response to emerging evidence, market dynamics, and ongoing public-health assessments, reflecting its flexible and iterative nature (Rosenberg et al., 2024). The following subsection examines the core regulatory architecture, key enforcement mechanisms, and evolving context of the CCA, including its economic footprint and its intersection with Canada's impaired-driving laws.

a. Core Principles and Legal Foundations

The CCA established the foundational legal conditions for the possession, production, distribution, and sale of cannabis for non-medical purposes in Canada. It is anchored in three explicit federal objectives: (1) protecting public health and safety, (2) restricting youth access to cannabis, and (3) reducing criminal activity associated with the cannabis illicit market. These principles are reflected in a series of prohibitions and allowances that define legal and illegal conducts.

Central among these is the prohibition of any cannabis sale unless explicitly authorized under federal or provincial regulatory systems. The CCA further prohibits the sale or marketing of cannabis products that may appeal to youth, including restrictions on flavours, shapes, promotional elements, and packaging features deemed attractive or misleading. These provisions draw heavily from earlier tobacco-control frameworks, demonstrating the legislator's commitment to using established public-health tools to govern a novel psychoactive product (Rosenberg et al., 2024). Possession limits form another key pillar of the CCA. At the federal level, adults aged 18 and older may legally possess up to 30 grams of dried cannabis (or equivalent) in public spaces. However, the Act allows provinces and territories to adopt stricter limits. Québec, for example, raised the minimum legal age to 21, reflecting a more precautionary stance grounded in local public-health priorities and political context. These jurisdictional variations highlight the federal–provincial collaboration that characterizes cannabis governance in Canada.

b. Federal Licensing and Provincial/Territorial Responsibilities

The division of powers under the CCA assigns the federal government responsibility for the licensing and oversight of all cannabis production activities, including cultivation, nurseries, processing facilities, and analytical testing laboratories. Health Canada regulates production standards, conducts inspections, and enforces compliance with product safety, chemical composition, contamination thresholds, and record-keeping requirements.

In contrast, provinces and territories hold exclusive authority over distribution and retail models, enabling substantial heterogeneity across the country. Some jurisdictions, such as Québec and Prince Edward Island, adopted government-run retail monopolies, whereas others, such as Alberta and Ontario (post-2019 reforms), implemented private retail systems. Provinces also regulate online sales, hours of operation, staff training requirements, point-of-sale oversight, and consumption rules in public and private spaces (Institut de la statistique du Québec, 2025).

This multilevel system has produced diverse market dynamics and varying degrees of success in displacing illicit supply. For example, provinces with more liberal retail licensing regimes have contributed to higher legal market penetration (Wadsworth et al., 2023), while more restrictive models have sometimes faced challenges meeting demand. Nonetheless, the national shift to a regulated supply chain represents a significant public-policy innovation that requires continual adaptation.

c. Regulatory Architecture and Compliance Mechanisms

The CCA introduced a sophisticated compliance framework aimed at preventing diversion to the illicit market and ensuring product safety. A central component of this framework is the national Cannabis Tracking System (CTS), which monitors cannabis from seed to sale. The CTS enables federal authorities to identify irregularities, track inventory flows, and detect potential sources of diversion or unauthorized distribution.

Security requirements constitute another essential element. Individuals involved in cannabis production and distribution must obtain security clearances, which assess criminal history and affiliations that could pose risks to the regulated system. These

provisions were designed to enhance the integrity of the supply chain, particularly during the early phases of legalization when illicit-market displacement was a priority.

Law-enforcement agencies have been granted strengthened tools and authorizations for monitoring compliance and conducting investigations. These include enhanced inspection powers, access to business records, and expanded enforcement authority for provincial regulators. Such measures underscore the dual emphasis of the CCA on public health and public safety.

Economically, Canada's legal cannabis industry has grown significantly. In 2024, it contributed approximately CA$ 16 billion to the national GDP (McKay, 2025). These figures reflect the rapid emergence of a sizable agro-industrial sector with strong linkages to retail, testing, logistics, and research.

d. Product Standards, Testing, and Packaging Regulations

One of the defining features of the Canadian cannabis regulatory model is its stringent product-standard regime, designed to minimize health risks and prevent misleading advertising. Health Canada requires mandatory analytical testing for potency, cannabinoids, microbial contamination, pesticides, and heavy metals (Health Canada, 2022). Products must adhere to clear composition standards, and licensed producers are obligated to implement rigorous quality-assurance systems.

Packaging and labelling regulations are similarly strict. The CCA mandates plain, child-resistant packaging, standardized THC and CBD concentration labels, health warnings, and limits on branding elements. These restrictions mirror tobacco-control approaches and were introduced to ensure that legal cannabis does not mimic the marketing strategies historically used to increase youth uptake of cigarettes or vaping products. The emphasis on packaging and labelling also supports informed decision-making among consumers by providing reliable potency and content information (Leos-Toro et al., 2021).

e. Cannabis-Impaired Driving and Criminal Code Reforms (Bill C-46)

The legalization of cannabis required substantial reform of Canada's impaired-driving legislation. Bill C-46, passed concurrently with the

CCA, modernized the Criminal Code by introducing new drug-impaired driving offences based on prohibited concentrations of THC within two hours of operating a motor vehicle.
The law established three primary offences:

1. A summary offence for low-level THC concentrations (≥2 ng/mL), intended as a preventive measure.
2. A hybrid offence for high-level THC concentrations (≥5 ng/mL), reflecting increased impairment risk.
3. A hybrid offence for combined alcohol and THC consumption, triggered at ≥2.5 ng/mL THC plus a BAC ≥0.05%, acknowledging that concurrent use substantially elevates crash risk.

Bill C-46 also expanded enforcement tools, including the authorization of approved oral-fluid screening devices and strengthened investigative powers for police officers trained in drug-recognition procedures. Provinces and territories may impose additional administrative sanctions, such as roadside licence suspensions or mandatory education programs, resulting in variation across jurisdictions.

f. Evolving Regulatory Context and Ongoing Challenges

As the cannabis market has matured, policymakers have continued to adjust the regulatory framework. Challenges include persistent illicit-market activity in some regions, concerns about youth consumption, and debates about the adequacy of THC potency limits and product forms. The expansion of product categories—such as edibles, extracts, and topicals—has prompted additional regulatory oversight to address dosing concerns and accidental pediatric exposures (Myran, Gaudreault, et al., 2023).

Moreover, the integration of cannabis policy with broader public-health and criminal-justice systems remains an ongoing task. For example, monitoring trends in cannabis-impaired driving, evaluating health outcomes associated with high-potency products, and assessing equity implications for communities disproportionately affected by historical drug enforcement all require sustained attention.

3. Implications for populations with cannabis use disorders

Research on the impacts of non-medical cannabis laws (NMCL) on different populations is rapidly expanding, encompassing outcomes such as cannabis consumption, cannabis use disorders (CUDs), treatment, traffic crashes, and crime (Callaghan et al., 2021; Farrelly et al., 2023; Jayawardhana et al., 2025; Windle et al., 2022). However, limited attention has been given to how these policies specifically affect pregnant women, a vulnerable group for whom cannabis use carries documented risks including preterm birth, low birth weight, and neonatal intensive care admissions. The enactment of the CCA in October 2018 has heightened public health concerns regarding prenatal cannabis exposure, while also providing an opportunity to examine potential spillover effects on the broader adult population.

Prior research in both Canada and the United States has shown that NMCLs are associated with modest increases in cannabis consumption, including during pregnancy, though findings on other substance use, such as alcohol and opioids, have been inconsistent (Myran, Roberts, et al., 2023; Nguyen et al., 2024). The COVID-19 pandemic added further complexity, influencing substance use behaviors through increased stress, social isolation, and reduced access to healthcare services (Mitra et al., 2024). While international evidence suggests substantial increases in cannabis use among pregnant women during the pandemic (Young-Wolff et al., 2021), Canadian studies indicate that prevalence remained relatively stable, with only specific subgroups experiencing elevated use (Kar et al., 2021).

To address these gaps, the present work combines population-based assessments of both the general adult population and pregnant women in Québec, leveraging linked administrative health data spanning January 2010 to March 2022 for adults, and January 2010 to July 2021 for pregnant women. These datasets, part of Québec's universal public health insurance system, allow for the identification of individuals newly diagnosed with CUDs and other substance-related disorders across hospitalizations, emergency, and outpatient settings. By using interrupted time-series analyses, this study quantifies changes in incidence rates associated with the implementation of the CCA and the onset of the COVID-19 pandemic, while considering both relative trends and absolute numbers of new cases.

This approach permits a dual perspective: assessing how broad

regulatory shifts affect cannabis use disorders in the general population, while also examining potential impacts on a high-risk group, pregnant women, whose health outcomes have direct implications for child development. By evaluating both relative measures (e.g., prevalence rates) and absolute numbers (e.g., total cases) in a province of over 9,000,000 people, and by integrating data on cannabis-, alcohol-, and other drug-related diagnoses, the study provides a comprehensive evaluation of potential spillover effects, policy impacts, and the differential effects of stringent versus more permissive regulatory frameworks.

Cannabis Use Disorders in Pregnant Women

Among pregnant women, the prevalence of CUD increased substantially following the enactment of the CCA. Prior to legalization, monthly prevalence rates were rising steadily by 0.5% per month (95% CI: 0.3–0.6%), reflecting an upward trend before policy changes. Post-CAC implementation, prevalence increased by 24% (95% CI: 1–53%), corresponding to an absolute increase of approximately 3 new diagnoses per month in a population of 6,450 pregnant women. The total of this effect was 52 new diagnoses for a total of a population of 115000 pregnant women.

By contrast, all drug-related disorders (excluding cannabis) and alcohol-related disorders in pregnant women remained relatively stable, with no significant changes attributable to the CCA. During the COVID-19 pandemic, there was a non-significant decrease of 20% (95% CI: −38 to 3%) in alcohol-related disorders, while cannabis-related disorders maintained elevated levels. These trends suggest that the CCA had a measurable and focused impact on cannabis-related harms in pregnant women, without apparent spillover to other substances.

Importantly, the magnitude of absolute change—3 new cases per month—illustrates the "big percentages, small numbers" phenomenon noted in the introduction. While relative increases appear substantial, the total number of new monthly cases in the context of Québec's pregnant population is modest. Nevertheless, even small absolute increases are clinically meaningful due to potential risks to both maternal and fetal health, including low birth weight, preterm birth, and neonatal intensive care admissions.

Cannabis Use Disorders in the General Population (15+)

In the broader population aged 15 years and older, monthly incidence rates of cannabis-related disorders also increased following the CAC and during the COVID-19 pandemic. Pre-CAC rates averaged 1.56 per 100,000 population, rising to 3.02 per 100,000 during the pandemic, effectively doubling baseline prevalence. Interrupted time-series analyses revealed that while there were no statistically significant level changes immediately following policy or pandemic onset, trends over time indicated significant increases in the monthly slope: in the general population: +1.22% per month (95% CI: 0.08–2.35) post-CCA, in males: +1.44% per month (95% CI: 0.04–2.84) post-CCA, in the general population: +1.43% per month (95% CI: 0.75–2.12) during COVID-19, sn f last in females: +1.75% per month (95% CI: 0.13–3.37) during COVID-19. The absolute impact corresponds to approximately 13 new cases per month in a population of 3,007,825. Nevertheless, these new cases were also negative, further suggesting an absence of association between the CCA and this particular outcome. While relative trends highlight statistically significant growth, absolute case counts again remain small relative to the total population, mirroring the pattern observed in pregnant women. These results suggest that both the CCA and pandemic-associated factors contributed to incremental increases in CUD diagnoses, with slight sex-specific variations during the COVID-19 period.

Comparative Insights: Pregnant Women vs. General Population

Comparing the two populations, several patterns emerge: first, magnitude of absolute change: Absolute case counts are low in both populations (3 per month in pregnant women, 13 per month in the general population), consistent with the concept that legalization and pandemic effects are detectable but numerically modest relative to population size. Second, pregnant women experienced a 24% increase post-CCA, whereas in the general population, monthly rates more than doubled from pre-CCA levels during the pandemic. This indicates that baseline risk and absolute population size shape observed relative effects, highlighting the importance of reporting both metrics for policy relevance. Third, substance in pregnant women, the increase was specific to CUD, with alcohol- and other drug-related disorders largely

unaffected. In the general population, analyses focused solely on cannabis-related disorders, reflecting broader public health concerns about cannabis use following legalization and pandemic-related stressors. Last, in the general population, males showed a post-pandemic decrease in slope during COVID-19 (−1.84%, 95% CI −3.41 to −0.24), while females exhibited a significant increase. This divergence may reflect differing coping mechanisms or social patterns of cannabis use between sexes, warranting further investigation.

4. Research on the impacts of non-medical cannabis laws (NMCL) on road safety outcomes

Research on the impacts of non-medical cannabis laws (NMCLs) on road safety is rapidly expanding, encompassing outcomes such as drug- and alcohol-related traffic crashes, fatalities, and severe injuries (KSI) (Callaghan et al., 2021; Farrelly et al., 2023; Jayawardhana et al., 2025; Windle et al., 2022). However, limited attention has been given to how these policies affect different urban populations across Québec, including Montréal, Laval, Longueuil, and Sherbrooke, which differ in population density, traffic patterns, and cannabis accessibility. The enactment of the CCA has increased public health concerns regarding impaired driving, while also providing an opportunity to examine potential spillover effects on alcohol- and drug-related crashes across the adult population.

Prior research in both Canada and the United States has shown that NMCLs are associated with modest increases in cannabis consumption, which may translate into higher incidence of impaired driving, although the evidence for spillover effects to alcohol-related crashes has been inconsistent (Mitra et al., 2024; Nguyen et al., 2024). The COVID-19 pandemic added further complexity, influencing substance use behaviors through increased stress, social isolation, and altered mobility patterns (Young-Wolff et al., 2021). While international evidence suggests notable increases in cannabis use during the pandemic, Canadian data indicate that changes were modest at the population level, though certain urban subgroups experienced elevated consumption, potentially affecting road safety (Kar et al., 2021).

To address these gaps, the present work combines population-based assessments of cannabis sales and traffic crashes across five major

cities in Québec, leveraging linked administrative data from January 1, 2015, to December 31, 2022. These datasets include daily counts of drug- and alcohol-related crashes, KSI incidents, and cannabis sales (legal and estimated illegal), while controlling for confounding factors such as temperature, seasonal trends, and the COVID-19 non-pharmaceutical interventions index (QCnPI-Index). By using interrupted time-series analyses with Negative Binomial regression and meta-analytic aggregation, this study quantifies changes in crash incidence associated with the implementation of NMCLs, daily cannabis sales, and the onset of the COVID-19 pandemic, while considering both relative trends and absolute numbers of crashes.

This approach permits a dual perspective: assessing how broader regulatory and consumption changes affect road safety outcomes in the general population, while also examining potential variation across specific urban contexts. By evaluating both relative measures (e.g., incidence rate ratios) and absolute numbers (e.g., total crashes) in cities with populations ranging from ~150,000 to over 1.7 million residents, the study provides a comprehensive assessment of potential spillover effects, policy impacts, and the differential effects of cannabis availability on drug- versus alcohol-related crashes.

Traffic Crashes Associated with Cannabis Sales

Across the five cities, higher total cannabis sales were significantly associated with an increase in both drug- and alcohol-related crashes. When aggregated, total cannabis sales corresponded to a 12% increase in drug-related crashes (IRR: 1.12; 95% CI: 1.01–1.27) and a 12% rise in alcohol-related crashes (IRR: 1.12; 95% CI: 1.06–1.18). Montréal experienced the largest effects, with cannabis sales linked to an 87% increase in drug-related crashes (IRR: 1.87; 95% CI: 1.54–2.28) and a 93% increase in alcohol-related crashes (IRR: 1.93; 95% CI: 1.58–2.36). Longueuil also exhibited substantial increases: drug-related crashes rose by 76% (IRR: 1.76; 95% CI: 1.02–3.02) and alcohol-related crashes by 43% (IRR: 1.43; 95% CI: 1.08–1.92). Québec City showed a 44% increase in alcohol-related crashes (IRR: 1.44; 95% CI: 1.28–1.64), while Laval and Sherbrooke did not exhibit statistically significant associations.

Comparison of Cannabis Consumption and Traffic Injuries

To contextualize these findings, we compared the absolute number of cannabis cigarettes consumed with traffic crash outcomes. Over the eight-year study period, more than 124 million cannabis cigarettes would need to be consumed to observe 49 drug-related crashes (95% CI: 11–87). This demonstrates the "big percentages, small numbers" phenomenon: while consumption is high at the population level, the absolute number of traffic incidents remains relatively modest. Nevertheless, these absolute increases carry important public health implications, especially in dense urban centers such as Montréal, where each incident can result in severe injury or fatality. This comparison allows policymakers to interpret incidence rate ratios in both relative and absolute terms, facilitating more precise decisions regarding road safety interventions, law enforcement resource allocation, and public education campaigns.

Comparative Insights: Drug- vs. Alcohol-Related Crashes

Analyzing patterns across substances, several insights emerge. First, the magnitude of absolute change: despite statistically significant relative increases, the total number of crashes attributable to cannabis remains modest in absolute terms, reflecting the same "big percentages, small numbers" dynamic observed in health outcomes such as cannabis use disorders. Second, urban variability is notable: Montréal and Longueuil experienced larger relative and absolute effects than other cities, suggesting that population density, traffic volume, and local consumption patterns mediate observed impacts. Third, parallel increases in alcohol-related crashes alongside drug-related crashes indicate potential interactions or shared behavioral risk factors, reinforcing the importance of integrated approaches to impaired driving prevention. Finally, temporal dynamics during the COVID-19 pandemic may have modulated these effects, with mobility restrictions and social distancing altering crash exposure and consumption behaviors in complex ways, warranting further investigation.

Implications for Policy and Public Health

These findings underscore the importance of region-specific,

evidence-based interventions. While increases in cannabis availability contribute to higher drug- and alcohol-related crashes, absolute crash counts remain small relative to the scale of consumption, suggesting that targeted enforcement, and harm reduction strategies may be more effective than broad population-level restrictions. Moreover, integrating absolute and relative metrics enhances understanding of risk magnitude, allowing stakeholders to balance cannabis policy objectives with public safety priorities. By considering both substance-specific and cumulative effects, interventions can be tailored to high-risk urban populations, mitigating harms while preserving the legal framework established by the CCA.

5. Last words

The findings from this study provide an important assessment of the impacts of the CCA in Québec, highlighting both population-level patterns and absolute changes in cannabis use disorders (CUDs) and traffic-related incidents. Across these two domains analyzed, a consistent observation emerges: although legalization and increased cannabis availability were associated with statistically significant relative changes, the absolute number of additional cases or crashes remained limited. This contrast between relative and absolute measures underscores the need for careful interpretation of regulatory effects, particularly in a large and diverse population such as Québec. Rather than indicating widespread increases in cannabis-related harms, the results suggest that observed changes occurred within a narrow numerical range and should be evaluated considering baseline levels, demographic composition, and local urban contexts.

Impacts on Cannabis Use Disorders: Relative versus Absolute Effects

The distinction between relative and absolute measures is crucial for public health planning. Relative increases can generate alarm if interpreted without context, yet absolute numbers provide a grounded perspective on the scale of risk and may improve resource allocation debates. For pregnant women, even a modest absolute rise is clinically significant due to potential consequences for fetal development,

including low birth weight, preterm birth, and neonatal intensive care admissions. In contrast, the general population experienced increases that, while statistically robust, remain limited in absolute terms. This pattern suggests that the Québec regulatory framework successfully allows monitoring and management of harms without producing substantial population-level shifts in problematic cannabis use. The analyzed data further suggest that the impact of legalization was largely specific to cannabis-related disorders. Alcohol- and other drug-related disorders remained stable across both populations, indicating that the CCA did not produce measurable spillover to other substance use. This observation reinforces the notion that a carefully regulated legal framework can contain substance-specific harms, mitigating broader unintended consequences in public health domains. Moreover, sex-specific variations, particularly the differential slopes observed during the COVID-19 pandemic, highlight the importance of nuanced analyses that account for social, behavioral, and environmental factors shaping substance use patterns.

Traffic Safety Outcomes and Urban Variability

Analyses of traffic-related incidents reveal a consistent pattern across Québec's major cities. Higher cannabis sales were associated with increases in both drug- and alcohol-related crashes, with Montréal and Longueuil exhibiting the largest relative and absolute effects. In Montréal, cannabis sales were linked to increases of up to 87% in drug-related crashes and 93% in alcohol-related crashes, whereas Longueuil showed rises of 76% and 43%, respectively. When interpreted alongside absolute counts, however, these effects remain numerically limited: more than 124 million cannabis cigarettes would need to be consumed to observe 49 drug-related crashes over the eight-year study period. This contextualization indicates that, although relative changes were statistically significant, the overall number of incidents attributable to cannabis was comparatively small within the broader landscape of traffic safety.

Urban variability further illustrates how population density, traffic volume, and local consumption patterns shape the magnitude of these impacts. Cities with denser populations and greater cannabis availability tended to display more pronounced associations, underscoring the importance of region-specific monitoring and targeted

interventions. Moreover, the observed increases in alcohol-related crashes alongside drug-related crashes point to potential behavioral interactions or shared risk profiles, reinforcing the need for integrated impaired-driving strategies that address the combined risks associated with multiple substances.

Québec's Regulatory Model and Illicit Market Displacement

A central insight from this study is the relevance of Québec's regulatory model in shaping observed outcomes. The province's state-run retail system, combined with strict age limits, possession regulations, and likely robust enforcement mechanisms, appears effective in displacing illicit market activity while maintaining control over product quality and distribution. By ensuring that cannabis sales occur within a balanced regulated legal framework, Québec may have mitigated the risk of large-scale increases in both CUDs and traffic-related incidents. Unlike jurisdictions with more permissive or privatized retail models, the Québec model maybe providing a controlled environment in which legalization does not translate into drastic population-level changes in harm.

This regulatory approach also supports public health monitoring and targeted interventions. Centralized sales through the *Société québécoise du cannabis* (SQDC) facilitate accurate tracking of consumption patterns, providing authorities with the opportunity to oversee if health and safety outcomes can vary significanlty. The Québec case demonstrates that legalization does not inherently lead to substantial population-level harm. Rather, careful calibration of regulatory tools—age limits, retail accessibility, product standards, testing protocols, and impaired-driving enforcement—can create a legal market that fulfills the CCA's objectives: protecting youth, minimizing health harms, and reducing criminal activity associated with cannabis.

Implications for Policy and Public Health

The dual assessment of CUDs and traffic outcomes provides several policy-relevant insights. First, interventions should consider both relative and absolute measures to avoid overestimating the scale of harm. While increases in CUD incidence or traffic crashes are statistically significant, absolute case counts remain manageable,

supporting proportionate responses. Second, the Québec model illustrates the feasibility of a controlled, state-run legal market in mitigating unintended consequences of legalization. This model may serve as a blueprint for other jurisdictions seeking to balance public health objectives with legal market development. Third, targeted, region-specific approaches are essential: urban centers with higher population density and greater consumption require tailored interventions to manage risk, whereas rural or smaller cities may need different strategies. Finally, integration of cannabis policy with broader public health and impaired-driving frameworks enhances overall societal safety, highlighting the value of multidimensional, evidence-informed policy design.

Strengths, Limitations, and Future Directions

A major strength of this study is the integration of large, population-level datasets, allowing for robust estimation of both relative trends and absolute effects. The use of interrupted time-series analyses, combined with meta-analytic aggregation across urban contexts, provides strong quasi-experimental evidence of regulatory impacts. By considering both pregnant women and the general population, the study captures vulnerable subgroups and broader societal outcomes simultaneously.

Nonetheless, limitations warrant consideration. Observational data cannot fully account for unmeasured confounding, including individual behavioral changes, social norms, or micro-level consumption patterns. Additionally, the "small numbers" phenomenon implies that rare but severe outcomes may not be fully captured, potentially underestimating the full spectrum of harms. Future research should examine longer-term trends, include detailed individual-level behavioral data, and explore potential interactions between cannabis potency, consumption frequency, and public health outcomes.

Conclusion

In conclusion, the Québec case study demonstrates that the CCA, implemented within a strict regulated provincial framework, produced detectable but modest absolute increases in cannabis-related harms. Both health and traffic safety outcomes emphasize the importance of

contextualizing relative effects within population-level metrics. Québec's state-run retail system and rigorous regulatory oversight appear effective in displacing illicit markets and maintaining stability in public health and safety outcomes. These findings highlight that legalization, when carefully designed and monitored, can achieve policy objectives without producing substantial population-level harms, offering a model for evidence-based cannabis regulation that balances legal market growth, public safety, and targeted health interventions.

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CANNABIS USE AMONG PEOPLE WHO USE UNREGULATED DRUGS: IMPLICATIONS FOR HIGH-RISK SUBSTANCE USE IN THE CONTEXT OF AN OVERDOSE CRISIS

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Introduction

1. Cannabis remains the world's most widely produced, trafficked and consumed unregulated drug (1). The prevalence of past-year use is estimated at 244 million globally (4.6%), followed by opioids, (61 million, or 1.2 per cent), amphetamines (31 million, or 0.6 per cent) and cocaine (25 million, or 0.5 per cent) (1). Over the past decade, many jurisdictions (United States [US], Canada, Uruguay, Germany, Luxembourg, Malta) have initiated or completed policy reform to legalize non-medical cannabis use and supply among adults (1). The legacy of cannabis criminalization was largely supported by the US-led "War on Drugs" that was declared in 1971 and aimed to eliminate illegal drug use and trade through prohibition, law enforcement and foreign assistance (2). This policy is now regarded as a failure that perpetuated health and social harms of substance use, with the harms being disproportionally borne by racial minorities and other populations experiencing socio-structural marginalization (e.g., gender and sexual minorities, people experiencing homelessness, people living with infectious diseases) (2, 3). In the United States, approximately 20% of all prisoners are incarcerated for drug-related offences (4). It is also important to highlight that the policies criminalizing substances such as cannabis were not based on

scientific evidence. In a landmark publication in 2010, a multicriteria drug harms analysis indicated that cannabis use was the eighth most harmful substance when considering both harm to others and harm to the user (5). Alcohol ranked as the most harmful substance and registered a harm score over three times greater than cannabis. It is also clear that a significant portion of the motivation for criminalizing substances such as cannabis was politically-based, and this was supported by John Ehrlichman, the advisor for Domestic Affairs to president Nixon, who was quoted in a 2016 interview stating:

> "You want to know what this was really all about? The Nixon campaign in 1968, and the Nixon White House after that, had two enemies: the antiwar left and black people. You understand what I'm saying? We knew we couldn't make it illegal to be either against the war or black, but by getting the public to associate the hippies with marijuana and blacks with heroin, and then criminalizing both heavily, we could disrupt those communities. We could arrest their leaders, raid their homes, break up their meetings, and vilify them night after night on the evening news. Did we know we were lying about the drugs? Of course we did (6)"

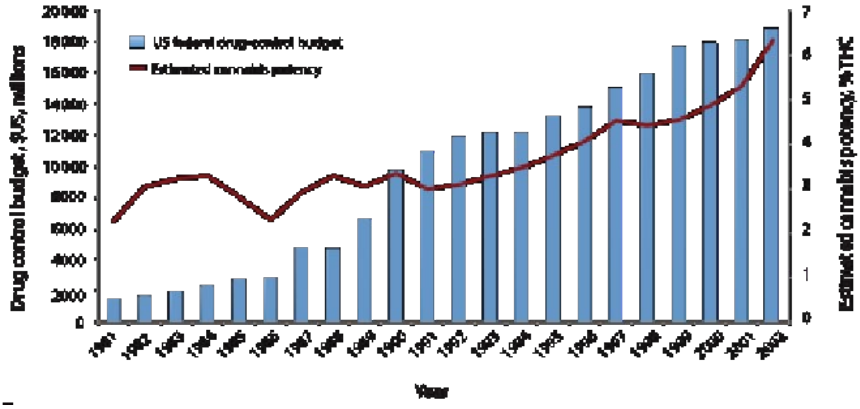
While the focus of this chapter is not to thoroughly investigate the origins of cannabis prohibition and political motives for the war on drugs, it is important to note that there were important political motivations for prohibition, and that this policy was not developed from the best available scientific evidence examining the health and social harms, as well as potential benefits, of cannabis use. Beyond the questions about the inherent risks of using a particular substance, it is also imperative to consider how the criminalization and regulation of a substance will function to improve or amplify the health and social harms of substance use (e.g., alcohol is one of the most harmful substances available yet it is widely legalized and regulated since this approach is accepted to be more advantageous than prohibition that leads to unregulated production and distribution).

Cannabis legalization

The primary motivations for cannabis legalization policy reforms in places such as Canada include 1) improving cannabis-related public health and safety, 2) reducing youth access to cannabis, and 3) reducing cannabis-related crime and unregulated drug markets (7). There was also emerging evidence that prohibition models were not making meaningful improvements in the availability, price or potency of unregulated cannabis. In fact, while the budget for the US Office of National Drug Control Policy increased by over 600% (inflation-adjusted) from 1981 to 2011, the inflation-adjusted price of cannabis decreased by 33% and its potency increased by 145% (8).

Figure 1 is taken from "Wood E, McKinnon M, Strang R, Kendall PR. Improving community health and safety in Canada through evidence-based policies on illegal drugs. Open Med 2012;6 (1) 35–40 (9)." Data from the University of Mississippi Cannabis Potency Monitoring Project13 and the US Office of National Drug Control Policy.8 THC = tetrahydrocannabinol.

Figure 1. US funding for drug control and estimated potency of cannabis, 1981–2002.



Moreover, in 2006 the US National Institute on Drug Abuse concluded that cannabis has remained nearly universally available to US 12th graders over the past 30 years, with 80-90% reporting that it was easy to obtain (10). Increases in drug purity associated with increased prohibition and enforcement have been described as a consequence of the "Iron Law of Prohibition"[11]. With increasing law enforcement, it becomes increasingly critical for unregulated drug

markets to avoid detection, and this is accomplished by producing increasingly concentrated substances of lower weight and volume that are easier to conceal, store and transport (11). Legalization and regulation of drugs such as cannabis offers an alternative to traditional criminalization approaches and can provide substances of known content and quality to reduce the harm associated with use. Legal regulation also provides an opportunity for governments to exert more control over where substances are distributed, who can access them and where they can and cannot be consumed (11). Other support for the regulation of cannabis came from prominent multicriteria decision analyses which showed that the harms of cannabis (to the user and others) was lower than other unregulated substances including heroin, crack-cocaine, methamphetamine and cocaine (5). This analysis also found that the most harmful substance, including both illegal and legal drugs, was alcohol (12).

Additional momentum for the regulation of cannabis emerged, as many innovative policies do, from the community of people who use unregulated drugs (PWUD). Canada was the second nation in the world to implement a centralized medicinal cannabis program that began in 1999 (13). This was initiated by patients who demonstrated that they benefited from medical cannabis use yet remained vulnerable to arrest and persecution due to cannabis being listed as a controlled substance (13). Before this, underground compassion clubs had emerged with the goal of providing access to a safe supply of cannabis for medical users. Over 20 years after the medical use of cannabis was recognized by the government of Canada, PWUD have continued to advocate for the medical and therapeutic uses of cannabis and this has become relevant in the context of the current opioid overdose crisis in Canada and the United States (14).

Cannabis use and the opioid crisis

The majority of health and social research on cannabis has focused on the harms of non-medical use, although this has shifted somewhat following the expansion of cannabis policy reform in jurisdictions including the United States, Canada and Uruguay. Growth in cannabis use has been most rapid in North America and Canada ranks in the top five of countries with the highest prevalence of cannabis use (27%

reporting use in the past year) (15, 16). Concurrently, the harms associated with opioid use continue to worsen from the widespread contamination of the unregulated drug supply with synthetic opioids, most notably fentanyl and fentanyl analogues (17, 18). In 2023, estimates from drug checking services are that nearly 90% of drugs sold as opioids were contaminated with fentanyl in Vancouver, Canada (19) and the number of opioid-related deaths in British Columbia, the most western province of Canada, has increased significantly over the past six years and reached an average of nearly eight opioid toxicity deaths per day in 2023 (20). Overdose is now a leading cause of death in Canada and British Columbia has seen a decline in life expectancy due to the overdose crisis(17, 21, 22).

Existing preliminary research suggests both positive and negative impacts of cannabis use on high-risk substance use trajectories but the evidence to date is equivocal. Population studies using U.S. state-level data found that the presence of legal systems for medical and recreational cannabis was linked to lower odds of prescription opioid use, reduced use of unregulated opioids and lower state-level rates of opioid overdose mortality(23, 24, 25), although subsequent studies found that some of these associations (opioid overdose mortality) have reversed over time (26, 27). Unfortunately, much of the research investigating the impacts of cannabis use/access on opioid-related harms has been derived from population-level research and survey methods, and there is limited evidence investigating these associations using robust longitudinal studies involving members of populations most at risk of overdose (27, 28, 29). As a result, experts in the field continue to call for rigorous evaluations of key health and social outcomes linked to cannabis use/access five years after cannabis legalization in Canada (7).

The impact of cannabis use on early high-risk drug use careers and overdose risk.

Statistics Canada recently estimated that more than half of the recreational cannabis used in Canada now comes from regulated sources 30). Preliminary cross-sectional research among PWUD has found that unregulated sources remain the primary means of access due to prevalent barriers including price, minimum purchasing

requirements, lack of specific products, structural obstacles (e.g., government identification and registration requirements) and geographic inaccessibility(31, 32). Unregulated drug market access among PWUD has been linked to higher-intensity drug use, high-frequency injecting, morbidity and mortality associated with overdose, as well as potential gateway effects whereby cannabis use facilitates transitions to initiation and use of higher-risk substances such as opioids (33-39). Supporters of the gateway theory suggest that substance use progresses from tobacco and alcohol to cannabis, with cannabis representing the critical transition from licit substances to illicit drugs such as unregulated opioids and stimulants (38, 39, 49). The three specific claims of the gateway hypothesis are: (1) that few people use high-risk drugs (e.g., opioids and stimulants) without first using gateway substances such as cannabis and tobacco; (2) that drugs earlier in the gateway sequence amplify the risk of using more dangerous substances; and (3) that the relationship between earlier gateway drugs and later substance use is causal (38, 40, 41). Numerous epidemiological studies have provided support to the gateway sequence, including a 25-year longitudinal study of adolescents that found cannabis use to be significantly associated with the use of other unregulated drugs and drug dependence (41, 42, 43).

However, other investigators contest that this association is attributed to the shared liability of cannabis and other high-risk use produced by psychosocial and genetic risk factors for substance use behaviours (e.g., impulsivity and thrill-seeking) (37, 41, 44-47). Among at-risk youth who use drugs, a previous analysis found that frequent cannabis use was associated with a 34% decrease in the hazard rate on injection initiation, which challenges the gateway theory that there is a causal link between cannabis use and the subsequent use of higher-risk substances (48).

A previous study of nationally representative data from 17 countries ($N > 85\,000$) found that the association between cannabis use and later unregulated substance use was weaker in countries with higher rates of cannabis use (37). This may indicate that the progressions from using one drug to another may be moderated by drug prevalence and the social acceptability of the substance(37, 49). This trend is hypothesized to reflect differences in social norms, where the use of less accessible drugs reflects a marker of ‘deviance’ more so than more commonly used substances (49). These studies suggest that drug prevalence or

social acceptability may moderate the association between use of a specific substance, such as cannabis, and higher risk substances such as opioids, stimulants or high-risk methods of use (e.g., injecting) (48, 49). In the Netherlands for example, where cannabis use is common, people who use cannabis are less likely to initiate using higher-risk substances such as opioids compared to the United States where cannabis use is less common (37). Twin and adoption studies have also found that drug use behaviours across substances may have common genetic influences that increase disinhibited drug use behaviours (46 47, 50). As a result, some authors have contended that the gateway sequence could be more accurately characterized as a 'progression of convenience' that reflects drug prevalence, drug accessibility, individual predisposition and social acceptability of cannabis use, rather than a causal relationship between cannabis use and subsequent higher-risk substance use (47, 50, 51). As a result, cannabis use may precede 'harder' drug use since it is more common, more socially accepted, and is perceived as a less 'deviant' behaviour than the use of substances such as opioids (41, 47, 51).

Cannabis use among people who use unregulated drugs

Among PWUD, cannabis use is common (50-62%) (32) with approximately 30% reporting daily use in the last six months (52). Moreover, nearly half of PWUD who use cannabis report using cannabis for some form of harm reduction (e.g., substitution, to manage opioid or stimulant cravings (53, 54, 55). Recreational use is also common (53%), as are other forms of therapeutic use (e.g., to help manage insomnia: 32%, pain: 31%, psychosocial stress: 32% and nausea: 29%) (32). Comprehensive analyses of these patterns of use have also identified distinct latent classes of use intentions that include primarily recreational use (32%), non-pain therapeutic use (38%) and pain relief (22%) (32). Among PWUD, there is accumulating evidence suggesting that cannabis use has been linked to improvements in a number of important measures of drug-related harm, particularly during the ongoing drug toxicity crisis.

One of the initial studies in this area found that periods where participants self-reported the intentional use of cannabis to reduce crack-cocaine use were associated with subsequent periods of decreased crack-cocaine use among PWUD in Vancouver, Canada

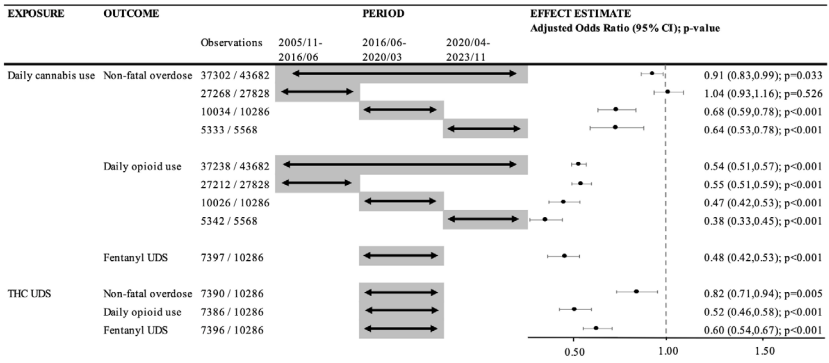
(56). A more recent study in 2024 found that self-reported cannabis use to manage stimulant cravings was associated with self-reported reductions in stimulant use (55). Other studies have found that treatment-seeking individuals with crack-cocaine dependence have used cannabis to help manage symptoms of craving and 68% were able to stop using crack-cocaine over a nine-month follow-up period (57). Qualitative studies among people who use crack-cocaine also indicate that cannabis use as a self-medication strategy is common to help reduce craving and other symptoms (e.g., paranoia and anxiety) and this behaviour decreased both cocaine-seeking behavior and crack-cocaine use (58, 59). Preclinical studies have found that Δ9-tetrahydrocannabinol and cannabidiol (CBD), the two main cannabinoids in cannabis, have been shown to decrease measures of cocaine-induced craving in rat models (60). However, other studies have shown that cannabis dependence may increase cravings for cocaine and relapse risk of relapse among people living with substance use disorders (61, 62, 63).

This heterogeneity may indicate that the impacts of cannabis use on the use of other substances such as stimulants could depend on how cannabis is used (e. g., recreational vs. therapeutic), the type of cannabis used (e.g., THC vs. CBD), other concurrent substance use (e.g., crack-cocaine vs. crystal methamphetamine) and the stage of substance use that cannabis is used (e. g., initiation, dependence, withdrawal, recovery) (54). Although there are important concerns about replacing one substance for another, the risks associated with cannabis substitution should be evaluated in the current context of polysubstance use among PWUD and the toxicity of the unregulated drug supply (64). The cumulative probability of transition to dependence is estimated at 9–13 % among people who use cannabis, 21 % among people who use cocaine and 68 % among people who use nicotine, with the rate of transition occurring more rapidly among cocaine users (65, 66). If cannabis use is linked to decreases in stimulant use among some PWUD, cannabis may have potential applications as a harm reduction strategy to limit exposure to the toxic drug supply. In the absence of available pharmacotherapies for stimulant use disorders, further study of the therapeutic and harm reduction applications of cannabis use to address the harms of stimulant use is warranted (67). CBD specifically may have unique therapeutic potential for stimulant use due to the anxiolytic and anti-psychotic properties, lower risk of adverse events,

and it can be provided in multiple formulations (67, 68). Nevertheless, further research is needed to disentangle these mixed results and identify longer-term outcomes associated with these cannabis use behaviours (53, 64, 67, 69).

The relationship between cannabis use and the use of opioids among PWUD has received the most recent scientific investigation recently. A three-year study of 1,152 PWUD in Vancouver, Canada found that among people living with chronic pain, those who used cannabis daily had significantly lower odds of using opioids daily (adjusted odds ratio [aOR]: 0.50, 95% confidence interval [CI]: 0.34-0.74) compared to people who did not use cannabis (70). Following this study, other investigations found that cannabis use was associated with a reduced likelihood of exposure to fentanyl among people on opioid agonist therapies (OAT) (71) and among people who inject drugs (72). In early 2026, a US study of 13 states found that compared to states with medical cannabis regulation alone, medical and recreational cannabis regulation was associated with a 9-11% decrease in the probability of daily opioid misuse among 28,069 people who inject drugs (73). Other studies have also identified associations between cannabis use and improvements in risk factors for overdose, including decreases in the frequency of injection drug use (52) and increases in injection cessation (74). In fact, a 2025 study found that there was a 40% increase in the odds of ceasing the use of unregulated opioids for six months among frequent cannabis users 75). More recently, in data collected over 18 years of follow-up, periods of high-frequency cannabis use were negatively associated with the likelihoods of experiencing a non-fatal overdose or daily use of unregulated opioids during the same 180-day observation period. Study periods in which individuals provided a urine sample positive for THC were negatively associated with three measures of fatal overdose risk (daily unregulated opioid use, fentanyl exposure and non-fatal overdose) (76). These findings were based on individual-level data collected from almost 4,000 people at highest risk of overdose both before and after the emergence of fentanyl as the dominant opioid in the unregulated drug supply and echo earlier findings into the use of cannabis to mitigate the harms of other substances and to address comorbidities among PWUD during the drug toxicity crisis (70, 77-79). A summary of this analysis is shown in Figure 2.

Figure 2. Summary of the effect estimates for cannabis use measures on overdose risk factors. Each model represents a specific time period and is adjusted for sex, age, race/ancestry, homelessness, binge drug use, engagement in drug or alcohol treatment and sex work (76).



While these findings are observational and not conclusive, they are supported by a growing number of studies identifying the intentional use of cannabis to decrease the use of opioids, and this is often in the context of chronic pain, or as part of a harm reduction strategy to reduce the risks of other substances (64, 80). Individuals accessing medical cannabis also consistently report that a central motivation is the substitution of cannabis for medications such as opioids and unregulated drugs (64, 80). Among 1,145 patients followed after their initiation of medical cannabis, the daily morphine equivalent dose declined 78% and the prevalence of opioid analgesic use decreased from 28% at baseline to 11% at six months (81). Several studies have also documented cannabis use as a strategy to address withdrawal symptoms among people with opioid use disorder (82, 83).

Biological explanations of the association between cannabis and opioid use

There is biological plausibility to support the epidemiologic associations between cannabis and opioid use behaviours (84, 85). Preliminary studies in humans have found that receipt of synthetic oral tetrahydrocannabinol (THC) (dronabinol), was associated with reduced severity of opioid withdrawal, although some mild dose-related side effects were reported in 1 trial (83, 86, 87). THC produces feelings of

reward by binding to cannabinoid receptor type 1 (CB1R) that are colocalized with m opioid receptors (85, 87-89). THC and other endocannabinoids been found to moderate opioid peptide levels and enhance the reward and sensitivity of other substances, which may account, at least in part, for the association between cannabis and reduced opioid withdrawal (85, 87). While cannabidiol (CBD) is a nonintoxicating phytocannabinoid and does not elicit reward in the same way as THC, CBD has also been studied in the treatment of substance use disorders and opioid use disorder specifically (85). Evidence from animal models and preliminary human studies have suggested that CBD attenuated the reward associated with opioids, decreased withdrawal symptoms and cue-induced cravings among people living with heroin dependence (87, 90). The reductions in craving associated with CBD were observed up to 1 week after the final CBD administration in both animal and human studies (87, 90). In a randomized clinical trial of 42 individuals living with heroin use disorder, three consecutive days of CBD administration significantly reduced both cue-induced drug craving and anxiety, with protracted effects lasting seven days after treatment (91). The protracted effects are particularly important given that drug craving increases with the duration of abstinence (91). Some of the most compelling neuroanatomic evidence regarding the effects of CBD involve brain regions including the amygdala. The amygdala mediates stress responses and encodes the processing of conditioned cues that elicit drug-seeking behaviours (92). In animal models, administration of CBD decreases the neuronal activity of nuclei in the amygdala and reduces anxiety-like behaviours (92). In humans, CBD administration was found to decrease amygdala activation during the processing of negative emotions (93). Other studies have shown that CBD may normalize opioid-induced impairment of CB1R receptors in the striatum, which plays an important role in the processing of reward, reinforcement, motivation, and decision-making (85, 90). The neurophysiological effects of THC and CBD and the potential to attenuate opioid withdrawal may account, in part, for the observations that cannabis use was associated with decreases in opioid use behaviours in observational and clinical studies of PWUD.

The co-localization of m opioid receptors and endocannabinoid receptors in the brain and spinal regions involved in antinociception also suggests that the interaction between THC and opioids may

improve analgesia among PWUD (70). This has been referred to as opioid-sparing effects, whereby the co-administration of THC with opioids can increase analgesia compared to consuming opioids alone (94, 95). Support for opioid-sparing effects was demonstrated in a systematic review of animal models although there was little evidence among human studies (95). However, a double-blind placebo-controlled human study found that pain tolerance and threshold were significantly improved when a non-analgesic dose of opioids was co-administered with a non-analgesic dose of cannabis (96). Given that the prevalence of chronic pain among PWUD (48–60%), and unmanaged chronic pain in particular, is a prevalent motivation for substance use among PWUD (97), further study of how cannabinoids moderate pain among PWUD is warranted.

Cannabis access among PWUD

Despite the potential benefits of cannabis use among PWUD, the vast majority of PWUD rely on unregulated sources with less than 5% reporting access to legal cannabis after legalization (32). This has been attributed to prevalent barriers including price, minimum purchasing requirements, lack of specific products, structural obstacles (e.g., government identification and registration requirements) and geographic inaccessibility (31, 32). These access limitations have led to the emergence of peer-led harm reduction initiatives (e.g., The Cannabis Substitution Project, High Hopes Foundation). These programs distribute low- or no-cost cannabis to PWUD in an effort to divert them away from the contaminated unregulated drug supply (14). The Cannabis Substitution Project began operating in 2017 and operates entirely through volunteers and donations. With 200 daily members, participants line-up daily to receive about CAD $50 worth of cannabis products. These packages usually include a combination of infused food edibles (e.g., brownies, cookies or gummies), one to two joints, capsules, creams and oils. Importantly, these packages also include pamphlets and onsite information for new members that includes information about the objectives of the programs and using cannabis as harm reduction.

The High Hopes Foundation also began in 2017 and provides no-cost or subsidized cannabis to PWUD in neighbourhoods contending

with substance use harms (e.g., Downtown Eastside). This program operates on a drop-in basis rather than daily provisions and individuals are able to communicate their needs to program managers. This program also operates on donations and provides similar products to the Cannabis Substitution Program (flower, cannabis infused food products, capsules, creams, oils and occasionally concentrates). Harm reduction information is typically informal and provided by people with lived or living experience of substance use. While both of these programs operate to improve access to cannabis for instrumental use in a structurally-marginalized community, a primary objective is to help PWUD reduce or eliminate the use of other higher-risk substances, or the adverse effects of using those substances.

Qualitative studies of these programs have found them to have beneficial effects on the rates of using higher-risk substances such as unregulated opioids and stimulants (14, 98). However, the evidence to date is preliminary and additional empirical evaluations are needed to verify their potential benefits and harms. Other studies have found that participants who reported cannabis use to manage opioid cravings were more likely to report accessing free cannabis distribution programs (54). This may indicate that some instrumental or therapeutic uses of cannabis may be moderated by cannabis access among structurally-marginalized PWUD. Experimental research investigating the impacts of different cannabis access models would be a valuable next step to understand how access can moderate the use and outcomes of cannabis among PWUD.

Cannabis use and substance use harms

While the focus of this work has been the potential harm reduction uses of cannabis use among PWUD, there are also important and risks and harms that should be acknowledged. Given that cannabinoids such as THC can enhance the reward and analgesic effects of opioids, experimental human studies have found that concurrent use of THC and hydromorphone increased the abuse liability and risk of adverse events among healthy participants, although these effects varied by opioid sensitivity (99, 100). In a US study, people with comorbid opioid use disorder (OUD) and cannabis use disorder (CUD) experienced increased rates of inpatient psychiatric admission compared to those

with OUD alone (101). Additional adverse effects of cannabis include cannabis withdrawal syndrome that affects nearly 50% of people with regular or dependent use of cannabis who cease use, as well as anxiety and other mental health symptoms (102, 103). Therefore, the harm reduction and analgesic benefits of cannabis must be balanced with potential adverse effects such as acute cognitive impairment and abuse liability (99-101). Findings from a systematic review also suggested that cannabis users were more likely to initiate opioid use and engage in problematic patterns of use compared to non-users, although the quality of these studies was deemed to be low[27]. With respect to stimulant use, frequent cannabis use was associated with increased cocaine craving and withdrawal among people in inpatient care for cocaine use disorder[68]. Among people living with poly-substance use disorders, chronic cannabis dependence may also increase crack-cocaine cravings and relapse risk (63, 104).

Conclusions

There is a current shift towards cannabis regulation policies that have adopted a public health approach to minimize the health and social harms of cannabis use and unregulated cannabis markets. This is a dramatic transition from the war on drugs approach that dominated drug policy across the world and criminalized PWUD. This shift has also facilitated research into the potential therapeutic and harm reduction uses of cannabis among PWUD, which may be useful adjuncts to unregulated substance use. While monitoring the harms of expanding cannabis access and use are important public health priorities, the harms and potential benefits should be evaluated with consideration for other concurrent unregulated substance use, especially during the drug toxicity crisis. Additional randomized controlled trials and longitudinal observational data will be helpful to clarify the outcomes of specific cannabis use patterns, such as substitution, with more certainty.

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PARTIAL LEGALIZATION OF CANNABIS IN GERMANY – RECENT DEVELOPMENTS AND FURTHER STEPS

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Substances have different degrees of restriction, partly developed historically based on ideological or moral reasons, partly depending on their risks to health and therapeutic potentials based on scientific evidences. This has gradually led to different legal regulations of some substances both internationally and at the national levels. However, most regulations still in place are dating back more than hundred years (UNODC 2008) and are the result of international and subsequently national agreements, beyond any scientific evidence, or practical knowledge and experiences of their individual health risks, risks for the society and/or their therapeutic potentials.

Case study: Towards (partial) legalization of cannabis use in Germany *1982 German Federal Narcotics Act*

The 1982 German Federal Narcotics Act[55] defines schedules of narcotic substances, the framework and procedure for legal trade and prescription of narcotics, criminal and administrative liability, and alternative measures for drug-dependent offenders. The use of drugs is not mentioned as an offence. Unauthorized personal possession and purchase of drugs are criminal offences punishable by up to 5 years in prison. However, the law affords various possibilities other than prosecution when only small quantities of narcotic drugs for personal use are involved. These depend on the amount and type of the drugs

[55] Microsoft Word - BtMG ohne Anlagen engl Juli 2010.doc

involved (different quantities for 'soft' and 'hard' drugs), the involvement of others, the personal history of the offender, and whether or not public interest would be served by prosecution. In accordance with the case law of the Federal Constitutional Court in Karlsruhe (9 March 1994) a person will no longer be prosecuted on the grounds of having committed an indictable offence if he or she is found to be in possession of a quantity of cannabis deemed to be for personal use.

Most of the 16 German states ('Länder') have defined values for 'small amounts' of cannabis (usually 6-15 g) and a few have established amounts for heroin, cocaine, amphetamine or MDMA/ecstasy; in the case of methamphetamine, a federal ruling limits a 'non-small' amount to 5 g of the active substance. When a sentence is imposed, the principle of 'treatment instead of punishment' still allows — under certain circumstances — a postponement or remission of the punishment if the offender enters treatment.

From November 2016, a new law has prohibited supply-related actions involving new psychoactive substances (NPS) that belong to groups of amphetamine-type stimulants, including cathinones and synthetic cannabinoids; these offences are punishable by up to 3 years in prison or up to 10 years' imprisonment in certain aggravating circumstances (see EMCDDA 2019).

Policies and coordination

The National Strategy on Drugs and Addiction Policy, announced in 2012 by the Federal Government Commissioner on Narcotic Drugs (Drogenbeauftragte der Bundesregierung), which is still in effect, and places a particular focus on addiction prevention and early intervention but also stresses the necessity of counselling and treatment services in Germany (Drogenbeauftragte der Bundesregierung 2012). In some *Länder*, local prevention projects, such as the widespread programme "Early Intervention with Drug Users Coming to the Attention of Law Enforcement for the First Time – FreD" (Frühintervention bei erstauffälligen Drogenkonsumenten)[56], had been used as a way of

[56] Görgen, W., Hartmann, R. and Karim, S. (2010), Final evaluation report of the European early intervention project 'FreD goes net', Cologne. (http://www.lwl-fred.de/de/)
LWL - Koordinationsstelle Sucht (2017). Projekt FreD-Crystal/ATS - Erweiterung des FreD-Ansatzes für ATS (Amphetamin-Typ-Stimulantien) Konsument/innen.

avoiding court proceedings. They represent an additional possibility for intervention without immediately initiating criminal proceedings. After the partial legalization of cannabis in April 2024, critics of the law said that these offers would no longer be used by young cannabis users.

Governance and coordination of drug treatment implementation

The care system for people with drug-related problems and their relatives involves a number of very different entities. Planning and governance of treatment in the various segments of the medical and/or psycho-social support system at a national level would not be compatible with the federal structure of Germany. Instead, governance and coordination occur at the Länder level, regional or municipal level. They are jointly agreed upon by the funding agencies, the service provides and other regional steering committees on the basis of the legal provisions as well as the demand and economic possibilities. The federal ministries, particularly the Federal Ministry of Health (Bundesministerium für Gesundheit – BMG), fulfill a cross-departmental and cross-institutional coordinating role at a federal level. They prepare and amend federal laws (e.g. the narcotics law and the social welfare legislation, which also affects treatment). Other than that, the BMG, just like the Federal Drugs Commissioner, can only issue recommendations to the Länder and responsible institutions. Health insurance providers and pension insurance providers in Germany play an important role in the governance and coordination of the acute treatment and rehabilitation of substance use disorders. They determine the essential framework conditions and rehabilitation treatment standards. In this respect, they consult, in regular meetings and working groups, with the associations of drug treatment professionals. The coordination body for charitable organisations working in addiction support is the German Centre for Addiction Issues e.V. (Deutsche Hauptstelle für Suchtfragen, DHS) as a national umbrella organization. In addition, the treatment centres and low threshold services cooperate with other entities involved, such as job centres. Health insurance providers and pension insurance providers are also responsible for assuming the costs of treatment. The health insurance providers are responsible for acute treatment (i.a. detoxification), pension insurance providers primarily for residential treatment and rehabilitation. The

municipalities are involved in the governance of acute treatment within the scope of hospital planning. Furthermore, they support the funding of counselling facilities and low threshold services, which as a rule are provided by non-profit organisations. Opioid Agonist Treatment (OAT – mostly with methadone or buprenorphine) is a service provided by the statutory health insurance providers. The federal German medical Association (Bundesärztekammer) developed medical guidelines for OAT, subject to the German Regulation on the Prescription of Narcotic Drugs (Betäubungsmittelverschreibungsverordnung, BtMVV). The standards for psycho-social care (PSC) provided as a complement to OAT are developed by non-governmental service providers. The funding for PSC is dealt with in varying ways by the Länder, however funding usually comes from the municipalities.

Organisation and provision of drug treatment

The legal basis for the treatment of those with dependency disorders is provided in Germany by various German Codes of Social Law (Sozialgesetzbücher, SGB), the German Public Health Service Act (Gesetz über den öffentlichen Gesundheitsdienst, ÖGDG) as well as the municipal services of general interest. The core element of the addiction support system, in addition to care from family doctors, consists of 1,500 addiction counselling and treatment centres. Furthermore, treatment and care are provided in over 320 outpatient and inpatient therapy facilities, in 84 psychiatric outpatient institutes as well as in over 1,000 facilities for integration support. In order to counter this problem, agencies have joined various services together into combined systems. The spectrum of services for people with substance related disorders is, however, mostly more extensive than is believed and its effectiveness as well as its significance for the wider community are often underestimated.

Outpatient drug treatment system – main providers and client utilization

Counselling, promotion of motivation and outpatient treatment are primarily offered in the outpatient counselling and treatment centres as

well as in specialist in-patient clinics. They are often the first port of call for clients with addiction problems, to the extent that they are not treated by the family doctor. As with low-threshold support services, they are, in part, funded from public resources. However, a relevant portion of the costs of the outpatient facilities is borne by the providers themselves. With the exception of outpatient medical rehabilitation, outpatient addiction support is, in varying degrees, voluntarily funded by the Länder and municipalities on the basis of municipal services of general interest. This is anchored under constitutional law in the Social State Principle (Sozialstaatsprinzip) as per Art. 20 (1) German Constitution. The fact that the funding of outpatient services is only partially guaranteed under the law, leads time and again to financing problems. Generally counselling is carried out free of charge.

Usage of illicit psychoactive substances in Germany

Calculations based on a treatment multiplier for 2022 lead to an estimate of 85,000 to 101,000 people with risky consumption patterns of opioids. (Reitox report for EUDA 2024) but heroin, which has long been the second most frequently used drug in the street drug scene (after crack), has clearly lost its importance. About 4.0% of the general German adult population between the ages of 18 and 64 have had experience with NPS (new psychoactive substances) at least once in their life made, based on the last twelve months it is 1.3% (Rauschert et al., 2022), a slight increase can be observed compared to the last study (Atzendorf et al., 2019). The stimulants in Germany are dominated by cocaine, amphetamines and ecstasy. In Germany, amphetamines have the highest prevalence among adults (18-64 years) with 6,1% lifetime and 1,4% 12 months. The prevalence shows that cocaine/crack was used more frequently than other stimulants (5,6% and 1,6%), while methamphetamine was consumed least often (1,2% and 0,2%). Ecstasy is the most widely used substance in the age groups 12 to 17 years and 18 to 25 years in terms of both lifetime prevalence (0.6% and 7.8%, respectively) and 12-month prevalence (0.5% and 3.6%, respectively).

Cannabis use in the general population

Cannabis is still by far the most frequently used illicit drug in Germany. In the last twelve months, 8.8% of adults and 6.7% of adolescents (12-17 years) have used cannabis. The 30-day prevalence is 4.3% the adults and 3.0% among young people. When looking at the data from 1995 to 2021, the 12-month prevalence of cannabis use among 18 to 59 year olds shows an acceleration in the last 10 years from 4.4% (1995) to 10.0% (2021). Based on these data, a further increase in the 12-month prevalence among 18 to 59 year olds to 10.4% to 15.0% is expected in the next few years. Looking at gender, the expected values are 13.3% to 19.1% for men and 7.4% to 11.4% for women. The lifetime prevalence of cannabis use among 12- to 17-year-old male adolescents since 2019 (13.1%) has declined slightly (2023: 9.3% Cannabis was the substance most frequently consumed in the last 12 months (69.4%). When it comes to cannabis, a distinction is made between THC-containing (67.7%) and CBD-containing (32.1%) cannabis products. The prevalence of regular cannabis use (male: 1.2%; female: 1.5%) is exceptionally higher among female than male adolescents. Signs of problematic consumption were found in 2.5% (1.3 million) of those surveyed. Among those who used cannabis in the last 12 months, the proportion of heavy use (almost daily or at least 200 times per year) has remained stable at around 10% since 1995 and increased significantly to 15.7% during the COVID-19 pandemic in 2021. The majority of people who use heavily said they had increased their consumption since the Covid-19 pandemic. In 2022, cannabinoid-related disorders were the second most common reason for accessing addiction help services after alcohol-related disorders (outpatient: 18.5%, inpatient: 9.9%). Since 2000, the proportion of outpatient care for cannabinoid-related disorders has increased by the factor three, increased by a factor of ten in the stationary area.

Cannabis for recreational use. The background of the debate in Germany – International Conventions

A statement by Mr. Werner Sipp, President of the International Narcotics Control Board/INCB until May 2017,) clearly shows the limits of liberalization of cannabis related laws: “In the special topic on

the regulation of the use of cannabis for non-medical purposes, the Board reiterates that the Parties to the 1961 Convention have assumed the obligation to limit exclusively to medical and scientific purposes production, manufacture, distribution, use and possession of drugs …"To this rule no exception is possible…It is now up to State parties to determine how to respond to the developments in those countries which disregard the treaties by permitting and regulating the non-medical use of drugs." (March 2017)[57]

Statement by Mr. Viroj Sumyai, President of the International Narcotics Control Board (2018): Non-medical cannabis legislation violates international obligations. "The Board reiterates that any measures that permit the use of cannabis for non-medical purposes are contrary to the 1961 Convention as amended (article 4, paragraph (c) and article 36) and the 1988 Convention (article 3, paragraph 1 (a)). Limiting the use of controlled substances to medical and scientific purposes is a fundamental principle of the international drug control treaties to which no exception is possible". (INCB) (March 2018)[58]

In Germany, there has been and is still ongoing a controversial public and political debate on dealing with cannabis use. On the one hand, again and again, particularly psychiatrists and other persons from the medical circuit refer to statements like: "Cannabis smoking makes you stupid, cannabis use promotes psychosis, cannabis use among adolescents inhibits the maturing of the brain" etc.

On the other hand, there had been and is a large majority of experts from all relevant fields (e.g. social science, criminology, psychology, drug services, etc. including some important persons from law enforcement) who call for decriminalization and/or legal regulation.- For instance the head of the Association of German Criminal Investigators recently stated: "The ban on cannabis is neither intelligent nor purposeful" (ZEIT and SPIEGEL, 5.2.2018).[59]

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[57] INCB Report 2017; Message of the President; 2nd March 2017 https://www.incb.org/documents/Publications/AnnualReports/AR2016/LAUNCH/MessageOfThePresident.pdf

[58] INCB Report 2018; Message from the President; 1st March 2018; Vienna https://www.incb.org/documents/Publications/AnnualReports/AR2017/LAUNCH/2017_press_kit_English_message_of_the_president.pdf

[59] "Das Cannabisverbot ist weder intelligent noch zielführend"; ZEIT Online; /SPIEGEL online; 5th February 2018 https://www.zeit.de/gesellschaft/2018-02/cannabis-bdk-chef-andre-schulz-legalisierung

A majority of Germans was opposing the legalization of cannabis. In a survey from 2017, 63 percent of Germans have spoken out against it. "The demand that adults should be able to acquire cannabis for personal use as an intoxicant in selected stores, is supported by one third (34 percent) of the German citizens", as shown by the survey (Rheinische Post 2017)[60]. However, considerable differences showed up between different surveys from different institutes and different ways of asking. E.g., in a slightly older survey, 39% tend to agree to the statement "Cannabis should be legal and regulated for adults, such as specialty stores like Colorado", while 58% tend to disagree (Infratest Dimap 2017). But: 52% agree that the possession of small quantities of cannabis should no longer be prosecuted. Another survey (Die Zeit 2017) even detected a majority of respondents (57%) who are in favour of legalization.

Cannabis as Medicine

In March 2017, the "Cannabis as Medicine" Act came into force. It regulates the use of cannabis-based pharmaceuticals in individual cases as a therapeutic alternative for patients with serious diseases. The costs of treatment can be reimbursed by the health insurance providers on request; this also applies for cannabis in the form of dried flowers. The production of cannabis for medicinal purposes will be monitored by the state in Germany in the future, a state controlled "cannabis agency" had been set up for this reason. Accompanying data had been collected in order to gather further information on the effects of cannabis. "A survey by the SCM (self-help network cannabis medicine) from January 2018 shows that most former license holders for the use of cannabis flower buds from the pharmacy according to § 3 Abs. 2 BtMG have not been prescribed cannabis with a reimbursement by the health insurance.

The current status of the survey with 4 alternative answer options after the participation of a total of 581 former license holders (from then on just over 1000) offers the following picture:

- I cannot find a doctor who is ready to prescribe (51%)

http://www.spiegel.de/panorama/justiz/cannabis-legalisierung-was-dafuer-spricht-a-1191487.html

[60] Rheinische Post online; 29 December 2017

- My doctor is ready to prescribe cannabis for me, but the health insurance does not cover the costs (25%)
- Now I get cannabis on prescription and the health insurance pays (21%)
- I have a cost commitment from the health insurance, but cannot find a doctor who commits me (3%) "[61]

In March 2017, doctors prescribed 564 cannabis-containing preparations or cannabis flowers in recipes on 488 prescription forms. In addition, around 3,100 finished medicinal products containing natural or synthetic cannabinoids were released. Previously rejected:

- until mid-2017: 25 - 50%
- at the end of 2017: 36%
- applications 16,000, of which 60% approved.

In 2016, there were 26,040 Sativex regulations.

After one year of operation the new law still lacked clarity. On the one hand the number of prescriptions went up substantially and more than many had estimated. On the other hand nothing had been regulated with this law regarding the situation of patients who are willing to grow their mediation at home (Plenert 2018).

In just a few years, Germany has developed into an important sales market for medical cannabis. In 2021 alone, cannabis medicines were prescribed by contract doctors in the statutory health insurance system at a cost of around 185 million euros, which corresponds to a growth of just over 12% compared to the previous year. In 2018, sales were still 74 million euros. The number of medical cannabis prescriptions increased from 340,000 to 372,000 prescriptions per year in 2021 compared to 2020. Almost 70 million euros went to cannabis flowers in an unchanged state and another 46 million to medicines containing cannabinoids. There are no reliable data available for self-payers and private patients. Sales could even amount to a higher amount than in the GKV system, as the prescription of medical cannabis for those with statutory health insurance depends on very strict requirements, so that many patients with statutory health insurance also have cannabis prescribed on a private prescription and bear the costs themselves.

[61] Newsletter of the Arbeitsgemeinschaft Cannabis als Medizin vom 27.01.2018

German Key Study on Cannabis "CAPriS"[62]: What the Study says and what not

In 2016 the Federal Ministry of Health had conducted a study on Cannabis. What had been the main results?

Cannabis consumption can cause

- impairments, and clearly in the memory, attention and psychomotor.
- Regular smoking cannabis also leads to global deficits in cognition, especially memory. However, the picture of these limitations is not as consistent as with the acute effects. A decrease in intelligence as a result of regular cannabis consumption could not be proven. Cognitive functional deficits due to chronic consumption seem to be temporary.
- The influence of the entry age on long-term cognitive disorders could not be conclusively clarified. International standards on key cannabis use variables are lacking to improve the comparability of studies and their outcomes.
- Regarding the organic consequences, the study summarizes: Chronic cannabis use increases the risk of respiratory symptoms. Acute cannabis use causes dilated blood vessels, high blood pressure and accelerated heart rate. A risk assessment of the cardiovascular effects associated with chronic consumption (ischemic infarction, myocardial infarction, atrial fibrillation) can not take place on the basis of the available evidence.
- Chronic smoking apparently causes brain structural changes, especially in the amygdala and in the hippocampus, i.e. structures important for memory formation. Above all changes of volume and form as well as density of the gray mass were shown. Perhaps these changes "are directly related to the THC:

[62] Kurzbericht: Cannabis: Potential und Risiken. Eine wissenschaftliche Analyse (CaPRis);
Ergebnisse der CaPRis-Studie Cannabis: Potential und Risiken. Eine wissenschaftliche Analyse; https://www.drogenbeauftragte.de/fileadmin/dateien-dba/Drogenbeauftragte/2_Themen/2_Suchtstoffe_und_Abhaengigkeiten/6_Cannabis/Downloads/BMG_CaPris_A5_Info_web.pdf
Hoch, E., Friemel, C. & Schneider, M. (2018). Cannabis: Potential und Risiko. Eine wissenschaftliche Analyse. Heidelberg: Springer-Verlag

CBD ratio of cannabis preparations consumed.

- Cannabis use during pregnancy may disturb the development of the fetus. In addition, there is some evidence of disturbances of child development in visual cognitive skills, attention and increased cannabis use in adolescence.
- Acute increases the risk of traffic accidents, especially when mixed with alcohol.
- Frequent cannabis use in early adolescence often leads to dropping out of school and fewer academic degrees. Too few empirical data are available regarding cannabis-related abnormalities in social behavior and offending.
- The risk of anxiety disorders and depression is slightly increased by cannabis use and dependence. The risk of psychotic disorders also increases.

(Ärztezeitung online, 28.11.2017)

The study suites not to justify ideologically motivated (criminal) restrictions on the consumption of adult recreational users.

The WHO Study on Cannabis should be taken into account

The 40th WHO Expert Committee on Drug Dependence from 4-7 June 2018 in, Geneva, Switzerland came to the following conclusions:

- The argument that cannabis causes schizophrenia is contentious, however, as some have observed that sharp increases in global cannabis use in recent decades has not increased the incidence of schizophrenia.
- The vast majority of people who use cannabis will never develop a psychotic disorder.
- Only a small effect size for reduced cognitive functioning in frequent or heavy cannabis users.
- The effects of cannabis use on cognition are reversible.
- The risk of developing cannabis use disorder among users appear to vary among studies and countries, but it appears that 1 in 10 or 1 in 11 is representative; the global epidemiological data based for prevalence of cannabis use and cannabis use disorders is surprisingly small, and de facto too small to report

reliable trends.[63]

In detail:

Section 2: Pharmacology

1.3 Pharmacodynamics: To date, over 500 naturally occurring compounds have been identified in cannabis, including cannabinoids (> 100 chemicals unique to the plant), terpenoids, and alkaloids. However, except for Δ 9 -THC, most of these other compounds are present in the plant in relatively small quantities. (p 36)

2. Dependence Potential

Estimated percentage of regular cannabis users who have experienced at least one episode of cannabis withdrawal during abstinence (e.g., when trying to quit) range from 16 to 33%, dependent upon the sample used for study.

Because worldwide use of cannabis is more extensive than any other illicit substance, with estimates ranging from 2.7 to 4.9%, the absolute number of people across the globe who have experienced cannabis withdrawal is quite large. However, rates of dependence are not equal in all countries. Rather, they exhibit geographical diversity, which is related to economic and cultural factors as well as to variability in the availability of specific types of cannabis. The availability of high potency cannabis is associated with increased prevalence of cannabis dependence.

Nevertheless, users report that high potency cannabis provides the "best high" and is most preferred. (p 41)

Section 3: Toxicology

Cannabis is not associated with acute fatal overdoses (…). Lethality studies in animals show the doses needed to induce mortality are well beyond what could possibly be consumed by a human. (p 53ff)

Cannabis ingestion acutely promotes transient tachycardia and increased supine blood pressure in humans. There is an uncertain association between cannabis use and heart attack but any association appears at best to be weak. A single cannabis-associated fatality which was attributed to a cannabis-induced coronary event was reported in a

[63] WHO Expert Committee on Drug Dependence Critical Review. Delta-9-tetrahydrocannabinol. WHO Geneva 2018

study that examined 2198 emergency hospital admissions across 14 European countries (…). While the terminal metabolite of Δ 9 -THC was detected in the urine indicating prior cannabis use, the individual also had a history of regular alcohol and tobacco use and had been recently diagnosed with epilepsy and had refused anticonvulsant treatment.

There is some limited population evidence to suggest that smoking cannabis increases the risk of ischaemic stroke, although it is hard to disentangle the contribution of tobacco smoking in this association.

Effects on the respiratory system (p 54)

It is reported a dose–response relationship: those using low levels of cannabis (3–5 joints per month) had improved respiratory function, whereas respiratory function in heavy users was impaired. Increasing use of vaporizers and other non-smoking modes of delivery is likely to reduce respiratory complications associated with cannabis.

Effects on the immune system

There is a wealth of data from studies on cells and animals supporting the notion that cannabinoids have immunosuppressant and anti-inflammatory effects. However, there are only limited data from studies in humans, although these studies do support anti-inflammatory effects.

Mutagenicity and cancer (p 55)

A wealth of preclinical literature demonstrates that cannabinoids reduce cancer cell proliferation, inducing apoptosis in these cells, as well as inhibiting cancer cell migration and angiogenesis in numerous cancer cell types. There is moderately strong epidemiological evidence that cannabis use does not increase the risk of cancers of the lung, head and neck. (…) A systematic review of six case– control studies on lung cancer patients and controls found a statistically nonsignificant trend towards cannabis smoking (> 1 joint per day) increasing lung cancer risk)

Fertility and teratogenesis (p 56)

There is strong population-based evidence that illicit cannabis smoking during pregnancy reduces the birthweight of offspring. (…) There is limited evidence that cannabis use increases pregnancy

complications such as stillbirth, spontaneous abortion and fetal distress.

Effects on cognitive function (p 56ff)

Acute cannabis use impairs certain types of cognitive function and can interfere with attention, learning and memory. (…) However, those who had commenced cannabis use in early adulthood and had been abstinent for a year did not display any reduction in IQ, suggesting a lack of residual effects

A recent systematic review and meta-analysis of cross-sectional studies with cannabis users and controls found only a small effect size for reduced cognitive functioning in frequent or heavy cannabis users.(…) No relationship could be found between the age of onset of cannabis use and cognitive function. Furthermore, no association between cannabis use and reduced cognitive function could be found in studies with a greater than 72-hour abstinence period, suggesting that the effects of cannabis use on cognition were reversible.

Some studies, involving small numbers of participants, have reported structural abnormalities in brain regions important to cognitive function, mood and reward. However, such effects appear to be absent in larger studies that controlled for confounders such as alcohol use, tobacco use, gender, age and other variables.

Mental health (p 57 ff)

A frequently cited adverse effect of cannabis use is increased risk of psychosis, where the user experiences disordered thinking, hallucinations and delusions. There are frequent reports of acute cannabis intoxication precipitating a short-lasting psychotic state that reverses once the effects of the drug have abated. Human population studies have linked cannabis use to schizophrenia, which is characterized by hallucinations, delusions and cognitive dysfunction, with cannabis increasing the risk of developing the disorder by around 2-fold. The relationship between cannabis use and risk of schizophrenia appears to be dose-dependent: heavier cannabis use increases the risk of developing schizophrenia.

There is also some evidence that cannabis use during adolescence may bring forward the age of schizophrenia onset. It has been argued that reducing the incidence of cannabis-induced schizophrenia would be difficult, because it has been estimated that 4700 young people would need to be dissuaded from cannabis use to prevent a single case

of schizophrenia The argument that cannabis causes schizophrenia is contentious, however, as some have observed that sharp increases in global cannabis use in recent decades have not increased the incidence of schizophrenia.

The vast majority of people who use cannabis will never develop a psychotic disorder, and those who do are likely to have some genetic vulnerability to cannabis-induced psychosis.

Adverse reactions in humans

Cannabis consumption causes euphoria, laughter and talkativeness. It is an appetite stimulant, and may promote dry mouth and dizziness as well as increasing visual, olfactory and auditory perceptions (1, 54, 55). Conjunctival reddening occurs, due to vasodilation of blood vessels in the eyes. Time perception may be altered and some users may experience anxiety and panic reactions. Cannabis intoxication can impair attention and short-term memory function. In inexperienced users, cannabis ingestion can promote a mild tachycardia and postural hypotension that can be associated with dizziness and syncope.

The pharmacological effects of cannabis are subject to tolerance following repeated exposure and therefore many of the marked reactions observed in naive users are diminished in frequent users.

Young children

...may be particularly vulnerable to the effects of cannabis. There are several recent case reports of young children accidentally ingesting cannabis and experiencing respiratory depression, tachycardia and temporary coma. This increasing risk of overdose and related adverse effects in paediatric populations may be greater in US states that have legalized cannabis use.

Non-medical use, abuse, and dependence (p 80 ff)

We refer to the World Drug Report 2017 (5) for data on the prevalence of cannabis use. About 192 million adults are estimated to have used cannabis in 2016, (…) Non-medical cannabis use as reported in this section involves a heterogeneous group of users with different use motives and also includes those with a cannabis use disorder.

All methodologies to estimate the prevalence of illicit drugs have weaknesses. For general population surveys, major weaknesses relate to the sampling frame, which in most cases does not include high-risk

populations such as institutionalized people, and to the fact that participants may be reluctant to disclose illicit drug use due to its illegality.

With regard to data availability of cannabis use prevalence, the vast majority of data has been collected in high-income countries.

Cannabis has some therapeutic potential for actual use.. (p 92)

While there are no global estimates of the proportion of people which use cannabis for self-medication or for purely recreational purposes, the high proportion of people with certain diseases in Table 3 indicates that self-medication plays an important role as a motive for cannabis use.

Trends in cannabis potency (p 98)

Overall, potency, as measured by level of THC content, has increased over the past decades for both herbal cannabis and for resins.

It should be noted that an upward trend in THC may have different underlying reasons: a higher proportion of people may use cannabis, or the cannabis use prevalence remained the same but the

cannabis consumed has higher potency, or both. Similarly, stable or downward trends in wastewater analyses could have different underlying reasons, and we would need more knowledge about trends in standard units such as joints.

Changes in the legality of cannabis may be one of the causes of increases in THC content. Between 1990– 2010, U.S. states that allowed medical cannabis had an average potency 3.5% higher than states without this law. (…) This increase in potency associated with legalization has been suggested to be due mainly to an increase of highly potent cannabis strains, which are the result of a professionalized breeding process and intensive growing methodology.

Self-medication will lead to higher prevalence (*p. 152*), and to more frequent use, leading to higher THC levels. (…) Finally, prevalence of recreational cannabis use depends on the culture, its availability in comparison to other psychoactive substances, and on the knowledge and risk evaluation with respect to outcomes.

Volkow[64] gives 9% or a ratio of 1:11 for dependence (for general

[64] Nora D. Volkow is a Mexican-American psychiatrist. She is currently the director of the National Institute on Drug Abuse (NIDA),which is part of the National Institutes of Health(NIH)

population studies. The proportion among users developing dependence increases to 17% in adolescents and as high as 25–50% with daily consumption. The data available to generate these estimates are from high-income countries only, mostly from the US. Thus, the variation in proportion of users with a use disorder cannot be assessed to date and the impact of political and cultural factors is yet to be determined.

In terms of harm, most harm is caused by frequent or heavy use, especially heavy use over time. Thus, prevalence of use per se is not a good indicator of public health harm. This is one reason why the GBD comparative risk assessment is based on cannabis use disorders. Alternatively, concepts like daily cannabis use, usually operationalized by use of cannabis on at least 5 days of the week, could have been used.

For example, in Europe, it has been estimated that 13% of all cannabis users would be daily users. The resulting ratio of daily users was about 8:1, which would be very similar to the ratio for cannabis use disorders (see above; for details of the calculation.[65]

NGOs working for a cannabis regulation

In Germany the resistance against the prohibition policy, namely the cannabis prohibition is growing. There are several NGOs working on the topic of regulation on different levels. “Der Deutsche Hanfverband (DHV)”[66] is a NGO that is aiming at a legal, user-friendly regulation of the cannabis market which should consist of home growing regulation, legal production, distribution and sale, and which is reflecting youth protection. Furthermore the DHV is campaigning against the discrimination and stigmatization of cannabis users. Finally the DHV is clearly struggling for cannabis as medicine and is promoting cannabis as raw material. DHV is running a website with all topics related to cannabis (driver’s license, relevant information for users etc.) is producing brochures, leaflets, and is organizing conferences on the topic of cannabis.

Another key NGO is “akzept e.V. – Bundesverband für

[65] Abuhasira R, Shbiro L, Landschaft Y.(2018) Medical use of cannabis and cannabinoids containing products - Regulations in Europe and North America. Eur J Intern Med.49:2-6

[66] https://hanfverband.de/

akzeptierende Drogenarbeit und humane Drogenpolitik"[67], which is the national umbrella organization of services working in the harm reduction field and is working on the regulation of all drugs. Annually, akzept together with Deutsche Aids-Hilfe"[68] and "JES"[69], is editing the Alternative Drug Report/"Alternativer Drogen- und Suchtbericht/ADSB)"[70]. This report is probably the most read and discussed alternative drug report to the governmental report. The ADSB is released always a few days before the official government report and is attracting a wide media perception (even in prime time news[71]). In most of the reports of the last 10 years the criminalization of drug users is a key topic of critique.

The process of criminalization of cannabis users

Offences related to cannabis (198,782) account for the vast majority of the total amount of illicit drug related offences of 330.580 cases in 2017, which is an increase of 9.2 % related to the year before. The police forces are inquiring against 263,255 persons, who committed drug-related crimes in 2017. In total the percentage of drug-related criminality accounts for 6 % of all criminal offences in Germany in 2017 (Bundeskriminalamt 2017, p.6). These figures illustrate that the police and law enforcement agencies are not less involved despite an ongoing debate about the necessity and appropriateness of the drug prohibition.

New developments re cannabis since 1st April 2024 – partial legalization

In Germany, too, there has been long-standing opposition to drug prohibition, particularly with regard to cannabis. In light of the fact that cannabis use has become mainstream in society, the parties in the German Parliament (with the exception of the conservative CDU/CSU

[67] http://akzept.org/
[68] https://www.aidshilfe.de/
[69] http://www.jes-bundesverband.de/
[70] http://alternativer-drogenbericht.de/
[71] https://www.tagesschau.de/multimedia/video/video-85811.html

and the right wing AFD parliamentary groups) have been calling for drug policy changes in the direction of decriminalization and even legalization for several years. When the SPD, FDP and Alliance 90/The Greens finally took over government responsibility in November 2021, they agreed to legalize cannabis in the coalition agreement. The following analysis deals briefly with the historical background, but is primarily intended as a chronology of recent changes in the way cannabis and the people who use it are treated.

In the 2021 coalition agreement, the current governing coalition agreed to introduce the controlled supply of cannabis to adults in licensed specialist stores. In the coalition negotiations, it was then decided: "We will introduce the controlled distribution of cannabis to adults for recreational purposes in licensed stores. This will control the quality, prevent the distribution of contaminated substances and ensure the protection of minors. We will evaluate the social impact of the law after four years."

In the course of implementing this agreement, a fierce dispute arose over the why and how. The core of this conflict was that cannabis was the first substance to be removed from the prohibition in the Narcotics Act and legalized as a recreational drug. Although cannabis has been available as a prescription-only and reimbursable therapeutic agent since 2017 (as has diacetylmorphine, i.e. heroin, since 2010), it is not a drug for recreational use, but a medication for pain and other disorders.

In view of concerns under European law regarding the originally intended legal distribution of cannabis in licensed specialist stores[72], a two-pillar model has now emerged. The coalition parties agreed on a final version of the law on the legalization of cannabis at the end of November 2023. The law came into force on 01.04.2024.

How does the population view the cannabis law?

In a survey published in the German Television (ZDF) from August 2023 50% of the population agreed in favor to the new law, 45% against; in March 2025 (after the elections for a new Parliament) a minority of 42% agreed with the law, 52% did not.[73] In a Scientific

[72] The Minister of Health has released its 'Eckpunktepapier', a concept note laying out the key points to shape the regulation of the recreational cannabis market.

[73] Hochschule Geisenheim University: Die eigene Ernte privater Anbau von Cannabis

study University of Geisenheim from 2025 mainly consumers had been asked about their experiences with the law:

- 47% of survey respondents expressed support for legal home cultivation
- 46.3% indicated agreement with the statement "The legalization of private cannabis cultivation reduces illegal activities in Germany."
- 44% of participants see legal home cultivation as 'an opportunity for better quality control'
- 41.1% see legal home cultivation as 'an opportunity for greater sustainability'
- One in ten participants indicated that they had already legally cultivated cannabis post-legalization
- 11% of participants who had not cultivated cannabis 'could imagine' doing so in the future
- A majority of participants who stated they had cultivated legal cannabis were male (58.5%). [74]

With a quantitative study, Larissa Steimle et al. from the Frankfurt University of Applied Sciences, Institute for Addiction Research, discuss the effects of the Cannabis Act with a specific focus.[75] The Cannabis Act (CanG) led to significant changes in the purchasing methods among adults: 88.4% purchased legally produced cannabis in the last six months (own cultivation, including self-cultivation by friends), cultivation associations, pharmacies); Before the law, 23.5% used the now legal sources. Since the introduction of the CanG, the proportions for home cultivation and pharmacies in particular have increased; Together, almost 80% cite one of these two categories as their main source of supply. Predominantly men (90.1%) have started growing their own crops since the CanG. 94% of pharmacy recipients do not have a prescription with health insurance reimbursement. At the

von Mira Lehberger und Kai Sparke Professur für Gartenbauökonomie Studienergebnisse Januar 2025 (Your own harvest private cultivation of cannabis by Mira Lehberger and Kai Sparke Professorship of Horticultural Economics Study results January 2025)

[74] See note 16

[75] Larissa Steimle und Bernd Werse (Institut für Suchtforschung, Frankfurt University of Applied Sciences) Anke Stallwitz (Evangelische Hochschule Freiburg): Veränderungen für Konsumierende von Cannabis durch das Cannabisgesetz (Changes for cannabis users through the Cannabis Act); August 2025

same time, the purchase of cannabis from dealers both in private spaces and in public decreased significantly. More than three quarters agree that they no longer fear prosecution for their cannabis use since the law was introduced.

What about Cannabis Cultivation Associations?

Germany implemented the first provisions of its new adult-use cannabis legalization model on April 1st, 2024. The initial provisions involved permitting adults to cultivate, possess, and consume personal amounts of cannabis, among other things. Then, starting on July 1st, 2024, people could start applying to launch a cultivation association (cannabis social clubs) in Germany. Cultivation associations, sometimes referred to as cannabis clubs, involve members joining an association from which to legally source their recreational cannabis. Personal provisions and cultivation associations serve as 'Pillar 1' of Germany's legalization model. According to recent data published by the Federal working group of cannabis cultivation associations [76] 368 cannabis social club applications were approved nationwide in Germany as of December 2024. Additional 438 applications are being processed, and 45 applications have been rejected so far. Currently, cannabis is legal for adult use in Uruguay, Canada, Malta, Luxembourg, Germany, and South Africa. Of those, Uruguay and Malta expressly allow cultivation associations (or 'clubs') as part of their legalization models. For contextual purposes, Uruguay currently has 460 registered associations/clubs, and Malta had only three registered cannabis clubs as of last year. When comparing the populations of Uruguay (roughly 3.4 million) and Malta (roughly 550,000) to that of Germany (over 84 million), it is obvious that Germany needs more cultivation associations to support its adult cannabis consumer base.

The Christian Democrats are bothered by the loose handling of medical cannabis, Health Minister Warken wants stricter handling. The newspaper "taz" commented on 6 of October 2025 as follows: "This is

[76] Bundesarbeitsgemeinschaft der Cannabisanbauvereinigungen (Federal working group of cannabis cultivation associations) from December 2025; see also: Drucksache 21/1093 from 30 July 2025 Ein Jahr Anbauvereinigungen und Cannabisgesetz (One year of Cannabis law) Kleine Anfrage der Linken (Small request of the Left party at German Parliament)

a big mistake. The abuse actually exists: the reform of medical cannabis as part of legalization in 2024 has led to a boom in online pharmacies. What Warken and her party friends still haven't understood is that when the state takes action against legal markets, it strengthens the black market. Cannabis is here. Whether legal or illegal. The alleged misuse of medical cannabis is: the greatest success in the fight against the cannabis black market!"[77]

What about the plans of the new government coalition?

The new coalition of Christian and Social Democrats discussed the coalition treaty (published in May 2025) and decided to take the increasing problem of addiction – including new synthetic drugs – seriously. In order to counteract the consequences, which can range from health risks to violence and neglection, they are working together to develop measures that include addiction prevention, help and substitution medicines. They want to take appropriate preventive measures to protect children and young people in particular from "everyday addictions" (such as dependency on Social Media). The Christian Democrats declared to reverse the partial legalization of cannabis against position papers of several addiction service associations calling for what has been achieved to be maintained. But the Social Democrats refused to completely revise the law and agreed to a compromise to conduct an open-ended evaluation of the law on the legalization of cannabis to conduct in autumn 2025 the Christian Democrats renewed on their annual assembly to reverse the partial legalization (February 2026).

What about licensed Cannabis shops?

The original plan to also offer cannabis for sale in licensed specialist stores (pillar 2) will not be implemented for the time being and within the current legislation period. Cultivation associations can be founded

[77] „Legalisierung von Gras. Medizinisches Cannabis missbrauchen? Ja, bitte! (Legalization of weed. Abusing medical cannabis? Yes, please!)" taz Comment of *Birger Stepputtis at 6 of October 2025*

as of 01.07.2024 (pillar 1). To protect consumers, the quality of cannabis is to be controlled, and the distribution of contaminated substances prevented. The possession of up to 50 grams from private home cultivation by adults as well as communal, non-commercial home cultivation in cultivation associations ("cannabis social clubs") should be permitted. Criminal liability in private areas should only apply from 60 grams. In public spaces, where adults are allowed to carry up to 25 grams of cannabis, criminal liability begins at 30 grams. Between 50 and 60 grams in private spaces and 25 and 30 grams in public spaces, possession of cannabis is considered an administrative offense.

The scientifically supervised supply of cannabis in licensed specialist stores has been made possible by an ordinance of the Federal Ministry of Food and Agriculture (BMEL 2024). In the future, the Federal Office for Agriculture and Food/Bundesanstalt für Landwirtschaft und Ernährung (BLE) will act as an authority to review and approve research applications in the field of consumer cannabis and industrial hemp. This is regulated by an ordinance signed by the Federal Minister of Food and Agriculture, Cem Özdemir (Bündnis 90/Die Grünen), in December 2024. Scientific institutions and companies can submit applications for corresponding projects to the BLE.

Research on and with consumer cannabis is now possible again, but requires a permit, the ministry announced. Research applications for a five-year period have already been submitted from Frankfurt (planned: 4 specialist stores) and Hanover (planned: 3 specialist stores); Bremen and Berlin, among others, delivered this (Stöver/Michels 2025).

The statement assesses of the BLE from 1st of October 2025 assessed whether the second pillar of cannabis legalization (commercial supply chains & specialist shops in regional scientifically supervised pilot projects) could be implemented via the research clause (Section 2 Para. 4 KCanG).

The result was: The implementation of the 2nd pillar via the research clause is not legally or practically possible. This is due to fundamental legal limits, political risks and numerous enforcement problems. The research clause is not intended to test a commercial supply chain. There is no legal basis for central framework conditions (e.g. number of shops, access restrictions, supervision). The BLE is not authorized to develop these independently. Every actor and consumer would have to receive an individual permit to participate in the study. The research clause cannot provide a scientific basis for later legalization of

commercial sales The BLE also says that at least one applicant is already suing,[78] others will follow.

Now it is up to the decisions of courts because some cities already started appeal procedures against the rejections of their applications. There are contrary legal assessments arguing that the rejection notice is unlawful. Section 2 Paragraph 4 KCanG provides a sufficient legal basis; research with consumer cannabis is expressly permitted; there is no violation of EU or UN drug treaties; no new legislative act is required. The goal of the appeal is to create a precedent as basis for future approvals. This may have a political signaling effect, because rejections slow down scientific progress. And nevertheless: there is continued interest from cities, universities and industrial partners.

Evaluation of the Cannabis-Law. First results

Part of the historic adult-use legalization measure that was implemented in Germany in April 2024 involves the ongoing evaluation of the public policy modernization's impact on the nation's society. The so-called EKOCAN research project, which is funded by the Federal Ministry of Health (BMG), focuses on three areas of evaluation:

1. Child and youth protection
2. General health protection
3. Cannabis-related crime

The ECOCAN project is monitored by a board with representation from "science, medicine, psychosocial care, law enforcement, the judiciary, consumers, and the relevant federal ministries." The research project published in September 2025[79] its highly anticipated initial findings. By many measures, the findings demonstrate that things are going well from the perspective of the three areas of evaluation listed above. For the first-time cannabis use among young people is declining

[78] BLE begründet abgelehnte Cannabis Modellprojekte im Sinne des damaligen Gesetzgebers (BLE justifies rejected cannabis model projects in accordance with the legislation at the time) by Moritz Förster, Krautinvest November 17, 2025

[79] Auswirkungen des Konsumcannabisgesetzes: Forschungsprojekt EKOCAN UKE - EKOCAN

since 2002, and consumption among young people has continued to decline since 2019. We recognize a confirmation of the effectiveness of the increased educational and prevention programs. Cannabis-related offenses were halved – over 100,000 cases were saved annually, freeing up police and judicial resources to combat organized crime. "As expected, the first figures now show, with the Cannabis Act, the police and the judiciary will be relieved of thousands of criminal proceedings. Thousands of people will no longer be criminalized for their consumption behaviour." the organization Law Enforcement Against Prohibition (LEAP) wrote in a public statement regarding EKOCAN's findings.[80] "The figures presented point in the right direction. LEAP therefore calls on all political leaders not to repeat old prejudices and stereotypical claims, but to use the evaluation to develop fact-based and progressive. EKOCAN's positive findings came at a time when cannabis opponents in Germany's government continue to work to hinder the progress of the nation's cultivation association sector. The failure to approve regional adult-use cannabis commerce pilot projects is an additional example of cannabis opponents in Germany's government getting in the way of progress.

The German Hemp Association (Deutscher Hanfverband) stated in a press release: "It was right and long overdue to finally end the mass prosecution of ordinary cannabis users. There is no evidence of significant negative effects. Now it is time to expand legal supply channels to ensure greater consumer protection and further curb the black market. (…) We call on the federal government to finally approve the first cannabis model projects with which, for example, Frankfurt, Hanover and several Berlin districts want to scientifically test the sale of cannabis in specialist shops."[81]

A push back with Medical Cannabis

Midst of October 2025 Germany's Federal Cabinet approved a measure that would amend the Medical Cannabis Act (MedCanG). The measure was drafted by the Federal Ministry of Health (BMG) and

[80] Statement of Law Enforcement Against Prohibition (LEAP) from September 30, 2025 Cannabisgesetz – die missverstandene Evaluierung! - LEAP Deutschland

[81] Deutscher Hanfverband: Der erste Zwischenbericht zur Evaluation des CanG: Entwicklung des Cannabismarktes; Press Release from October 25, 2025

includes the following changes:

- In the future, medical cannabis can only be prescribed after personal contact between the patient and the doctor, either in the doctor's office or during a home visit. This requires consideration of the patient's health status, individual illnesses, and other medications being used, which generally requires a careful medical history and physical examination. Furthermore, ongoing information about the risk of addiction and possible physical or psychological consequences of consumption, which can change depending on the extent and duration of consumption, is required.
- For follow-up prescriptions, a face-to-face consultation is required every four quarters, with the previous contact within that period being related to the prescription of cannabis for medical purposes. Under this condition, a prescription may also be made via telemedicine in the following three quarters.
- The mail-order option for medicinal cannabis is excluded, as there are comprehensive information and consultation obligations that must be provided during a personal consultation at the pharmacy. Pharmacies' delivery services remain unaffected.

The Federal Cabinet's approval does not automatically move the changes forward. Rather, the measure will now be considered by relevant committees in the Bundestag and requires a majority of votes in the legislative body before it can proceed. The SPD parliamentary group has expressed direct opposition to the changes. Members of the SPD parliamentary group are not the only ones pushing back on the Federal Cabinet's recent move. Several medical cannabis patient and industry advocacy organizations have also published statements against the plans of the Ministry of Health. Representatives of Medical Cannabis producers and Patients initiatives started a vivid debate, which calls for the following (among other things):

- Support for telemedicine services
- Stronger enforcement of the Medicinal Products Advertising Act (HWG) instead of stricter laws
- Equal treatment of medical cannabis flowers and cannabis extracts compared to finished medicinal products containing

cannabinoids
- Introduction of recourse protection for reimbursement of costs involving the Medical Service
- Proportionate and medically justified maximum limits in the agreements of the associations of statutory health insurance physicians

These planned changes are very drastic and could even jeopardize the BMG's goal of a safe drug supply rather than improve it. The requirement for in-person medical consultation represents a restriction on remote treatment and leads to a ban on exclusively remote treatment. The Federal Ministry of Health argues that, due to the risks and side effects associated with medical cannabis, in-person medical consultation is sensible and necessary. However, the ministry overlooks the fact that strict rules for medical treatment already exist in Germany, which also apply to telemedicine treatments. This new movement claims that "Those who are sick need help – not new hurdles."

The hurdle of EU law and international treaties

Even though the coalition agreed that cannabis should be legalized in Germany, a report by the Federal Parliament's Scientific Service identified a number of legal hurdles to the implementation of this idea. Two EU treaties are a problem, the experts warned. For example, the planned legalization of cannabis in Germany could conflict with EU law[82]. In a study commissioned by the party of the CSU health politician Stephan Pilsinger, the Scientific Service of the Bundestag lists two EU treaties to which Germany is also bound and which would stand in the way of controlled cannabis legalization.

On the other hand, the current government received support from criminal law experts at the University of Nijmegen (Prof. Masha Fedorova and Prof. Piet Hein van Kempen)[83], who showed that

[82] German cannabis regulation on thin ice - The government's risky approach to international legal obstacles puts the entire project in jeopardy - International Drug Policy Consortium (IDPC)

[83] Fedorova & van Kempen's assessment of the legal situation with regard to the feasibility of cannabis legalization in Germany is presented in detail by Hasso Suliak in an

cannabis legalization in Germany could succeed under European and international law and pointed out ways in which the plan to legalize cannabis could be justified under European and international law. Legalization can be justified if the state in question is "sincerely convinced and convincingly argues that it can use this system to implement individual and public health, public safety and/or the prevention of violent crime more effectively than it can achieve through the prohibitive approach to cannabis for recreational purposes."

The criminal law experts looked at the relevant EU Framework Decision 2004/757/JHA and in particular Art. 2, which obliges the Member States to criminalize all forms of illegal drug trafficking, including cannabis. At least if, according to Art. 2 para. 1 sentence 1, it is carried out "without authorization". The lawyers argue: If Germany were now to legalize cannabis as planned, such an "authorization" within the meaning of EU law would be given. This is because a state-licensed and strictly controlled dispensing system for the cultivation, distribution and sale of cannabis for recreational purposes would not run counter to the purpose of Art. 2 para. 1 of the Framework Decision. The prerequisites for this are that the planned legalization has no cross-border effects and does not hinder transnational cooperation in the fight against cross-border drug trafficking.

Furthermore, the lawyers dealt with the following provisions:

- the so-called Schengen acquis (Schengen Convention of 1985 and Implementing Convention of 1990) and
- the United Nations (UN) Convention on Narcotic Drugs - in particular the Single Convention and the Convention against Illicit Traffic in Narcotic Drugs.

What are the consequences of a roll-back?

The number of recorded "cannabis crimes" declined dramatically in 2024. In the year before partial legalization (2023), the police statistics (PKS) registered 215,865 cases, in 2024 there were only 101,345 - a decrease of 114,520 cases or 53%. There is a broad consensus among experts that the prohibition practiced for decades with its criminal law

online article (LTO, 01.03.2023).

control regime has not only failed to achieve its own objectives (protection of public health and a general preventive effect), but that - on the contrary - the health and social situation of people who use psychotropic substances (including heroin, cocaine/crack, methamphetamines) has deteriorated significantly due to criminal liability and an uncontrolled illegal market. The above-mentioned paradigm shift in drug policy is therefore urgently required for reasons of health policy, criminal policy, the rule of law and, not least, constitutional law. With the future exemption from punishment for the purchase and possession of cannabis for personal use and the authorization of cultivation associations, the legislator has finally taken the first step in drawing the consequences from the fact that the criminal law on drugs has done more harm than good.

The fact that the law that has now been passed falls far short of the original objective of the coalition agreement is an urgent call to think ahead and create a legal framework for a regulated, state-controlled market (pillar 2) that is organized from the perspective of consumer and youth protection.

This first step towards cannabis legalization should be the starting point for an evidence-based, science-driven drug policy that replaces a 100-year-old narcotics law and its enforcement by means of criminal law.

Conclusions

In Germany, Luxembourg, Malta, the Netherlands and Spain, cannabis is legal under certain conditions. Cannabis remains illegal in all other EU countries. Luxembourg, for example, allows adults to grow up to 4 cannabis plants privately. However, the plants may not be publicly visible and must be grown from seed. Consumption must take place at home. In Spain, the private cultivation of small quantities and consumption in the home is also exempt from punishment. Consumption in public, on the other hand, is fined, as an administrative offence.

However, countries such as Portugal, the Czech Republic, Croatia, Italy and Belgium only classify the possession of small quantities for personal use as an administrative offense, which is no longer prosecuted. Nevertheless, smoking cannabis can still be punished with

heavy fines in some cases (e.g. in Croatia). Repeat offenders are punished more severely.

There is no country offering a legal access to other drugs than cannabis except for medical purposes.

All in all as Martin Jelsma pointed out, the legal regulation of cannabis markets for recreational use contravenes certain UN treaty obligations and conflicts with correlated EU law (Jelsma 2022). However, the non-compliance with these obligations should neither prevent nor delay countries from proceeding ahead with legal regulation of the cannabis/drugs market.

A strategic dialogue is needed between countries working on models of legal regulations for the cannabis/drugs market. First attempts can be observed and must be strengthened.

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SUBSTANCE USE IN ADOLESCENCE BETWEEN SOCIO-FAMILIAL RISK FACTORS AND PROTECTIVE FACTORS: SCIENTIFIC EVIDENCE AND CLINICAL CONSIDERATIONS

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"When you meet them, these kids seem like orphans—orphans of family, of enthusiasm, of meaningful relationships, of positive things—lost dogs without a collar, who need to talk, to do things, to have non-pathological people around them."
Massimo Barra

ABSTRACT
Within the ESPAD® Italia research project, the aim of this article is to collect data on the correlation between family and socio-cultural variables as predisposing risk factors for the use and poly-use of psychoactive substances (legal and illegal) and school-related distress (low academic performance, absenteeism, school dropout, etc.) among high school students. In order to contribute to the formulation of research hypotheses oriented in this direction, the article includes a section dedicated to diagnostic classification according to international nosography; a section reviewing the scientific literature on risk and protective factors for substance abuse in adolescence; and finally a section presenting considerations drawn from the author's personal clinical experience in the field of Pathological Addictions, developed at the Villa Maraini Foundation, National Agency of the Italian Red Cross and World Training Center of the International Federation of Red Cross and Red Crescent Societies for the treatment of pathological addictions.

Background

This article is situated within the ESPAD® Italia research project (*www.epid.ifc.cnr.it*), which investigates patterns of alcohol, tobacco, and legal and illegal psychoactive substance use among male and female students aged 15 to 19 attending Italian upper secondary schools. The survey is conducted through the administration of the ESPAD questionnaire, which assesses both the socio- cultural conditions of respondents and their patterns of use/abuse of legal substances (tobacco, alcohol, prescription drugs, doping agents) as well as other illicit psychoactive substances.

The ESPAD® Italia study considers substance use across three time frames—lifetime use, use in the past 12 months, and use in the past 30 days—and, through annual reports, responds to the information requirements of the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA).

Diagnostic framework of pathological addictions

The World Health Organization (WHO) defines "*pathological addiction*" as a "*psychic condition, sometimes also physical, resulting from the interaction between an organism and a substance, characterized by behavioral responses and other reactions that include a compulsive need to take the substance on a continuous or periodic basis, in order to experience its psychic effects and sometimes to avoid the discomfort of its deprivation*." *(www.salute.gov.it)*

The negative consequences of pathological addiction on health may be direct (pharmacological effects of the substance and the route of administration) or indirect (Hepatitis B and C, AIDS, disorders of the central nervous system), and are accompanied by social consequences related to illegal behaviors, violence, and accidents. The onset of addictions is presumably linked to the unfavorable interaction of three categories of factors: neurobiological factors (genetic vulnerabilities, abnormalities in the availability of certain neurotransmitters that regulate mood), individual factors (personality style, life history), and socio-environmental factors (the family, socio-cultural, and economic context in which the individual lives).

Nosographic Categories of the International Classification

The diagnosis of a substance use disorder is based on the identification of a pathological pattern of behaviors in which individuals continue to use a psychoactive substance despite experiencing significant problems related to its use. The *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, Text Revision* (DSM-5-TR) provides 11 criteria divided into four categories.

Individuals who meet two or more of these criteria within a 12-month period are considered to have a substance use disorder.

The symptom categories that define substance use disorder are:

- *Impaired control over substance use*: the individual uses the substance in larger amounts or for a longer period than originally intended; is unable to stop or reduce substance use; spends a significant amount of time obtaining, using, or recovering from the effects of the substance; experiences a strong desire or urge (craving) to use the substance.
- *Social impairment*: the individual fails to fulfill major role obligations at work, school, or home; continues substance use despite persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of the substance; reduces or gives up important social, occupational, or recreational activities because of substance use.
- *Risky use of the substance*: the individual uses the substance in physically hazardous situations (e.g., while driving or in dangerous social circumstances); continues substance use despite knowledge that it is causing or worsening a physical or psychological problem.
- *Pharmacological symptoms:*
  Tolerance: the need to progressively increase the amount of the substance to achieve the desired effect.
  Withdrawal: unpleasant physical effects that occur when substance use is discontinued or when its effects are blocked by a specific antagonist.

The number of criteria identified determines the severity of the substance use disorder:

Mild: 2–3 criteria; *Moderate:* 4–5 criteria; or *Severe:* ≥ 6 criteria.

The diagnostic framework devotes particular attention to *physical, psychological, and social- behavioral changes. Physical changes* include sudden weight loss or gain, bloodshot eyes, facial swelling, unusual skin coloration, bad breath, muscle jerks or tremors, a general deterioration in physical appearance, and signs of injection. *Psychological changes* manifest as sudden mood swings, irritability or outbursts of anger, feelings of hyperactivity or agitation, anxiety, fear or paranoia without a specific reason, difficulty concentrating, defensive attitudes, poor judgment, low self-esteem, feelings of hopelessness, and worsening of pre-existing mental health conditions.

Finally, *social changes* involve the presence of secretive, withdrawn, or dishonest behaviors; lack of motivation to act; apathy; changes in eating habits or sleep patterns; loss of interest in hobbies and activities; isolation from friends and family; poor performance or poor attendance at work or school; attitudes of justification or minimization toward substance abuse; neglect of family or work responsibilities; borrowing or stealing money; and erratic behavior.

Patterns of substance abuse in adolescence

Adolescents who engage in problematic use of illicit drugs experience multiple difficulties at the individual, family, and school levels. Studies on developmental patterns of *poly-substance use* (PSU) among adolescents aged 13 to 17 from urban neighborhoods with low socioeconomic status (SES) identify three classes of consumption (Carbonneau et al., 2023). These include: *non- users/low poly-substance users* (61.0% of the sample); *low-risk poly-substance users* (24.1% of the sample, characterized by later onset and occasional use of two or fewer substances); and *high-risk poly-substance users* (14.9% of the sample, characterized by early onset and frequent use of three or more substances) (Carbonneau et al., 2023).

Research findings indicate that poly-substance use during adolescence is a risk factor for the persistence of substance-related problematic behaviors at age 24 (frequency of alcohol consumption, drug use and intoxication, engagement in risky behaviors under the

influence of substances, and psycho-physical problems related to use), as well as for the deterioration of psychosocial competencies (lack of a high school diploma, occupational or financial difficulties, and antisocial behaviors). For the group of low users/non-users, these risks are more limited, whereas individuals who use multiple substances are at significantly higher risk, reporting poorer outcomes across most of the areas investigated, including substance use in adulthood, problems in occupational settings, difficulties in managing financial matters, and involvement with the justice system (Carbonneau et al., 2023).

Other authors identify *six developmental patterns* of the concurrent use of alcohol, marijuana, and other illicit drugs during adolescence within a longitudinal sample of 926 youths from low– socioeconomic-status urban neighborhoods (Carbonneau et al., 2022). On the one hand, a group of adolescents emerges who do not use alcohol or illicit drugs or who report limited use (61% of the sample); on the other hand, five groups of poly-users with varying levels of severity, depending on age of onset, frequency, and type of substances used. Compared to the non-user and low-use group, several *preadolescent risk factors* were associated with increasing severity of poly-substance use (Carbonneau et al., 2022). Overall, however, all user groups share a tendency to seek intense sensations through substances. Compared to late-onset users, early-onset poly-substance users show the following preadolescent risk factors: low self-esteem, higher impulsivity, family-related difficulties, and school problems. The most common pattern of combined substance use in a sample of adolescents aged 15 to 17 (N = 1,661) appears to be *alcohol and tobacco*, followed by *alcohol and cannabis* (Jongenelis et al., 2019).

Risk Factors for Substance Abuse in Adolescence

During adolescence, experimentation with alcohol reaches its peak. Specific risk factors have been identified, including repeated exposure to traumatic experiences and parenting style, both of which may increase the risk of substance use among adolescents (Stewart et al., 2023). Overall, the literature shows that studies on risk and protective factors related to substance abuse in adolescence distinguish *three main domains*: individual, family, and community factors. With regard to

individual risk factors, variables in preadolescence that may predispose individuals to the development of substance dependence during adolescence generally include: high levels of impulsivity (Chuang et al., 2017 in Nawi et al., 2021; Carbonneau et al., 2022); sensation seeking, high levels of anxiety, and low self-esteem (Carbonneau et al., 2022); a tendency toward rebellion; fragile emotional regulation and alexithymic traits; the presence of traumatic experiences; technology abuse; the presence of psychiatric disorders (conduct problems and major depressive disorder); early exposure to e-cigarettes; behavioral addictions (gambling or video gaming); reduced risk perception; easy access to medications; and a high propensity for the use of synthetic drugs (Nawi et al., 2021). In particular, adolescents aged 15 to 17 who exhibit conduct problems and depressive disorders appear to be at greater risk for poly-substance use compared to their peers (Jongenelis et al., 2019). Particularly noteworthy are the data regarding *adolescent risk factors for marijuana/cannabis abuse:* significant factors include rebellious behaviors (Guttmannova et al., 2019 in Nawi et al., 2021), the presence of alexithymic traits (Dorard et al., 2017 in Nawi et al., 2021), and the belief that cannabis is a harmless drug (El Kazdouh et al., 2018 in Nawi et al., 2021). Conversely, individuals with social phobia tend to avoid marijuana/cannabis use (Khoddam et al., 2016 in Nawi et al., 2021).

Regarding *family risk factors*, interesting data first emerge from *epigenetic studies* on potential prenatal factors, such as maternal tobacco and alcohol use during pregnancy; in these cases, there appears to be a link with substance abuse by their children during adolescence (Osborne et al., 2020 in Nawi et al., 2021). Family variables considered as risk factors for the development of

problematic substance use behaviors generally involve *chronic maltreatment*, both physical and psychological (Longman-Mills et al., 2015 in Nawi et al., 2021). With respect to *parenting style***,** the following risk factors have been identified: low maternal psychological control, absence or disengagement of the father figure (Luk et al., 2017 in Nawi et al., 2021); low parental education, negligent behaviors, limited supervision, uncontrolled allowance, and the presence of family members who use substances (Ogunsola, 2016 in Nawi et al., 2021). Conversely, the presence of *adequate and balanced parenting skills* may help "modulate" substance use behaviors, supporting and

reinforcing adolescents' ability to perceive the harm and danger associated with these behaviors. Regarding family risk factors, other authors have found that in families where parents have used drugs in the past, adolescent children have a higher likelihood of using cannabis, although not necessarily in a problematic manner (Lobato Concha et al., 2020).

Regarding *community risk factors*, a positive association has been found between adolescent substance abuse and low adherence to a *spiritual/religious value system* (Nawi et al., 2021); frequent and continuous contact with peers who use substances (Li et al., 2017 in Nawi et al., 2021); adolescents' perception of high drug availability in their neighborhood; and the quality of their engagement in extracurricular activities (Schleimer, 2019 in Nawi et al., 2021). Researchers also note that, at a socio-cultural level, the tendency to *normalize substance use* is an important risk factor, as it can justify early use and minimize the perceived harmful effects (Cioffredi et al., 2021 in Nawi et al., 2021). A significant focus in studying community-level risk factors is the *school environment*. In general, school absenteeism and dropout are associated with numerous life-course problems. Regarding absenteeism, risk factors include a *negative attitude toward school*, early substance use, difficulties in the externalization and internalization of emotions, and low parent– school involvement. For school dropout, risk domains include *low academic performance, low IQ, and learning difficulties* (Gubbels et al., 2019). Early school dropout is a risk factor for substance abuse among middle school students. Conversely, this risk can be reduced by 43% if children and their significant caregivers access local family-oriented services starting in late childhood; the reduction is even greater when adolescents who are not attending school are included (Lee et al., 2025).

Protective Factors Against Substance Abuse in Adolescence

From a prevention perspective and in the interest of strengthening individual and family competencies, it is useful to study *protective factors* that can counterbalance the negative effects of adolescent risk factors for substance abuse. At the *individual level***,** researchers have identified personality traits oriented toward optimism; a high level of

awareness of one's own emotions, thoughts, and behaviors; strong convictions against substance abuse; and the desire to maintain and nurture one's psycho-physical health (Nawi et al., 2021). Other protective traits include the ability to regulate emotions, *mindful personality traits*—the capacity to maintain present and conscious attention in the moment (Wilson et al., 2017 in Nawi et al., 2021)—and a tendency toward an optimistic and positive attitude (Marin et al., 2019 in Nawi et al., 2021). Among *family protective factors,* parental monitoring of adolescents' movements is particularly effective, as is parental opposition to cannabis use, which reduces the likelihood of adolescent consumption overall, regardless of the parents' past substance use (Lobato Concha et al., 2020).

At the *socio-cultural level***,** protective factors include adherence to a religious and/or spiritual value system; participation in structured socio-recreational and sports activities; a meaningful connection to school as a system of belonging and identity; and the perception of solid and supportive relationships with significant adults (Dash et al., 2020 in Nawi et al., 2021). Early identification of adolescent depression and conduct problems, along with the development of programs to help youth and their families address these symptoms, can prevent or reduce *poly-substance use* in this population (Jongenelis et al., 2019).

Types of Substance Use in Adolescence

Adolescent substance use exists on a *continuum*, ranging from occasional use to severe substance use disorders. The psycho-physical health consequences can be *acute or chronic*, with severity varying depending on the substance, the circumstances, and the frequency of use. Even occasional substance use can expose adolescents to increased risks, including *impaired brain development, road accidents, violent behaviors, and unprotected sexual activity* (leading to unintended pregnancies or sexually transmitted infections). Regular use of alcohol, cannabis/marijuana, nicotine, or other substances during adolescence is associated with *higher rates of mental disorders, poorer functioning in adulthood, and increased risk of addiction.* For the adolescent brain, *all substance use is "heavy":* continuous cannabis use, especially during adolescence, can exacerbate preexisting conflicts or create new ones. Persistent cannabis use can alter the development of

consciousness, significantly affecting memory, attention, and concentration processes (Bolletta, 2017). One of the most dangerous outcomes is the so-called *"amotivational syndrome"***,** characterized by reduced motivation and interest in previously rewarding activities, including schoolwork, recreational activities, or sports (Bolletta, 2017).

In studying adolescent substance abuse behaviors, *psychological and relational functions* underlying their initiation and repetition are important. Conger and Petersen (1984) distinguish different forms of use based on the purpose of substance consumption:

- *Experimental use:* primarily exploratory, driven by curiosity and the desire for new and exciting experiences.
- *Social use:* recreational and social purposes, fostering group interaction.
- *Use for personal effect*: aimed at managing personal problems or regulating emotions.
- *Enslavement:* a severe state of dependency in which substance use is heavy and prolonged, causing significant physical, psychological, and relational harm.

Three main factors help explain not only *initial contact with substances* but also the *repetition of abusive behaviors:*

1. *Psychological factors* related to personality organization.
2. *Pharmacological and neurobiological factors* related to the type of drug and its effects on the central nervous system.
3. *Contextual factors* involving events, people, and relational dynamics during consumption (Ravenna, 1997).

Massimo Barra (in Moretti & Stefanelli, 2018) emphasizes that *contact with substances does not inevitably lead to pathological addiction***,** dominated by totalizing self-annihilation in the service of the drug. This is because three interrelated factors—*the brain, the substance, and the environment*—are necessary to trigger and stabilize such a complex process. Barra notes: *"the brain, and therefore the individual with their behaviors, is not a blank page, but a partially written book in continuous plastic and dynamic evolution"* (in Moretti & Stefanelli, 2018).

Substance use is thought to evolve through *three phases:*

1. *Preparatory or approach phase*: the individual becomes curious about the substance, believing it may meet personal and/or relational needs.
2. *Contact or initiation phase:* the individual decides to try the substance to test whether it fulfills their expectations; the positive or negative outcomes of this experience will guide future decisions about continued use.
3. *Stabilization phase:* through repeated use, the individual develops a personal *pattern of consumption*, which may be occasional/episodic, regular, or dependent (Ravenna, 1997).

Pathological addictions and clinical practice

Personal experience within Villa Maraini Foundation, the National Agency of the Italian Red Cross and World Training Center of the International Federation of Red Cross and Red Crescent Societies for the treatment of pathological addictions, represents a daily source of knowledge, inspiration, and clinical reflection. Villa Maraini *(www.villamaraini.it)* was founded by Massimo Barra in 1976 and consists of a comprehensive system of services for the treatment and rehabilitation of drug addiction, alcohol abuse, gambling disorder, and new forms of addiction (ranging from technological addictions to chemsex). These services are structured across different *threshold levels*—very low, low, medium, and high—depending on the level of motivation required of the user to engage in the proposed treatment pathway. The uniqueness of this facility lies precisely in the possibility of finding the full complexity of treatment thresholds within the same setting, located in a single park area in Rome, at Via B. Ramazzini 31.

The work carried out within Villa Maraini Foundation, operating *24 hours a day, 365 days a year,* brings us into contact with a large number of individuals suffering from pathological addictions and their families, allowing us to learn about their stories and to directly encounter their suffering. The humanitarian approach to pathological addictions promoted by the Villa Maraini Foundation, embodied in the figure of Massimo Barra and inspiring our professional practice, is based, among

other elements, on three key principles: promoting "*access to treatment*" for people with substance use disorders by simplifying bureaucratic procedures and offering immediate and timely admission; ensuring the so-called *"continuum of care"* namely the possibility for users to find appropriate and personalized responses to their problems within a threshold-based pathway that guarantees continuity and quality of interventions; and finally, adopting the perspective of *"compassion,"* understood as the capacity to welcome and take care of users with sensitivity, empathy, participation, non-judgment, and an active commitment to combating stigma.

Overall, clinical experience confirms what is widely reported in the scientific literature. Clinical work with these individuals takes place within complex treatment pathways that take into account physical, psychological, family, and socio-cultural dimensions. We frequently observe, among users in treatment, a familial pattern of addiction-related behaviors, such as the presence of alcoholism, substance dependence, or deviant behaviors in both the second generation (parents) and the third generation (grandparents).

With respect to the research questions within which the present article is situated, the anamnesis of users in treatment often reveals significant critical issues related to their school experience. Early use or abuse of alcohol and psychoactive substances during adolescence inevitably compromises continuity in education, predisposing individuals to absenteeism and school dropout. At the same time, the nature of the correlation between these two variables is not always clear, as many users report pre-existing academic or behavioral difficulties that, in their view, undermined their well- being in the educational context. Today, such difficulties would likely fall within diagnostic frameworks such as Specific Learning Disorders (SLD), Attention-Deficit/Hyperactivity Disorder (ADHD), or Oppositional Defiant Disorder (ODD) which, if identified and treated early, can nevertheless be associated with a less unfavorable prognosis.

Another important aspect concerns the *family context:* clinical experience presents a highly complex picture in which we are first and foremost confronted with profound suffering that leads individuals to seek help. In this area as well, we can clearly confirm what is reported in the literature. When working on the family histories of users in

treatment, we observe how fragile emotional bonds, the lack of a consistent and clearly defined system of rules, and impaired communication represent significant risk factors for the use and abuse of psychoactive substances. Histories of chronic maltreatment or neglect, traumatic experiences, bereavement, dysfunctional triangulation dynamics, family conflict, emotional disengagement, poor parental supervision, excessive economic availability or, conversely, conditions of social marginalization are frequently found in the narratives of people with pathological addictions. At the same time, the repeated engagement in abusive behaviors inevitably affects relational dynamics and family balance, triggering processes of codependency, stigmatization, and social isolation.

In such highly complex situations, daily clinical practice shows that identifying and strengthening *protective factors* represents the most effective path to restoring hope and motivation to engage in a recovery project. Being able to recognize positive and constructive elements within stories marked by profound suffering and loneliness is the most significant challenge of the recovery process.

Finally, clinical experience highlights how the *socio-cultural context* plays a crucial role in supporting the harmonious development of children and adolescents. Being born and raised in a stimulating environment that is emotionally available and culturally enriching undoubtedly constitutes an important protective factor. Conversely, contexts dominated by social marginalization, deviance, neglect, carelessness, and a lack of opportunities for positive socialization may represent fertile ground for the development of substance dependence.

Particular attention should be paid to substance use considered *occasional and non-problematic.* We know that any psychoactive substance introduced into the body and the central nervous system alters its functioning, especially during adolescence, influencing thoughts, emotions, and behaviors. It is not uncommon to observe situations in which occasional use during adolescence or adulthood

evolves into more problematic patterns in the presence of stressful factors or traumatic events, leading the individual to develop a full-fledged pathological addiction.

Current international diagnostic classifications allow so-called "*occasional and non-problematic use*" to be framed within *mild*

substance use disorder, helping clinicians to identify potentially at- risk situations that may evolve toward more severe outcomes. This clinical condition therefore requires careful attention, particularly when substance use occurs during adolescence, since within this *developmental window* any psychoactive substance that alters the delicate neurobiological and psychological systems has inherently problematic effects on the developmental process of young people.

The Work of Villa Maraini Foundation with Young Population Groups

Among the wide range of interventions offered by Villa Maraini Foundation to individuals with problems related to pathological addictions, particular attention is devoted to younger population groups**.**

Within its outpatient services, Villa Maraini Foundation offers *therapeutic groups for adolescents and young adults* who seek help for issues related to the abuse of psychoactive substances, alcohol, or gambling. The aim is to create a space for listening and care that is specifically tailored to the developmental needs of this population group and suited to the particular patterns of abuse associated with it. In parallel, Villa Maraini Foundation also provides *support and listening to family members*, through individual interviews, family meetings, and multifamily groups. The primary objective is to help parents better understand addiction-related issues, to acknowledge and contain their suffering and doubts, and to promote protective behaviors both for themselves and for the users. Villa Maraini Foundation is also actively involved in *prevention interventions* targeting adolescents and young adults, focusing on the prevention of substance abuse, alcohol misuse, and pathological gambling. These activities are carried out through projects in schools and through training and educational events organized at the headquarters on Via Ramazzini in Rome. Massimo Barra maintains that "*true prevention is represented by care***,"** meaning the need to reach the largest possible number of substance users and to create a valuable link with specialized services dedicated to harm reduction and the treatment of pathological addictions (Barra, 1997). The prevention work carried out by Villa Maraini Foundation with

young people aims at *raising awareness* of the dangerously "seductive" effects that psychoactive substances can exert on young personalities and on the developing brain, as well as of their pathogenic short-, medium-, and long-term consequences. The approach adopted is *psychoeducational*, combining informative interventions based on scientific evidence from the field of neuroscience with experiential activities such as role- playing and storytelling.

Over its fifty years of experience, Villa Maraini Foundation has observed the failure of the so-called *"fear-based" or "terroristic" approach* when working with young people. Interventions that merely demonize psychoactive substances can be counterproductive, often triggering curiosity and transgressive behaviors. It is well established that the ***"****adolescent brain****,"*** for strictly developmental reasons, tends to underestimate risk factors associated with certain behaviors while amplifying those related to pleasure and excitement (Bueno, 2022; Siegel, 2014). It is therefore essential to

support "young minds" through prevention interventions that operate on two main fronts: first, strengthening reality testing by fostering awareness of the risks associated with substance abuse, without denying the aspects of pleasure objectively linked to the activation of the dopaminergic system (Cannizzaro, 2005); and second, offering experiential opportunities that help young people become aware of their own vulnerabilities and suffering, as well as their vital and protective drives, with the aim of strengthening individual and group resources.

According to the experience of Villa Maraini Foundation, the most effective strategy for helping young people create a space for dialogue and discussion with professionals (psychologists, educators, and peer social workers) around the issues of drugs and gambling is precisely that of *"non-judgmental listening."* This approach facilitates the sharing of experiences, doubts, and fears related to risk behaviors, while avoiding diagnostic labels and moralistic interventions. In the Villa Maraini model, *primary prevention interventions* in the field of pathological addictions involve a *multiprofessional team* composed not only of physicians, psychologists, and educators, but also of a *peer social worker*. Drawing on their personal experience as a former substance user and on their own recovery and rehabilitation process, the peer worker offers a valuable and enlightening perspective for

young people. Adolescents and young adults are undoubtedly more engaged when listening to *"real-life stories"* in which they can recognize and identify with experiences of fragility, suffering, but also rebirth and resilience. Moreover, they often show a positive curiosity about the opportunity to feel listened to and emotionally validated—even in their most destructive experiences—and increasingly ask for help and guidance in managing moments of difficulty and distress, both at school and within the family context.

Conclusions

The overview of the scientific literature and the reflections derived from personal clinical experience at Villa Maraini Foundation regarding substance abuse behaviors suggest the need to proceed with rigor, adequate preparation, and sensitivity when working with adolescents.

Identifying individual, family, and socio-cultural risk factors for the development of problematic substance use, in order to help young substance users contain or prevent more severe trajectories toward pathological addiction, is a goal that mental health professionals must undoubtedly pursue.

In this regard, the ESPAD® Italia research project appears to be a valuable tool for more accurately outlining the characteristics of the Italian student population aged 15 to 19 with respect to substance use behaviors, thus enabling the design and modulation of targeted preventive interventions oriented toward the promotion of well-being. From this perspective, and in line with the data reported in the literature, it is necessary to strengthen variables related to the *school and socio-family context* as important protective factors against substance abuse behaviors, thereby fostering a harmonious and balanced psychophysical and relational development of adolescents.

With this contribution, Villa Maraini Foundation aims to place its fifty years of experience in the field of reception, treatment, and rehabilitation of individuals and families suffering from pathological addictions at the service of the scientific community, in order to continue promoting research projects, organizing opportunities for multiprofessional dialogue and exchange,

disseminating knowledge and information, and designing clinical

interventions that are increasingly human-centered and attentive to the needs of individuals and the community.

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UNVEILING DRIVERS OF ADOLESCENT SUBSTANCE USE: A MULTIDIMENSIONAL ANALYSIS OF INDIVIDUAL AND ENVIRONMENTAL FACTORS

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1. Introduction

Adolescents are vulnerable to the effects of substance use and are at risk of developing serious consequences. A low level of commitment to education and to higher truancy rates appear to be related to substance use among them. Cognitive and behavioral problems experienced by alcohol and drug using youth may interfere with their performance and present obstacles to learning for their classmates. Given the at-risk consumption of substances in this age group and given the particular social context, there is an increasing need to focus on characterizing the factors that lead to or facilitate substance use in adolescents, while also devoting special attention to optimizing and disseminating evidence-based prevention, evaluation, and treatment interventions. This leads to the need to monitor such consumption effectively and properly link the level of use to factors, mostly social.

The standard epidemiological indicators for monitoring drug use, still in use worldwide, were developed in the 1980s, when people using drugs were primarily using a single substance (heroin, cocaine, amphetamines, cannabis...) and so, putting the substance at the centre of the assessment was equivalent to putting the consumer at the centre. The main indicators were the prevalence and incidence of specific substance users.

Recently the use of indicators to evaluate problematic drug use (PDU) has seen important developments [1]. The trend away from standard Problem Drug Use (PDU) consumption patterns with single substances has become increasingly evident in practice, but still not incorporated into current epidemiological tools. The change in the definition of serious substance use by EMCDDA[4] (presently EUDA[5]), around 2010, going from Problem Drug Use (PDU), which was based on the use of few individual substances such as heroin, cocaine and amphetamines, to High-Risk Drug Use (HRDU), which is focused on the risky behaviour of people who use drugs, regardless of the substances, is a first step towards the evaluation of subjects and not just of substances [2]. However, the definition, although being less specific about substances, still refers to prevalence and incidence of single substances as epidemiological tools, not mentioning poly-drug use in monitoring, apart from doing it qualitatively.

Specific indicators that can measure the expected individual levels of harm, following drug use and poly-drug use, have been proposed and applied to various populations. The defined poly-drug use indicators allow the quantitative characterisation of risk profiles for selected groups of people who use drugs, both over time and between stratified populations, with the aim of comparing outcomes of drug policies, or comparing drug use between HRDU populations and adolescents and further situations, as summarised in [3] and in the references reported there.

These poly-drug use indicators are based on individual drug use frequency data and expert rankings of health and social harms related to various substances, developed simultaneously and published in 2010 by two research groups [4,5]. Since the 2019 report, the Global Commission of Drug Policy[84]has been calling out the need to take into account the level of personal and social harms associated with individual substances in drug laws and policies, citing just [5].

Further advances, regarding the classification of individual drug use health and social harms, presented in a joint paper by van Amsterdam and Nutt in 2015 [6], are a refinement of the substance scores by separating and summarizing in single values the effects of harm to self

84 https://globalcommissionondrugs.org/gcdp-reports/classification-of-psychoactive-substances-when-science-was-left-behind/

and harm to others. In a recent paper [7], the harm scores for the use of different substances are evaluated, also introducing some new chemicals drugs, such as synthetic cannabinoids and others, the scores are reported in Table A1 in the Appendix.

Correlations of the new scores with those previously used have been evaluated and result is high for common substances. Thus, the results of the previous analyses, reported and mentioned in [3], remain valid and may suggest new analyses to be carried out as shown in the following.

Paragraph 2 explains the dateset that will be used and the methodology regarding poly-drug use indicators and methodology used for the analysis. Paragraph 3 provides an analysis of the ESPAD®Italia data for the assessment of all socio-economic variables that may influence the development of substance use and high levels of poly-drug use up to the determination of a multivariate model. Paragraph 4 reports conclusions and suggestions for future commitments for further study.

2. Materials and Methods

2.1. The ESPAD[85] study and ESPAD®Italia[86]

The ESPAD study (European School Survey Project on Alcohol and Other Drugs) is an international collaboration between several countries, producing comparable data, every four years, on substance use among 15-16 year old students since 1995. The ESPAD®Italia study covers the 15-19 age group (high school students) and is conducted annually by the Institute of Clinical Physiology of the National Research Council (CNR).

Every four years, data on Italian students aged 16 years are provided to the international study and fed into the ESPAD database[87].

In line with ESPAD methodology [8], a representative sample of

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85 http://www.espad.org/

86 https://www.epid.ifc.cnr.it/project/espad-it/

87 The study adheres to both European and national ethical guidelines and received ethical approval (No. 0027159/2019) from the Ethics and Research Integrity Committee of the CNR.

high school students aged 15–19 is obtained through multistage stratified random sampling, with classes as the final sampling unit. Data are collected via an anonymous questionnaire administered in classrooms under exam-like conditions, using a mixed-mode approach (paper-and-pencil or online). Regarding consent procedures, passive parental consent is applied. Detailed information letters are provided to participating schools, parents/guardians, teachers, and students, explaining the study's objectives, administration procedures including all measures to ensure privacy and anonymity and the use and dissemination of results. In 2023, 85% of the invited schools agreed to participate. More detailed information on the sampling and data collection procedures is available elsewhere [9]. In total, 12,225 Italian students aged 15–19 participated in the survey.
Data analysed here were drawn from the 2023 wave of the ESPAD®Italia study.

2.2. Methods

In terms of the methods used, all available data were explored extensively and various procedures were used to reduce the size of contextual statistical variables, such as principal component analysis, specifically with respect to ESPAD®Italia data.

The severity of consumption, which depends on both the frequency of use and the type of substance used, was measured using the poly-drug use indicators based on the individual substance harm scores reported in Table A1 in the Appendix [7]. Definition and calculation of poly-drug use indicators can be found in [3], where also several applications are reported. The calculation formulas are only briefly reported here.

Poly-drug use approach and formulas
For any user the poly-drug use indicator, measuring the global degree of physical and social harm, is obtained by adding up the score *w* of all the substances used by the *i-th* subject in the last thirty days, or last 12 months, multiplied for the frequency of use *f*.

Any user is then characterized by two Poly-drug use scores (PDS):

$$PDS_i^{self} = \sum_{j=1}^{k} w_j^{self} f_{ij}$$

$$PDS_i^{others} = \sum_{j=1}^{k} w_j^{others} f_{ij}$$

where w_j^{self} and w_j^{others} are the scores relating to harm to oneself and harm to others, respectively.

Given the availability of socio-economic variables, the impact of these variables on the level of poly-drug use and the onset of use is tested. The link between each contextual variable and the level of poly-drug use was studied for specific subgroups of users.

3. Social and Environmental Factors influencing drug use: ESPAD®Italia

3.1. Preliminary analysis on multidimensional variables

Information about family and friend relationships and habits with respect to reading, sports, and other activities, which we know, from preliminary analysis years ago, may influence the desire to try or use psychotropic substances on a regular basis [11], appears in specific questions in the questionnaire[88] in which possible answers are provided to simplify compilation. We report one of them just as an example.

For each of the seven questions, a Likert scale from 1="Almost never" to 5="Almost always" is used. Of course there are important correlations among the 7 questions/answers and it would be good for the analysis to limit the factors. This can be done by first applying principal components analysis, from which it is possible to derive a small number of new variables obtained as a linear combination of the original variables.

For example, the first two principal components are sufficient to explain all 7 questions. The number of explanatory variables to be considered was reduced from 7 to 2. The first component summarizes the information contained in the answers given to questions regarding relationships with parents, etc., while the second summarizes the information contained in the answers given to questions regarding monetary aspects.

The same procedure was used for all other similar questions. This

[88] https://www.epid.ifc.cnr.it/wp-content/uploads/2024/02/ESPAD_2022_Questionario_Versione_10_03_2022_WEB.pdf

preliminary analysis greatly reduces the number of explanatory variables to be used in the model, while also reducing the correlations between these variables. The applications are reported below, showing their use.

3.2. Analysis and results

To assess the influence of contextual variables on the level of poly-drug use, the PDS variable was divided into several classes. The six classes are as follows: 0; (0-5]; (5-30]; (30-50]; (50-90]; (>90) The results are shown in Table 1 and Figure 1; Table 2 and Figure 2 show the distribution related to consumers only.

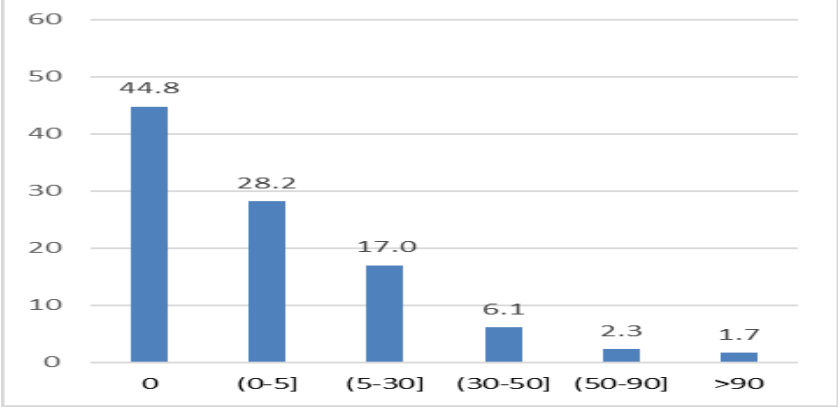
Table 1. PDS percentage distribution

PDS class	Percentage
0	44.8
(0-5]	28.2
(5-30]	17.0
(30-50]	6.1
(50-90]	2.3
>90	1.7

Table 2. PDS percentage distributions related to consumers

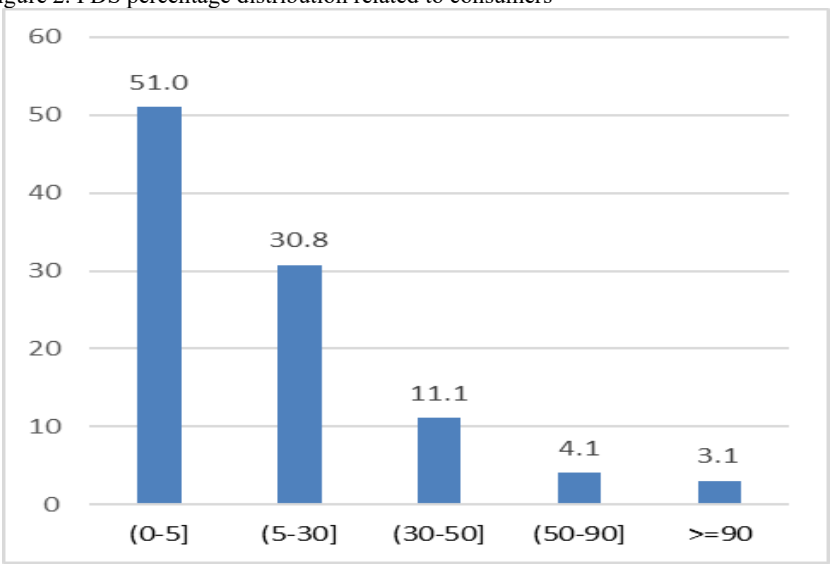
PDS class	Percentage
(0-5]	51.0
(5-30]	30.8
(30-50]	11.1
(50-90]	4.1
>90	3.1

Figure 1. PDS percentage distribution



As can be seen, 55.2% of students consume some substance. As regards to consumers about half of them use only cannabis or alcohol or medicines (0-5], while the other half use more than one substance.

Figure 2. PDS percentage distribution related to consumers



As can be clearly seen in Figures 2, the distribution of consumers is highly asymmetrical with a long tail on the right.
To further refine the analysis, consumers were divided into four groups:

1. Group 1: the group that consumes any substance except cannabis and alcohol;
2. Group 2: the group that consumes any substance except cannabis;
3. Group 3: the group that consumes any substance except alcohol;
4. Group 4: the group that consumes any substance including cannabis and alcohol.

The position indices of PDS for male and female consumers are shown in Table 3.

Gender influence

The mean for each group is higher than the median, confirming the right-hand asymmetry similar to the trend shown in Figure 2. This means that most of the PDS values in each group take on more lowest values, which are denoted by the medians, for both males and females.

This is evident from the mean/median ratios for each group, which range from 1.5 (Group4) to 4.3 (Group3) for males and from 2 (Group 4) to 4.6 (Group2) for females.

Table 3. Position indices of consumers in the four groups.

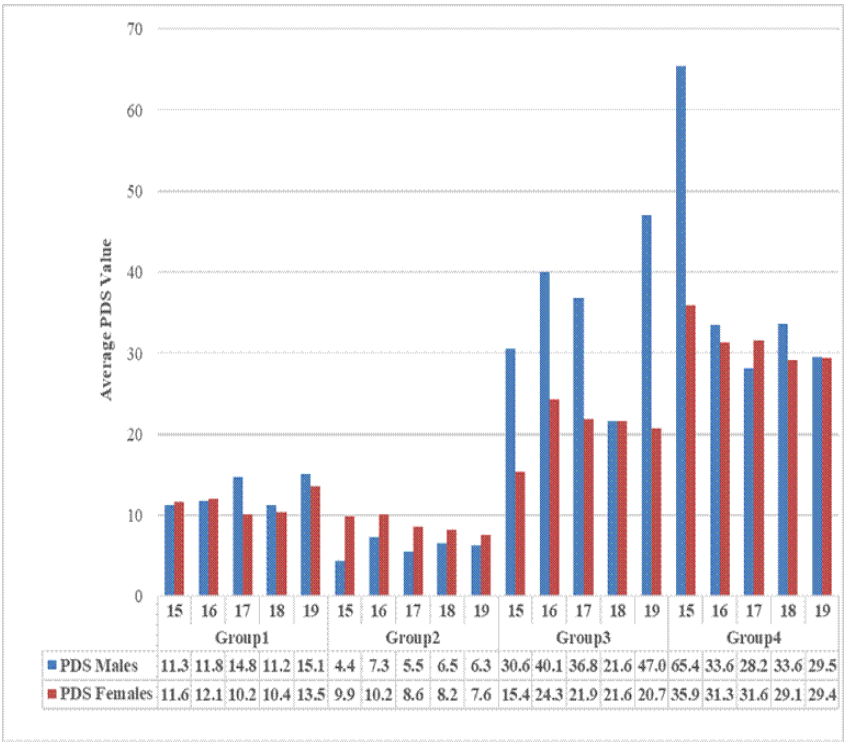
	Males				Females				
	Distribution	%	Mean	Median	Distribution	%	Mean	Median	Males /Females
Group1	414	15	12.5	4.7	949	29	11.5	4.8	0.44
Group2	992	36	6.1	1.9	1052	32	8.8	1.9	0.94
Group3	452	16	35.8	8.4	441	14	21.1	8.4	1.02
Group4	924	33	33.4	22.2	820	25	30.5	15.1	1.13
total	2782	100			3262	100			

The percentage distributions of males and females are particularly different, as females show a clear prevalence of their percentage distribution in Group1 and males in Group4, while the two intermediate groups have more similar percentages, with the percentage of the distribution of males always being higher. It is clear that the male-female ratio is particularly low in the first group, where subjects mainly use medicines; it is well known that adolescent females have more reasons for using medicines. Therefore, it must be taken into account that many substance users are actually using soft medicines that do not require a prescription, as these are mostly over-the-counter medicines. It is important to analyse this aspect separately and not as “drug” use.

Age influence on PDS

Figure 3 shows the mean PDS values by group, age and gender.

Figure 3. Mean PDS values by group, age and gender



There is a clear general low trend in Group1 and Group2, which is very similar for males and females, with females slightly higher in the second group and for males very higher in the third group. With regard to age, the trend in the first three groups is also fairly constant, with small, insignificant increases and decreases. The special case concerns Group4, where males have a significantly higher value than females at age 15 and similar in the following years. Furthermore, for both, the maximum value is observed at age 15, while it decreases and remains almost constant at older ages. This trend was also found in the previous study on the years 2012-2015 by ESPAD®Italia [11]. In that case, a public study on school dropouts, particularly at the beginning of secondary school, corresponding on average to 15 years of age, was available. The comparison suggested a strong link between heavy substance use and school dropout, which is greater for males than for females, who nevertheless show the maximum mean PDS at 15 with a subsequent decline. The difference between the value at age 15 and the

value at age 16 is greater for males, as was also the case in previous analyses, and was perfectly consistent with the study on school drop-out.

What seems to be lacking in Italy is the necessary indicated prevention measures for these critical cases, which presumably involve heavy use of substances, including legal alcohol, due to family problems, which we will analyse later and which were also influential in the previous study [11], where, however, they were less detailed in the questionnaire.

Visible variables linked to high substance use: absences due to lack of interest and personal rating

A good school teacher knows that students who are uninterested in school for various reasons, including substance use, do not follow lessons carefully, have many unjustified absences and perform poorly. The variables that measure these aspects were identified in the questionnaire. These two variables are:

- absences of at least three days in a month due to a lack of desire to attend school;
- personal rating of one's own academic performance.

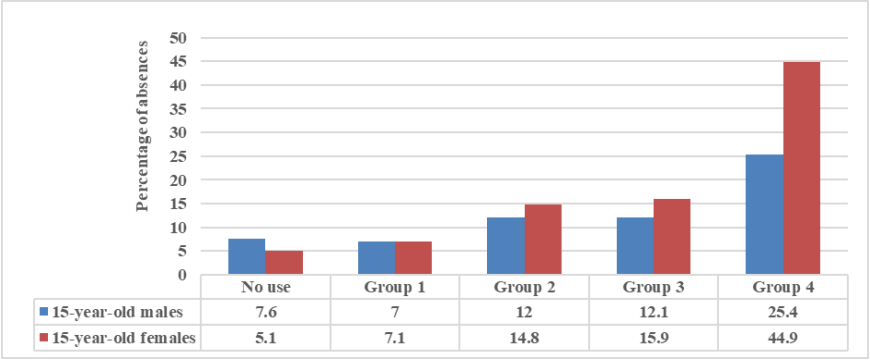
The two variables are highly correlated.

Absences

Figure 4 shows the trend in the percentage of absences of more than three days due to lack of interest for both males and females fifteen-year-olds. The trend is clearly consistent with PDS values.

A similar, but less evident trend, can also be seen for other ages, not shown in the figure, but available upon request, to interested researchers.

Figure 4. Percentage of absences lasting more than three days due to lack of interest among fifteen-year-olds.



Personal rating of one's own academic performance

The rating is classified as: Low, Medium, High.

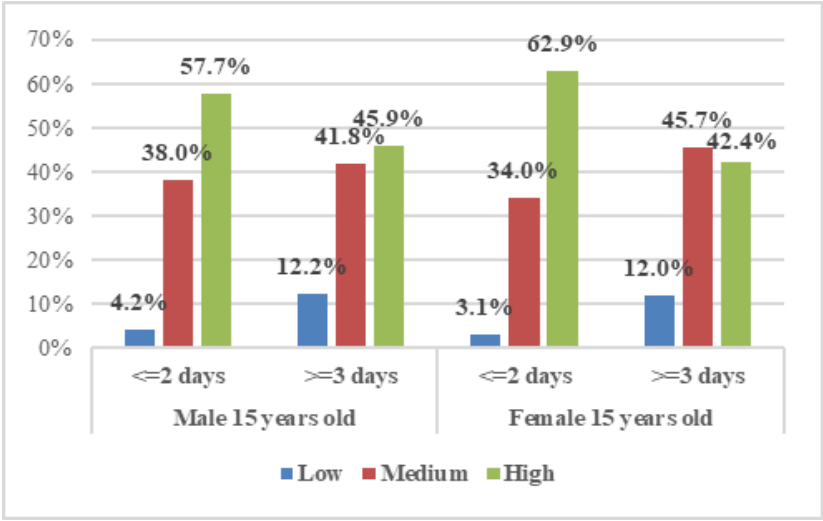
Given that the Absences and Personal rating variables are highly correlated, we do not include the marginal distributions of the rating variable, but rather the distributions of that variable conditioned on the absences variable, both for 15-year-old students and 17-year-old students, to show the difference with respect to the age most closely linked to early school leaving.

Distribution of personal rating conditioned on the type of absences from school (three days due to lack of interest or not)

Combining information on the type of absences from school and personal rating yields Table 4 and Figure 5, showing the distribution for males and females aged 15 and 17. We can observe an improvement in personal rating for 17-year-olds compared to 15-year-olds.

It is clear that these school variables, in particular frequent absences and poor attention spans among students, are readily apparent to attentive teachers and therefore provide clues to problems that need to be addressed through a broad and effective teaching approach, which also tackles the psychosocial problems of their students.

Figure 5. Conditional percentage distributions of personal rating conditioned to absences from school for males and females aged 15 and 17.



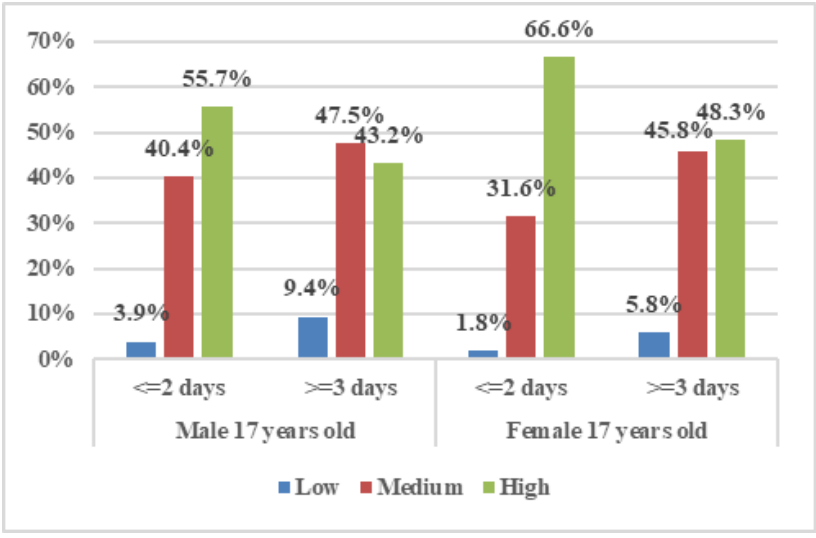


Table 4. Percentage distributions of personal rating conditioned to absences from school.

Age	Personal rating	Male		Female	
		<=2 days	>=3 days	<=2 days	>=3days
	Low	4.2%	12.2%	3.1%	12.0%
	Medium	38.0%	41.8%	34.0%	45.7%
15 years old	High	57.7%	45.9%	62.9%	42.4%
	Low	4.3%	7.7%	3.21%	10.92%
	Medium	36.6%	59.6%	30.62%	36.97%
16 years old	High	59.1%	32.7%	66.17%	52.10%
	Low	3.87%	9.35%	1.77%	5.83%
	Medium	40.45%	47.48%	31.64%	45.83%
17 years old	High	55.68%	43.17%	66.59%	48.33%
	Low	2.57%	9.09%	1.25%	1.65%
	Medium	38.17%	46.28%	28.79%	48.76%
18 years old	High	59.25%	44.63%	69.96%	49.59%
	Low	4.11%	7.32%	1.58%	4.51%
	Medium	36.58%	53.05%	28.16%	39.85%
19 years old	High	59.32%	39.63%	70.26%	55.64%

Socio-economic variables influencing consumption: preliminary analyses to identify variables to be included in the model

Let us now consider the family-related variables that may influence consumption. As regards the influence of the relationship with parents on poly-drug use, using the comprehensive PDS indicator, we again find that the relationships are significant and that average consumption (PDS) increases when they are unsatisfactory.

Analyses, conducted by statistical tests, show that the relationship with parents, particularly with the mother, influences use. A higher value of PDS is found in cases of unsatisfactory relationships.

Going out in the evening with friends freely seems to be highly associated with the level of PDS; otherwise the intellectual dimension does not seem to be influential. The habit of playing for money is very influential. The details of these individual analyses are not reported, as some variables are also correlated and their importance is verified using the model.

Age at first use of cannabis

From the analysis about the first substance used, apart from alcohol, we find that the substance most commonly used for the first time at a young age is cannabis, so we compared the ages at first use of this substance with the PDS values in Table 5. Table 6 and Figure 6 show the percentage distribution of age at which cannabis use began conditional to PDS class values.

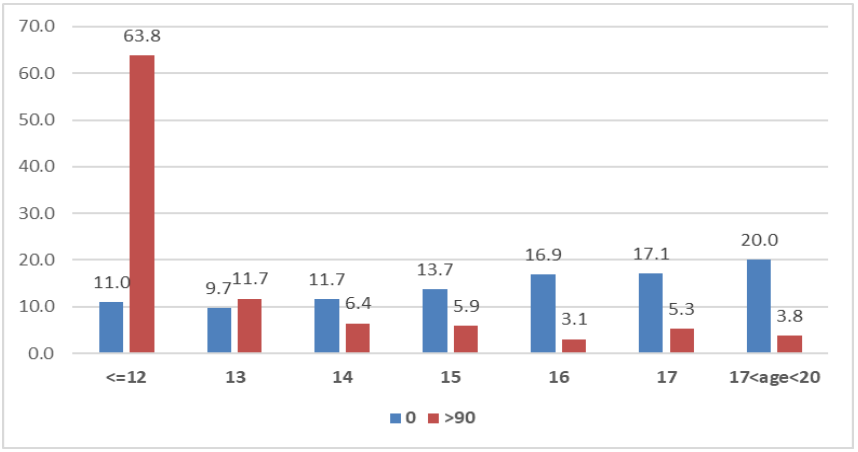
Table 5. Percentage distribution of the PDS value class for age at which cannabis use began.

PDS class	<=12	13	14	15	16	17	17<age<20
0	5.2	4.6	5.5	6.5	7.9	8.1	9.4
(0-5]	7.4	16.4	21.8	27.6	32.2	37.2	38.7
(5-30]	17.0	32.9	34.1	38.6	40.3	39.5	39.8
(30-50]	24.4	32.9	26.8	19.2	13.2	9.9	6.8
(50-90]	11.1	6.8	8.2	4.9	4.6	2.5	3.1
>90	34.8	6.4	3.5	3.2	1.7	2.9	2.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 6. Percentage distribution of age of first use conditional to PDS class values.

PDS class	<=12	13	14	15	16	17	17<age<20	Total
0	11.0	9.7	11.7	13.7	16.9	17.1	20.0	100.0
(0-5]	4.1	9.1	12.0	15.2	17.8	20.5	21.4	100.0
(5-30]	7.0	13.6	14.1	15.9	16.6	16.3	16.4	100.0
(30-50]	18.3	24.7	20.1	14.4	9.9	7.4	5.1	100.0
(50-90]	26.9	16.6	19.9	11.9	11.1	6.0	7.6	100.0
>90	63.8	11.7	6.4	5.9	3.1	5.3	3.8	100.0

Figure 6. Percentage distribution of age first use conditional to PDS class values 0 and >90.



Although early cannabis use leads to higher mean PDS values in adolescence, this result should not be used to revive the gate theory, which claims that cannabis use leads to the use of harder drugs. In fact, national data, presented in the annual report to parliament, show the opposite, even if the writer does not understand this and provides data that is not directly applicable unless it is first transformed using probability. This was shown, using probability, in Italy many years ago [13].

Saying that cannabis is the first substance used by 30% of heroin users can be misleading because this data is not statistically significant in establishing a correlation between the two events. In order to obtain reliable data, it is necessary to introduce Bayes' theorem, which is used to calculate the conditional probability of event A with respect to another event B, knowing the probability of the two events and the conditional probability of event B with respect to event A:

$$P(A|B)=P(B|A)P(A)/P(B)$$

In this case, P(A) is the number of heroin users relative to the total population, P(B) is the number of cannabis users relative to the total population, and P(B|A) is the probability that heroin users have also used cannabis at some point in their lives. Knowing that P(B|A) for heroin is 30%, that there are 500,000 heroin users (estimated) and 5,000,000 cannabis users (estimated), we obtain:

$$P(A|B)= (0.30 \cdot 500{,}000)/5{,}000{,}000=0.03$$

Therefore, the probability that a cannabis user becomes a heroin user is 3%. The same consideration can be made for cocaine, knowing that there are 750,000 users of this substance and that P(B|A) for cocaine is 29%. The scientific ignorance among politicians who write reports to parliament is huge!

3.2. Ordinal Logit Model applied to ESPAD data

Having identified all the variables correlated with the PDS indicator, we can now set up a multivariate model to identify the different influences of the various factors. It should be remembered that some variables may influence the level of PDS, as co-causes, while others measure its consequences, such as absences from school and personal rating, which represent its "symptoms".

The ordinal logit model was used to analyse the dependence between the PDS variable, categorized into six ordered classes. This model estimates how a predictor changes the probability of falling into higher classes, while holding other predictors constants. In this case we use the following predictors:

Individual factors

- Age (15, 16, 17, 18, 19 years old)
- Gender (Female/Male)
- Going out with friends in the evening (PCA dimension)
- Practising hobbies (PCA dimension)
- Using the internet to play games/chat/social-net (PCA dimension)
- Age at first cannabis consumption (<=12, 13, 14, 15, 16, 17, >=18, never consumed)

Factors related to the family context

- Language(s) spoken at home (only Italian; only foreign; Italian and foreign)
- Relationship with mother/father 1=Very satisfied;…;5=not at all satisfied)
- Perception of family financial status (1=not satisfied; 2=neutral; 3=satisfied)

- Level of relationship with parents (PCA dimension)
- Availability of money given by parents (PCA dimension)

Due to the presence of missing data in the variables, the sample analysed is reduced to 7298 students (65% of total sample). To satisfy the proportional odds hypothesis, 5 different ordinal logistic models were estimated, one for each age group. Given the values of the factors, the model estimates the probabilities of belonging to each PDS class. Table 7 summarises the results obtained.

As can be seen from the table, there are some factors that do not affect PDS at any age, such as practising hobbies, ease in obtaining money from family. Some factors are protective at any age, such as being male and age at first cannabis use: the higher the age, the lower the poly-drug use (PDS); this aspect will be revised in the comparison of the two data sets. One factor is negative at all ages: always going out with friends.

Table 7. Estimation of ordinal logit model coefficients: results.

Predictors	Age				
Individual Facotors	15	16	17	18	19
To be Male					
Go out with friends					
To practice hobbies					
Stay at PC to play/chat/social-net					
Age al first cannabis consumption					
Factors related to the family context					
Good relationship with one's mother					
Good relationship with one's father					
Perceived financial status					
Level of mutual trust with parents					
Ease in obtaining money from family					
Language: only Italian vs only foreign					
Language: only Italian vs Italian+foreign					
		decrease the risk		rise the risk	
Significance level:		0.05	0.01	0.05	0.01

Among the contextual factors, the level of mutual trust with parents, as well as a good relationship – particularly with the father – reduces the probability of high poly-drug use.

One factor is particularly negative for 15-year-olds “Stay at PC to play/chat/social-net” and, as it is easily known, could be considered in relation to any indicative prevention interventions. In general, we can conclude that the factors that lead to increased exposure to the risk of

poly-drug use (high PDS values) are:

- Early age of cannabis use
- To be female, especially among 15-years-olds
- To go out with the friends
- Dissatisfaction in the relationship with the mother and father
- Dissatisfaction with the family's financial level
- Low level of mutual trust with parents
- Low family financial status

It is noted that students who live in families where both Italian and another language are spoken are less at risk. These are integrated families, 40% of which speak either English, French, German, or Spanish/Portuguese.

A comparison of data relating to adolescent users of psychotropic substances according to ESPAD Italy data and data on minors entering San Patrignano is available in [14].

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Appendix: Table A1: (from Bonnet et al., 2020)

Substances[11]	Harm to self	Harm to others	Total
Crack	2.3	1	3.3
Methamphetamine	2.3	0.9	3.2
Heroin	2.2	0.9	3.1
Alcohol	1.9	0.8	2.7
Cocaine	2	0.7	2.7
GHB	1.8	0.6	2.4
Amphetamines	1.8	0.6	2.4
Cathinones (Khat)	1.7	0.5	2.2
Synthetic cannabinoids	1.7	0.4	2.1
Propofol	1.6	0.4	2
Natural hallucinogens	1.6	0.4	2
Ecstasy	1.5	0.5	2
Ketamine	1.6	0.4	2
Barbiturates	1.6	0.3	1.9
Benzodiazepines	1.5	0.4	1.9
Cannabis	1.4	0.5	1.9
Psychotropic mushrooms	1.4	0.4	1.8
LSD	1.4	0.4	1.8
Nicotine	1.3	0.4	1.7
Opioidergic Analgesics	1.2	0.3	1.5
ZDrugs	1.2	0.3	1.5
Codeine	1.1	0.3	1.4
Tilidine/Tramadol	1.1	0.3	1.4
Methadone	1	0.3	1.3
Gabapentinoids	0.9	0.2	1.1
Buprenorphine	0.8	0.3	1.1
Methylphenidate	0.8	0.2	1
Flupirtine	0.8	0.2	1
NSAIDs	0.7	0.2	0.9
Triptans	0.6	0.1	0.7

[4] European Monitoring Centre for Drugs and Drug Addiction
[5] European Union Drugs Agency
[6] https://globalcommissionondrugs.org/gcdp-reports/classification-of-psychoactive-substances-when-science-was-left-behind/
[7] http://www.espad.org/
[8] https://www.epid.ifc.cnr.it/project/espad-it/
[9] The study adheres to both European and national ethical guidelines and received ethical approval (No. 0027159/2019) from the Ethics and Research Integrity Committee of the CNR.
[10] https://www.epid.ifc.cnr.it/wp-content/uploads/2024/02/ESPAD_2022_Questionario_Versione_10_03_2022_WEB.pdf
[11]The highlighted substances are those that appear for the first time in the harm scores assessment.

FACTORS INFLUENCING DRUG USE AND HEAVY POLY-DRUG USE AMONG ADOLESCENTS: SPECIFIC ANALYSIS OF DATA ON MINORS

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1. Introduction

Adolescents are vulnerable to the effects of substance use and are at risk of developing serious consequences. A low level of commitment to education and to higher truancy rates appear to be related to substance use among them. Cognitive and behavioral problems experienced by alcohol and drug using youth may interfere with their performance and present obstacles to learning for their classmates.

Given the at-risk consumption of substances in this age group and given the particular social context, there is an increasing need to focus on characterizing the factors that lead to or facilitate substance use in adolescents, while also devoting special attention to optimizing and disseminating evidence-based prevention, evaluation, and treatment interventions.

This leads to the need to monitor such consumption effectively and properly link the level of use to social factors.

The standard epidemiological indicators for monitoring drug use, still in use worldwide, were developed in the 1980s, when people using drugs were primarily using a single substance (heroin, cocaine, amphetamines, cannabis...) and so, putting the substance at the centre of the assessment was equivalent to putting the consumer at the centre. The main indicators were the prevalence and incidence of specific substance users.

Recently the use of indicators to evaluate problematic drug use

(PDU) has seen important developments [1]. The trend away from standard Problem Drug Use (PDU) consumption patterns with single substances has become increasingly evident in practice, but still not incorporated into current epidemiological tools. The change in the definition of serious substance use by EMCDDA[89] (presently EUDA[90]), around 2010, going from Problem Drug Use (PDU), which was based on the use of few individual substances such as heroin, cocaine and amphetamines, to High-Risk Drug Use (HRDU), which is focused on the risky behaviour of people who use drugs, regardless of the substances, is a first step towards the evaluation of subjects and not just of substances [2]. However, the definition, although being less specific about substances, still refers to prevalence and incidence of single substances as epidemiological tools, not mentioning poly-drug use in monitoring, apart from doing it qualitatively.

Specific indicators that can measure the expected individual levels of harm, following drug use and poly-drug use, have been proposed and applied to various populations. The defined poly-drug use indicators allow the quantitative characterisation of risk profiles for selected groups of people who use drugs, both over time and between stratified populations, with the aim of comparing outcomes of drug policies, or comparing drug use between HRDU populations and adolescents and further situations, as summarised in [3] and in the references reported there. These poly-drug use indicators are based on individual drug use frequency data and expert rankings of health and social harms related to various substances, developed simultaneously and published in 2010 by two research groups [4,5]. Since the 2019 report, the Global Commission of Drug Policy[91] has been calling out the need to take into account the level of personal and social harms associated with individual substances in drug laws and policies, citing just [5].

Further advances, regarding the classification of individual drug use health and social harms, presented in a joint paper by van Amsterdam and Nutt in 2015 [6], are a refinement of the substance scores by separating and summarizing in single values the effects of harm to self and harm to others. In a recent paper [7], the harm scores for the use of

[89] European Monitoring Centre for Drugs and Drug Addiction
[90] European Union Drugs Agency
[91] https://globalcommissionondrugs.org/gcdp-reports/classification-of-psychoactive-substances-when-science-was-left-behind/

different substances are evaluated, also introducing some new chemicals drugs, such as synthetic cannabinoids and others, the scores are reported in Table A1 in the Appendix.

Correlations of the new scores with those previously used have been evaluated and result to be high for common substances. Thus, the results of the previous analyses, reported and mentioned in [3], remain valid and may suggest new analyses to be carried out as shown in the following.

Paragraph 2 explains the database that will be used and the methodology regarding poly-drug use indicators and methodology used for the analysis. Paragraph 3 provides an analysis of the San Patrignano data for the assessment of all socio-economic variables that may influence the development of substance use and high levels of poly-drug use up to the determination of a multivariate model. Paragraph 4 reports conclusions and suggestions for future commitments for further study.

2. Materials and Methods

2.1. San Patrignano's data on incoming minors

The San Patrignano Therapeutic Community (SPTC), is a private residential center for the rehabilitation of drug users in Coriano, Italy. The residential treatment is free of charge for individuals, their families, and Public Health Service (SSN). All drug users who enter the community receive drug-free therapy, which lasts for a mean of 30 months[92].

For the purposes of this study, we considered minors (aged up to 18 years at the time of admission to the SPTC) with substance use disorder admitted from 01.01.2010 to 31.12.2022). Baseline information is recorded for each individual on admission, including:

- demographic data,
- education (scholarity);
- social status (derived through parental job);

[92] www.sanpatrignano.org/la-comunita/

- Eventual childhood adverse experiences (ACE): Adoption, parental substance use problems; parental mental health problems; instability due to parental separation; instability due to household members being in jail or prison. Other ACE, like sexual abuse, are frequently collected during the residential program.
- Toxicological history: for every legal (tobacco, alcohol, psychotropic medications, painkillers) and illegal substances (cannabis, psychedelic substances, entactogenic drugs, meth., ketamine, cocaine, heroin, and eventual opioid agonistic treatment), are collected the age at first use, length of use, intensity of use (sporadic vs continuous), age at eventual interruption of use, and path of use (non-injected vs. injected). For alcohol use three variables are considered: (a) non-use or very limited use; (b) binge drinking; (c) daily abuse or alcohol use disorder. For cocaine use, since 2020, three different means of use were considered: (a) inhaled; smoked (crack); (c) injected.
- Incarceration;
- Medical history, with special attention for sexually transmitted disease, blood-borne infectious disease (HIV, Hepatitis), and psychiatric diseases.

2.2. Methods

In terms of the methods used, all available data were explored extensively to determine the correlations between state variables and consumption levels. The severity of consumption, which depends on both the frequency of use and the type of substance used is generally measured using the poly-drug use indicators based on the individual substance harm scores reported in Table A1 in the Appendix [7]. Definition and calculation of poly-drug use indicators can be found in [3], where also several applications are reported. The calculation formulas are only briefly reported here.

Poly-drug use approach and formulas

For any user the poly-drug use indicator, measuring the global degree of physical and social harm, is obtained by adding up the score w of all

the substances used by the *i-th* subject in the last thirty days, or last 12 months, multiplied for the frequency of use *f*.
Any user is then characterized by the two Poly-drug use scores (PDS), introduced in Chapter 6.

Using data from San Patrignano, it is necessary to modify the PDS indicator because data on the frequency use of substances is not available. The PDS indicator is therefore calculated by removing frequencies from the formula providing the PD indicator. In the present work, only the harm to self-scores were considered. The score, related to *i-th* subject, for all substances used results:

$$PD_i^{self} = \sum_{j=1}^{k} \delta_{ij} w_j^{self}$$

where:
$\delta_{ij} = 1$ if the j-th substance is consumed;
$\delta_{ij} = 0$ if the j-th substance is not consumed.
Given the availability of socio-economic variables, the impact of these variables on the level of poly-drug use and the onset of use is tested.

3. Social and Environmental Factors influencing drug use

The factors that can influence heavy consumption of psychotropic substances, such as consumption by individuals who are admitted for treatment and reintegration by the Communities, must be accurately identified scientifically in order to evaluate secondary prevention interventions used and suggest other appropriate ones. For this reason, based on data from San Patrignano, analyses are carried out on the correlations between social variables and the level of poly-drug use, assessed using the appropriate indicator, among adolescents.

Poly-drug use indicators

In the San Patrignano data analyses the index PD was used. The two specific sub-samples compared concern the groups ‘users of any substance excluding alcohol’ and ‘users of any substance including

alcohol'.

The results are very interesting, both for the level of PD and for the social indicators that influence use and its level, such as, to give an example, relationships with parents. To deepen the analysis, the distributions were divided into classes of values; Figure 1 and Figure 2 show the distributions of the two groups. Table 1 shows the values of the position and dispersion indices.

Figure 1. PD empirical distribution - users of any substance excluding alcohol

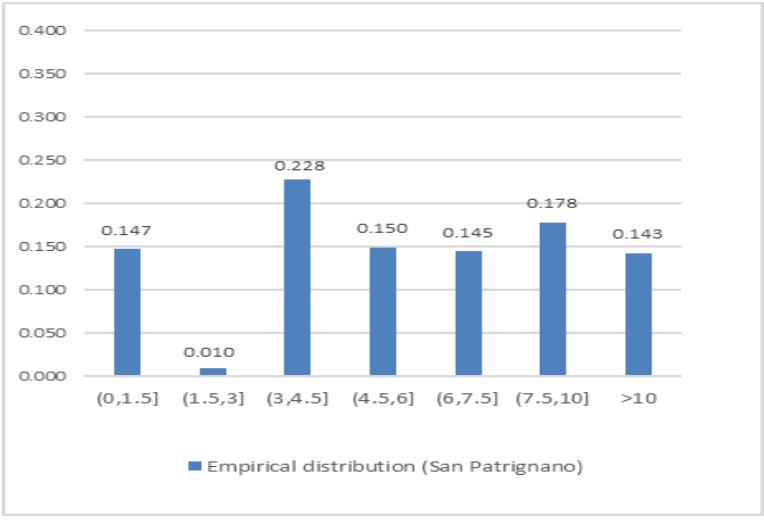


Figure 2. PD empirical distribution – users of any substance including alcohol.

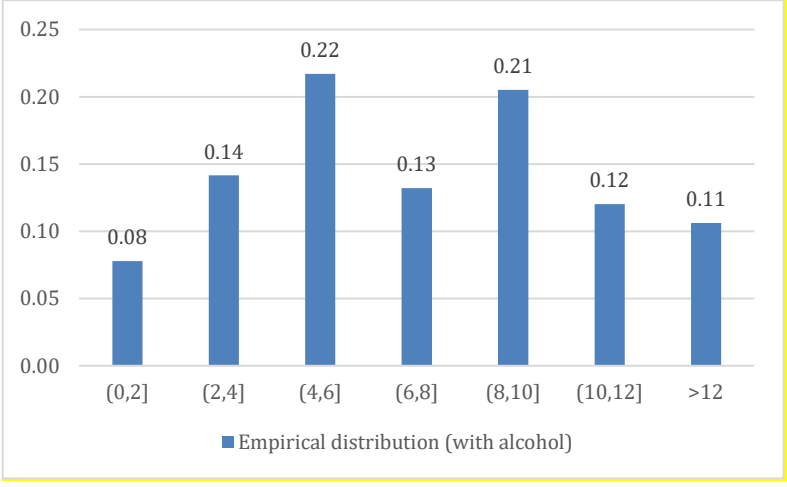


Table 1. Position and dispersion indices.

	San Patrignano (no alcohol)	San San Patrignano (with alcohol)
Mean	5.8	7.07
Standard deviation	2.9	3.21
Minimum	1.4	1.4
First quartile	3	4.9
Median	5.5	7.1
Third quartile	8.4	10
Maximum	10.3	12.2

Age and gender analysis – San Patrignano minors (aged up to 18 years at the time of admission to the SPTC)

The following analyses are carried out for subjects who also consume alcohol critically. Nicotine consumption is not taken into account because it is very widespread and, in general, the level of use is unknown. The level of harm associated with nicotine is very similar to that of cannabis: 1.3 instead of 1.4 for harm to oneself and 0.4 instead of 0.5 for harm to others. It should be noted that the assessment for cannabis refers to cases where it is not legalised. Therefore, the level of pollution of the substance is also included in the harm, as shown by the experiment reported in the report [8]. In Table 2 the age distribution is reported and the corresponding PD means and standard deviations; PD mean values for different ages are not significantly different, even if they increase with age.

Table 3 shows the gender percentage distribution and the corresponding PD means and standard deviations.

Table 2. Age percentage distribution, PD mean and standard deviation.

Age	Percentage distribution	PD mean	PD standard deviation
15	13.4	5.31	2.73
16	19.3	5.54	2.93
17	35.4	5.89	3.08
18	31.9	6.47	2.70

Table 3. Gender percentage distribution, PD mean and standard deviation.

Gender	Percentage distribution	PD mean	PD Standard deviation
Female	39.2	6.55	2.88
Male	60.8	5.31	2.87

As can be seen from the percentage distribution, there are far fewer females than males entering in San Patrignano, but the average PD

value is significantly higher for females than for males. It should be noted that these analyses are carried out for all subjects in the sample who consume both illegal substances and alcohol.

Situations involving parents and age at first substance use as factors of critical substance use

It is interesting to analyse the influence of such factors on substance use among adolescents.

- An important aspect to consider is the absence of parents and, subsequently, the substance dependence and/or psychiatric illness of the parents themselves, information that is present in the San Patrignano database.
- Another important variable is age at first substance use, in particular cannabis and alcohol.

Influence of parents': presence, work situation, substance use and mental illness

Information on these aspects is available in the database for most minors, making it possible to assess the influence of each situation on the PD value upon admission to the treatment facility. Information about the father and mother is stored in the database and includes:

- father alive;
- father in contact;
- father's occupation;
- father addicted to substances or gambling;
- father's substances of addiction;
- father's mental illness.

The same information is available for the mother.

The influence of all these variables, once codified, on the subject's PD value have been analysed and evaluated as factors influencing the life and extent of psychotropic substance use of the subject.

Influence of parents: results for individual parent variables

Regarding the presence of parents, there is a significant difference in the PD level between having neither parent present (frequency = 42) or having at least one parent present (frequency = 365): the PD average for those who have no parents is significantly higher than that for those who have at least one parent present. Table 4 reports the results.

The significance of the influence of one or two parents present is evident compared to the case where no parents are present.

It can therefore be concluded that the presence of at least one parent is partially protective in terms of the level of poly-drug use among sons and even more so among daughters.

Table 4. Results on the average PD as the number of parents in contact with the subject varies.

Number of parents present	Sample size	PD mean	Standard deviation	PD standard error
0	42	7.3	2.6	0.4
1	54	5.1	2.9	0.4
2	311	5.8	2.9	0.2

Considering parental mental illness or addiction, the result that emerges is that having both parents who are addicted or ill (frequency = 73) leads to greater substance use and that having at least one parent without psychiatric disorders (frequency = 320) has no effect. For what concern parent's addiction only females are significantly affected by their father's level of poly-drug use.

The occupation of the father or mother does not significantly influence the level of poly-drug use, even though there are significant differences. For example, the father may be an entrepreneur, but also a member of the Camorra, and the mother a drug dealer or an employee.

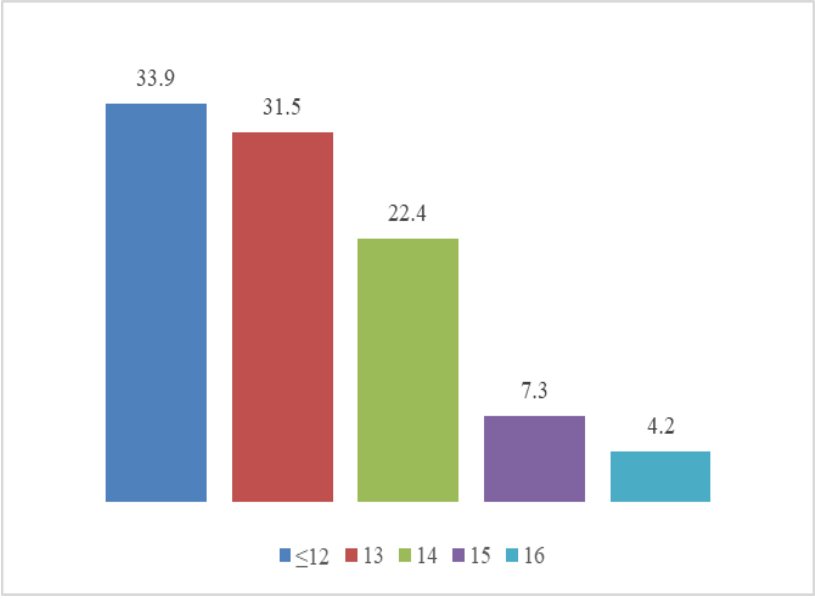
It is a crucial point for the early identification of individuals at risk through observation of individual pupils at school, as also mentioned in the previous chapter, and the application of appropriate prevention measures, i.e. indicated or, where necessary, secondary prevention.

Age at first use of cannabis or alcohol

Having excluded medicines from the data analysis, we find that the substance most commonly used for the first time at a young age is

cannabis, but also alcohol is frequent.
Figure 3 shows the percentage distributions of age at first cannabis consumption related to females.

Figure 3. Percentage distribution of age at first cannabis consumption (Females).



It is clear that most, over 60%, start using cannabis before the age of 13, i.e., before reaching high school age.

The younger the age at which cannabis use begins, the higher the PD level achieved. It is clear that the younger age at which cannabis use begins leads to a higher PD value at the time of entry into San Patrignano as shown in Figure 4.

A similar situation can be observed for males, as shown in Figures 5, where it appears that, on average, males start later than females, and Figure 6 shows the percentage probability distribution of PD conditioned on lowest and highest ages at first cannabis consumption for males.

Figure 4. Percentage distribution of PD conditioned on lowest and highest ages at first cannabis consumption for females.

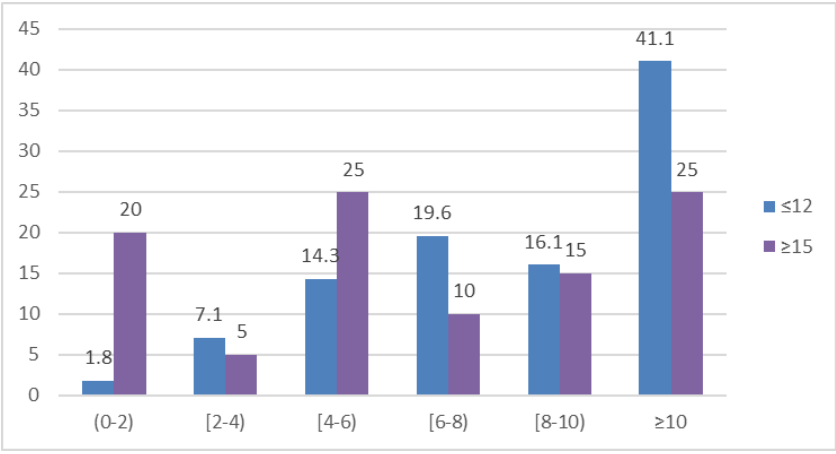
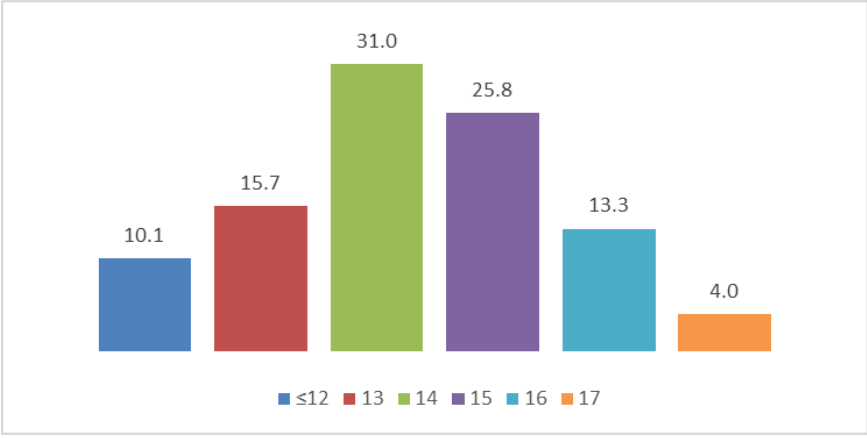


Figure 5. Percentage distribution of age at first cannabis consumption (Males).



A different situation occurs with regard to the first heavy use of alcohol as shown in Figures 7, 8, 9, 10.

Figure 6. Percentage distribution of PD conditioned on lowest and highest ages at first cannabis consumption for males.

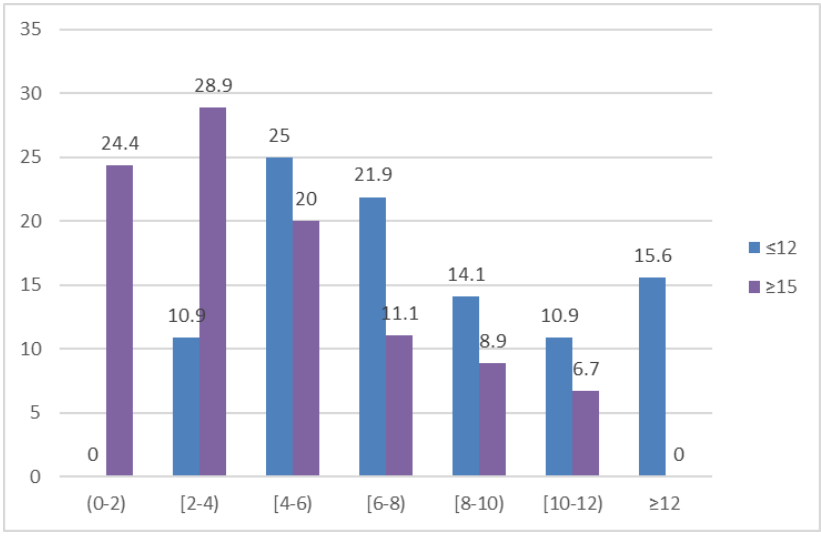
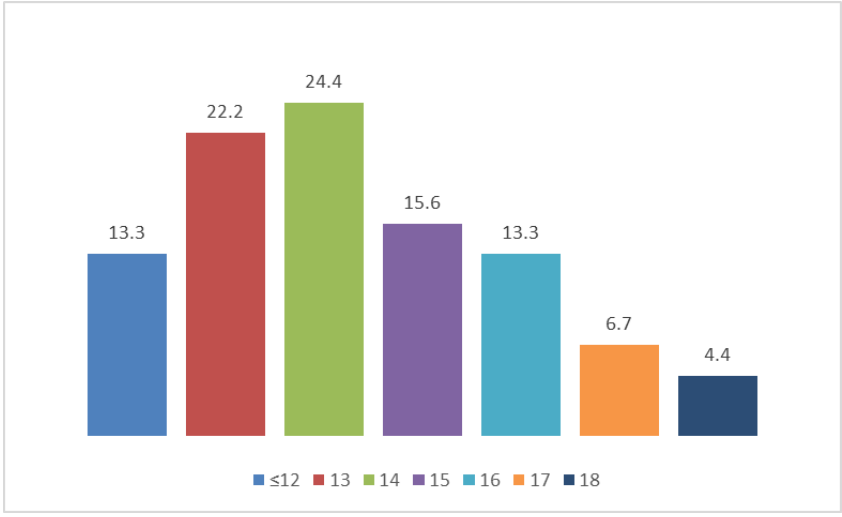


Figure 7. Percentage distribution of age at first heavy alcohol consumption (Females).



As can be seen, more than 50% begin heavy drinking before the age of 14.

Figure 8. Percentage distribution of PD conditioned on lowest and highest ages at first heavy alcohol consumption for females.

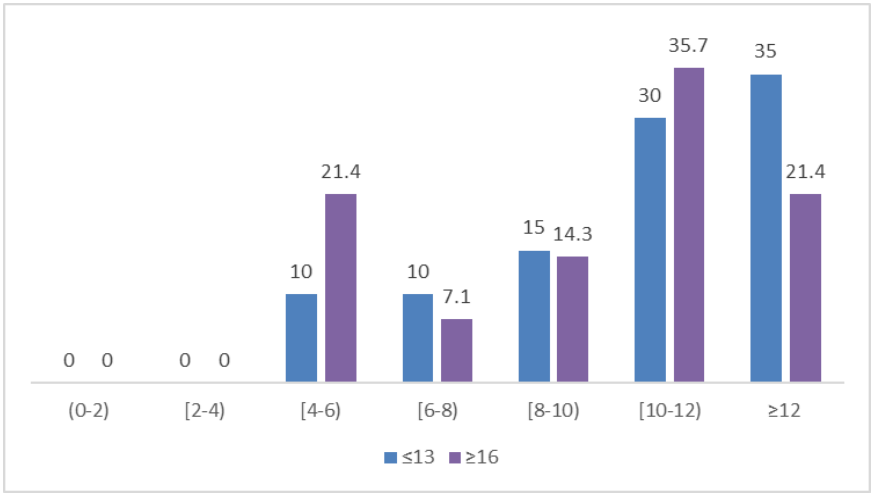
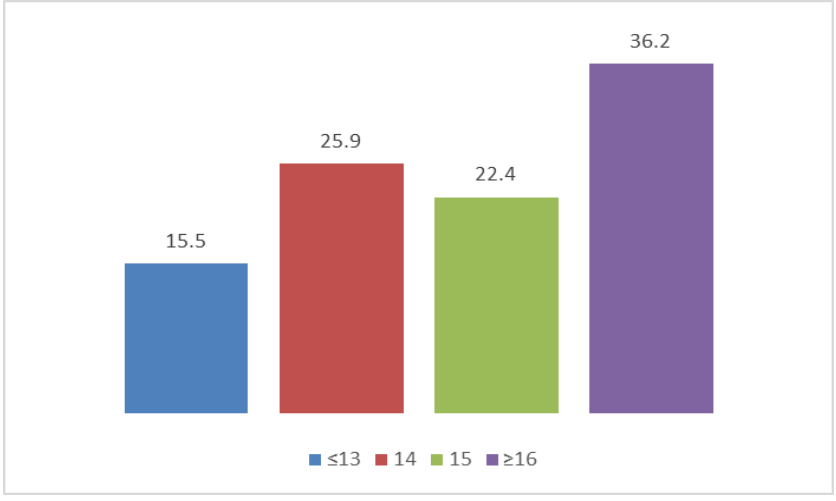
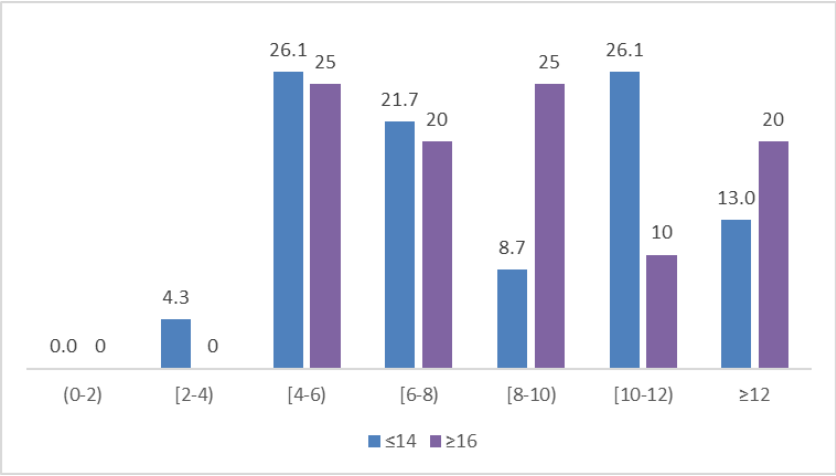


Figure 9. Percentage distribution of age at first heavy alcohol consumption (Males).



As was clear for the onset of cannabis use, girls also start heavy alcohol use earlier than boys; proportionally, many more girls start heavy drinking in adolescence: 27% of the total 169, while only 22% of the total 262 boys do so. The percentage distribution of PD is also greater for males than for females at low values.

Figure 10. Percentage distribution of PD conditioned on lowest and highest ages at first heavy alcohol consumption for males.



4. A serious consequence of substance abuse: early dropping out of school

To complete the analysis let us consider the problem of early school leaving. As seen in a previous study dedicated to the analysis of ESPAD®Italia data [10], early school leaving in high school occurs mainly after the first year of high school, between the ages of 15 and 16, and, presumably, mainly affects individuals with higher substance use [11]. In Italy drop out is around 12% and is higher for males than females [12].

According to recent official data[10], the percentage of students who drop out of school before completing upper secondary education is around 10% in Italy in recent years.

Let us now consider the data from San Patrignano to see whether higher-risk use leads to higher school drop-out rates and at a younger age, before high school.

According to data, even though there is a lot of missing data relating to the start of high school, the percentage of school drop-outs before high school is 31% for males and 15% for females, if subjects with missing information are excluded. This is significantly higher than the figures for the general population officially provided by Istat.

If all subjects with missing information are interpreted as not having dropped out of school, the frequencies of drop-out are as follows: 15% for males and 12% for females, always significantly higher than the national data. The analysis of observational data from San Patrignano regarding the admission of minors showed that in cases of critical social situations, the use of psychotropic substances can begin early and lead to early school dropout in the most serious cases, which is very important to address in prevention interventions.

Prevention measures should not be general in nature, but teachers, starting in primary school, should be trained to recognise behaviours that indicate social and family problems and should also be prepared to take appropriate secondary measures. In some serious cases, it is too late to take preventive action in middle and secondary schools, although the approach must also be continued in middle and secondary schools, given that the ESPAD Italy data in the previous chapter show that school dropouts also occur in the early years of secondary school.

5. Brief conclusions

To conclude this paper, it must be recognized that currently it no longer makes sense to talk about prevalence and incidence of users of individual substances, as even now EUDA nationally collects individual HRDU Prevalence Tables for heroin, cocaine, cannabis...for statistics on HRDU users to be officially disseminated, and it is no longer reasonable to describe poly-drug use only qualitatively.

Given the ongoing work, including updating on new substances, that provides health and social harm scores of each substance, any quantitative poly-drug use indicator, such as the PDS or PD, can be applied with useful summary results, providing the level of severity of each user's use.

Having a quantitative index available makes it possible to assess correlations with individual aspects of users' lives and habits. External symptoms of high poly-drug use can then also be identified, such as, for example, 'unexcused' school absences or/and poor school performance, on which teachers can be trained.

In conclusion, we note that this study presents, for the first time, an analysis on adolescents who are receiving treatment in a therapeutic community for serious abuse of legal and illegal psychotropic

substances. The results, regarding the factors that negatively influence poly-drug use, are consistent confirming that prevention interventions, which must be aimed at adolescents from an early age (11-12 years) in schools. It should be noted that dropping out of school is generally considered a consequence of substance use, but when substance use and dropping out of school occur at a very young age, it is also possible to assess how teachers at school, working with very young pupils, could prevent both substance using and dropping out of school. It is important to organise schools with training courses for teachers and the presence of psychologists to limit both dropout and serious substance use at a very young age.

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Appendix: Table A1: (from Bonnet et al., 2020)

Substances[5]	Harm to self	Harm to others	Total	San Patrignano
Crack	2.3	1	3.3	
Methamphetamine	2.3	0.9	3.2	
Heroin	2.2	0.9	3.1	X
Alcohol	1.9	0.8	2.7	X
Cocaine	2	0.7	2.7	X
GHB	1.8	0.6	2.4	
Amphetamines	1.8	0.6	2.4	X
Cathinones (Khat)	1.7	0.5	2.2	
Synthetic cannabinoids	1.7	0.4	2.1	
Propofol	1.6	0.4	2	
Natural hallucinogens	1.6	0.4	2	X
Ecstasy	1.5	0.5	2	X
Ketamine	1.6	0.4	2	X
Barbiturates	1.6	0.3	1.9	
Benzodiazepines	1.5	0.4	1.9	
Cannabis	1.4	0.5	1.9	X
Psychotropic mushrooms	1.4	0.4	1.8	
LSD	1.4	0.4	1.8	
Nicotine	1.3	0.4	1.7	
Opioidergic Analgesics	1.2	0.3	1.5	
ZDrugs	1.2	0.3	1.5	
Codeine	1.1	0.3	1.4	
Tilidine/Tramadol	1.1	0.3	1.4	
Methadone	1	0.3	1.3	
Gabapentinoids	0.9	0.2	1.1	
Buprenorphine	0.8	0.3	1.1	
Methylphenidate	0.8	0.2	1	
Flupirtine	0.8	0.2	1	
NSAIDs	0.7	0.2	0.9	
Triptans	0.6	0.1	0.7	

[1] European Monitoring Centre for Drugs and Drug Addiction
[2] European Union Drugs Agency
[3]https://globalcommissionondrugs.org/gcdp-reports/classification-of-psychoactive-substances-when-science-was-left-behind/
[4] www.sanpatrignano.org/la-comunita/
[5] The highlighted substances are those that appear for the first time in the harm scores assessment.

STUDY ON THE HEALTH IMPACT OF DRUG USE, BASED ON DATA FROM THE EMERGENCY DEPARTMENT AT TOR VERGATA HOSPITAL

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1. Introduction

1.1. Substance abuse and use disorder (AUD and SUD)

Substance abuse is a growing global health emergency: according to the latest estimates from the World Health Organisation, in 2021 more than 296 million people aged between 15 and 64 (approximately 5.8% of the world's population) used drugs, an increase of 23% over the last 10 years. In addition, the number of people suffering from substance use disorders has increased by 45% over the last decade, reaching 39.5 million in 2021 (1). When analysing psychotropic substances, it should be remembered that, in addition to the substances usually considered, i.e. illegal substances, the use of alcohol, which is legal, in many countries as Italy, and causes more harm than cannabis, as analysed by many projects, must also be taken into account. The values of harm to oneself and harm to others, according to the most recent study (Bonnet et al. 2020), are reported in the table included in the Appendix.

According to the 'Global status report on alcohol and health and treatment of substance use disorders' (2), in 2019 alone, there were 2.6 million deaths caused by alcohol worldwide (2 million males and

600,000 females), accounting for 4.7% of all global deaths, and 600,000 caused by illegal psychoactive drugs. Although there has been a reduction in alcohol consumption compared to 2010, its social and health impact remains very high, particularly among the younger population: 13% of alcohol-related deaths in 2019 occurred in the 20-39 age group, representing the highest number of deaths relative to the general population. The document also highlights the difficulties that many users, especially those most in need, encounter in accessing quality treatment for their disorder, which is often severely limited or inaccessible. Difficulties in accessing prevention and treatment services are further exacerbated by stigma, discrimination and a lack of information about the availability of local services and treatment options. Furthermore, people with lower socioeconomic status are the most susceptible to the damage, not only physical, caused by substance abuse, and it is precisely these people who should be the focus of prevention, support and treatment programmes, but often it is precisely these people who are abandoned and marginalised by society. According to the same report, average per capita consumption in 2019 was 5.5 litres of pure alcohol over the course of the year, a slight decrease (3.5%) compared to 2010, when 5.7 litres were consumed. The European and American regions have the highest per capita alcohol consumption (9.2 and 7.5 litres respectively). All these data are associated with an increased risk of developing numerous organic diseases, as well as disability and mortality.

Also in 2019, 17% of the population over the age of 15 and 38% of regular drinkers engaged in occasional binge drinking (defined as consuming at least 60 g of pure alcohol on one or more occasions in the last month considered), while continuous heavy drinking was very prevalent among the male population (6.7%). The prevalence of alcohol consumption among the population aged between 15 and 19 was 22%, with minimal difference between genders.

Worldwide, approximately 400 million people (corresponding to 7% of the population over 15) live with alcohol use disorder (AUD), while approximately 209 million (3.7% of the global adult population) suffer from alcohol dependence (the most severe form of AUD).

When talking about substances in general, including alcohol, SUD refers to the set of serious substance use disorders. SUD is the condition in which the use of one or more substances causes clinically significant impairment (psychological and/or physical) or distress to the patient

(social, relational, occupational, legal).

1.2. European epidemiology of substance use

In the European Region, average per capita alcohol consumption is the highest globally, and alcohol is the most widely used substance. According to the European Drug Report 2024 (3), among people aged 15–64, the other substances most commonly used are:

- Cannabis: 22.8 million users (8% of the population) in the last year, 85.4 million (29.9%) in their lifetime.
- Cocaine: 4 million users (1.4%) in the last year, 15.4 million (5.4%) in their lifetime. In particular, it is the second most commonly used illicit drug in Europe. In 2022, it was identified in about one-fifth of drug overdose deaths, often in combination with other substances.
- MDMA: 2.9 million users (1%) in the last year, 12.3 million (4.3%) in their lifetime.
- Amphetamines: 2.3 million users (0.8%) in the last year, 10.3 million (3.6%) in their lifetime

Another increasingly common phenomenon is poly-drug use, defined as the simultaneous or sequential use of multiple substances, which represents a growing threat to public health in Europe. This can occur as a result of certain strategies used by users to limit the undesirable effects of a particular substance by taking another substance that blocks them. The substances most commonly involved in poly-substance use are cocaine, alcohol and cannabinoids.

1.3. Italian epidemiology of substance use

Data on the prevalence of substance users in Italy in 2022 are obtained on the basis of IPSAD®Italy (Italian Population Survey on Alcohol and other Drugs), conducted by the Institute of Clinical Physiology of the National Research Council (CNR) on a biennial basis, on the use of alcohol and other psychoactive substances, both legal and illegal, in the general Italian population and are available in the EUDA Statistical

Bulletin[93]. It should be noted, and this is clearly evident from the responses relating to the use of legal alcohol, that the prevalence estimates for the use of illegal substances are underestimated, especially for harder drugs, given that many questionnaires are not returned (about 65%), and this is mainly linked to more serious users. Therefore, the estimates are partly underestimates.

For simplicity, only those relating to the most commonly used substances are reported here in Table 1. No quantitative data, via indicators, are available on the multiple use of substances (poly-drug use), which can only be found in scientific papers and are mostly derived from sample surveys. The population of Italy in 2022, aged between 15 and 64, consists of 18,885,200 males and 19,300,005 females in total 38,185,205. From Table 1, which shows the percentages of consumers by gender, it is possible to calculate the total number of consumers of all substances and of each specific substance for males and females. The results are reported in Table 2.

Table 1. Estimated annual prevalence in percentage of drug users in Italy in 2022 (age 15-64).

Substance	Sample size	Males %	Females %	Total %
Cannabis	4011	13.2	8.3	10.8
Cocaine	4011	1.9	0.9	1.4
Alcohol	4011	91	78.6	84.8
Ecstasy	4011	1.1	0.5	0.8
Any illicit drugs	4011	14.5	9.6	12.1

Table 2. Estimated annual prevalence of drug users in Italy in 2022 (age 15-64).

Substance	Males	Females	Total
Cannabis	2,492,846	1,601,900	4,094,747
Cocaine	355,819	173,700	532,519
Alcohol	17,185,532	14,843,767	32,029.299
Ecstasy	207,737	96,500	304,237
Any illicit drugs	2,738,354	1,852,800	4,591,154

Given that it is unclear from the survey responses whether alcohol use is problematic or whether problematic use is included in use. Alcohol is legal, and therefore even at-risk consumers do not fully assess this aspect. In the following, we will only use data relating to illegal substances as prevalence. However, in the analysis of emergency room data, alcohol use will also be considered because the information

[93] https://www.euda.europa.eu/data/stats2025/gps_en

on each case is complete and allows for the assessment of use.

1.4. Italian epidemiology of emergency department admission

At national level, the data can be found in summary form in the 2025 Report to Parliament on drug addiction in Italy, where can be found quite summary data. In particular, supplemented by summary analyses in red:

As regards visits to the emergency room for drug-related problems in 2024, there were 8,378 (2.5% less than the previous year) representing 0.05% of the total number nationwide), which, as a result, amounts to over 3 million, exactly 3,351,200. Of these visits, 67% were by males, 32% by females and 1% by others. Forty-seven per cent involved drug-induced psychosis, (3938) of which 15% resulted in hospitalisation (591); 46% (3854) involved drug abuse without addiction, of which 6.6% (254) resulted in hospitalisation; 6.6% (553) involved drug addiction, of which 8.5% resulted in hospitalisation (47); 1% drug poisoning (analgesics, antipyretics and antirheumatics) (84), of which 8.5% (7) resulted in hospitalisation. The psychiatry department accounts for 37% (333) of hospitalisations and the intensive care unit for 17%, (153) while 44% (396) were admitted to other medical departments.

Summarizing the absolute frequencies derived solely from the relative frequencies provided in the 2025 Report to Parliament in total, there were 899 hospitalisations from emergency room cases (8378) in 2024: 333 in the psychiatric ward and 153 in the intensive care unit, total=486; the other hospitalizations in other departments.

2. The sample study at the Tor Vergata Emergency Department (Rome)

2.1. Data and aims

This is a single-centre study (Cluster sample) designed to understand the socio-demographic characteristics of the population that tested positive for one or more substances (licit and illicit) during a visit to the Emergency Department of the Tor Vergata Polyclinic. It is based on observational data from the Emergency Department collected in a

database. The inclusion criterion was a positive toxicological test for at least one substance (licit or illicit). However, in the study of poly-drug use, due to the difficulty in obtaining information about therapeutic or illicit use of benzodiazepines, opiates or methadone, in cases where only one of these substances was positive, patients were classified as if they had not taken any substances. The use of benzodiazepines is very common, with few cases in which other sedatives are used.

This phenomenon is perfectly analogous to that observed in a study carried out to evaluate mental health wards established after the Basaglia law closing mental hospitals. Even in 1980, the same procedure was observed for the admission of mentally ill patients to the ward. This should prompt specific reflection on the personal use of psychotropic substances as pseudo-medication for mental difficulties (4-7). In the early years of the mental health service, drug addicts, who sought help, were not allowed to enter. But in 1980, there were few of them and few substances.

Now, drug users and addicts often enter the emergency department and then access the mental health ward, as reported below.

The sample size is 399 patients who visited the Emergency Department of the Tor Vergata Polyclinic and tested positive for at least one substance in toxicological tests between 01/01/2023 and 20/05/2023 (140 days) These patients represent 2.6% of total emergency room admissions during the same period (15340). This percentage is much higher than the general percentage reported in the official Italian document, which appears to be 0.05% in 2024, the sample size available is 52 times the national percentage reported. Evaluating this data according to gender, we find that in women (6,523 visits) it was positive in 1.6% of visits, while in men (8,656 visits) it was positive in 3.4% of visits.

The aim of the work is to define:

- The differences in age and gender for the various types of substances,
- The days of the week with the highest number of visits to the Emergency Department,
- The association with known psychiatric disorders,
- The correlation with road accidents,
- The impact of poly-drug use,
- The rate of hospitalisation, readmission and spontaneous

discharge.

In addition, we will try to discuss the psychopathology of addiction, seeking to understand its deeper dynamics and illustrate some possibilities for intervention and prevention.

2.2. Dual diagnosis or dual pathology?

The term 'dual diagnosis' refers to the coexistence of a substance use disorder and one or more psychiatric disorders in the same individual. Although it is true that patients with SUD often have another psychiatric diagnosis (at least 70%, and this figure appears to be an underestimate), this term suggests a situation of comorbidity between the two disorders, as if they were two independent conditions that happened to be present in the same individual by chance. This meaning is limiting since, often, it is not just a coexistence but a single pathology that is expressed in different ways. The term dual disorder (8) better describes this unified view of two diagnostic categories, seeking to go beyond the myth of the pure drug addict, mistakenly understood as a subject not affected by psychiatric pathology. Of course, there are many diagnostic difficulties: many of the typical symptoms of SUD, such as mood instability, impulse control problems and anxiety (9), are attributed to other diagnoses considered comorbid rather than being considered specific to SUD. Furthermore, substances can shape the clinical expression of the disorder, and this can create further diagnostic confusion, with certain state factors (i.e. linked to a temporary and fluctuating condition of the patient) being taken for trait factors (i.e. stable and lasting characteristics that are part of the subject's personality). The antisocial aspects of a drug addict may in fact derive from state factors due to the effect of the substance or a state of abstinence, unlike pure psychopathy, in which they are trait factors.

2.3. Comorbidity statistics

It is well known, therefore, that psychiatric disorders and substance use disorders often coexist, although it can be difficult to understand the deeper relationships that intertwine these conditions. A 1990 American study (10) investigated the comorbidity of different disorders in statistical terms on a sample of more than 20,000 patients and,

although it is now an older article, it gives an idea of the extent of this correlation. It found that among patients with alcohol use disorder (AUD), 37% also had another psychiatric disorder, a figure that was even higher in patients with other substance use disorders (excluding alcohol), where the percentage rose to 53%, with an odds ratio (OR) of 4.5.

More specifically, considering individual psychiatric diagnoses, it was noted that among patients with AUD, 19.4% also had an anxiety disorder, which is a very high percentage but corresponds to a rather low OR (1.5) due to the high prevalence of anxiety disorders in the general population as well; 14.3% had a diagnosis of antisocial personality disorder, with an OR of 21, the highest among all categories; 13.4% also had a mood disorder, with an overall OR of 1.9, but rising to 5.1 when considering bipolar disorder alone; 3.8% had a diagnosis of schizophrenia (OR 3.3).

In patients with SUD (where substance does not refer to alcohol), 28.8% had an anxiety disorder (OR 2.5); 26.4% had a mood disorder (OR 4.7); 17.8% had been diagnosed with antisocial personality disorder, again with the highest OR of all categories, equal to 13.4; 6.8% had been diagnosed with schizophrenia, with a high OR (6.2).

The opposite data was also analysed, i.e. how many patients with a psychiatric illness also had a SUD (in this case, alcohol was also included among the substances). In general, the lifetime prevalence of this occurring was 29% (OR 2.7), but here too it was analysed for different diagnostic categories: in the case of schizophrenia, the association with a SUD was 47% of patients, with an OR of 4.6; in antisocial personality disorder (ASP), the percentage of SUD was very high, corresponding to 83.6% of patients and an OR of 29.6, even though substance use was one of the diagnostic criteria for ASP; 23.7% also had an anxiety disorder (OR 1.7) and, in this case in particular, the use of substances other than alcohol prevailed; 60.7% had a diagnosis of type 1 bipolar disorder, again with a very high OR of 7.9.

3. Quantifying the damage resulting from substance use

3.1. Type of damage

The use, and in particular the abuse, of substances, represent not

only a health problem but also a more global problem for society, since those under the influence of drugs may engage in behaviour that can harm themselves and others. For this reason, it is important to consider it a problem of global interest to the community, to seek to understand it more deeply and to implement preventive measures in order to minimise the, sometimes, tragic, consequences associated with this disorder.

Numerous attempts have been made to quantify the degree of damage caused by individual substances, comparing them with each other and creating severity rankings that can also help in decision-making from a legislative and health perspective. A 2015 study by van Amsterdam, Nutt, Philips and van den Brink (11) deals precisely with this issue: a group of experts in the field in the European Union was tasked with assigning each of the 20 substances considered a severity score according to 16 criteria of harm, so as to obtain a score between 0 and 100 for each drug. The results of the study showed that alcohol is the substance with the global highest harm score, at 72/100, followed by heroin and crack, with scores of 55 and 50 respectively. All other substances scored below 38, creating a significant gap between them and the top three in the ranking.

In 2020, another article (12) was published on a study carried out in Germany with the aim of analysing the German situation regarding substance use and comparing it with the previous European study from 2015. In this case, a group of doctors with extensive experience in the field of substance use disorders was recruited and asked to assign a score for each criterion. In particular, 33 substances were considered, including synthetic cannabinoids for the first time, propofol and non-opioid analgesics, and each was assigned a score from 0 (corresponding to "not dangerous at all") to 4 (corresponding to "extremely dangerous") for each criterion. The criteria were divided into: physical harm to the user (PHU), psychological harm to the user (PSHU), social harm to the user (SHU), physical and psychological harm to others (PPHO), and social harm to others (SHO). The complete Table is in the appendix.

3.2. Poly-drug use indicators

In addition to interpreting the damage caused by individual substances, it is also important to understand the damage caused by

multiple substances. Italian studies (13, 14) conducted in years until 2023 sought to quantify this data by introducing a formula to calculate the damage caused to oneself and others by substance use. Presently the formulas are not used in the present intervention.

3.3. Role of the Emergency Department in directing patients to treatment pathwayss

It is clear at this point that patients who use substances are more likely to access emergency services for various reasons, ranging from acute intoxication to the need for a place to sleep (it is not uncommon, in fact, for these individuals to be socially disadvantaged and/or homeless), to escape violent family situations, or even because they are seeking affection, as reported in several psychiatric consultations in this study. Given these premises, it is necessary to entrust the emergency department with a key role in establishing long-term management of patients with SUD in the community. The debate on the most optimal strategies for initiating these pathways in the emergency department is still heated, as the data and research available on the subject are scarce and often inconclusive. Early intervention is certainly necessary and would allow for less dispersion of patients, preventing them from being abandoned. A 2019 American study (15) attempted to define effective first-response methods to be implemented in emergency departments for patients with SUD, but here too, no effective conclusion was reached. Brief approaches involving motivational interviews with these patients, based on reflection and empathic rapport, were tried but did not yield lasting results even after a few months. At the same time, approaches that involve the patient being taken on by a tutor or coach who has personally experienced drug addiction, such as in self-help groups, are ineffective. Bearing in mind the psychopathology of this disorder, it is not surprising that these interventions can be unsuccessful. Tutors, although they may be useful in encouraging patients to continue with their treatment in the most difficult moments, are not trained like psychiatrists, psychotherapists and psychologists, and what they can offer is pure support but not treatment, for which specialised professionals with the highest level of human and medical training are required. Self-help groups offer symptomatic treatment and assistance, but there is no concept of human transformation. Therefore, it is as if the person is labelled with a mark that can never be changed

if they suffer from addiction.

Obviously, it is unthinkable to carry out psychotherapy in the emergency room, since neither the resources nor the setting would be adequate. What can happen, however, is to guarantee patients who arrive with substance intoxication (of any kind) an initial connection with a path outside the hospital, first of all by explaining, during the visit, the treatment options available in the area and then ensuring an appointment with external centres from that moment onwards. Directly contacting local services will be essential, as it is very likely that a patient who has just left hospital will not maintain the momentum to actually do something active to get better, especially if they are faced with the prospect of giving up the substance. This initial contact, provided directly by healthcare staff without any effort on the part of the patient, will be crucial in increasing the likelihood that the patient will begin their recovery journey. In this way, we are not just stabilising the intoxicated patient while waiting to discharge them and hoping that they do not return to the same hospital the next time they are intoxicated. On the contrary, we are opening up a new path for the individual that will, in the long term, lead to a reduction in their use of emergency services, reducing the already very high burden on these facilities, and above all, it will provide treatment options for patients who would otherwise be forced to live with this condition and all the associated family, work, legal and social problems.

This is undoubtedly not an easy task, considering that patients often arrive in a state of agitation and/or confusion, unable to understand what the priorities are for their health and usually unable to make medical decisions for themselves. All this obviously requires greater effort and a lot of patience on the part of healthcare staff, who are already extremely busy, but however complicated it may be to manage a patient suffering from acute intoxication in an emergency setting, it is really important not to limit oneself to caring for only their basic needs but to go further, taking an active role in the care and recovery of these patients.

Another point worth considering is the high rate of spontaneous discharge among patients who arrive at the emergency room with a substance use disorder. As these are very delicate and complicated patients, it is easy for them to decide to leave spontaneously shortly after admission, both because of their lack of patience with the often long waits before consultations and because they may think that they

are actually well and no longer need any treatment, denying their own difficult situation[94]. Unlike physical illnesses, where medical intervention is often required quickly in order to return to a state of health, in the case of mental illnesses this is much rarer: in many cases, there is a lack of insight, i.e. a lack of awareness of the illness, which leads to underestimating or, in the most serious cases, denying one's pathological condition, with the result of blocking any veiled request for help and rejecting the attempts at rescue that are offered, opposing treatment. It therefore happens that all these cases of spontaneous discharge represent missed opportunities in prevention (16), a missed contact with local services, and it is necessary to avoid this dispersion in order to reduce the number of untreated patients.

Furthermore, going to hospital for reasons that are not strictly physical but rather mental is still too often seen as a sentence to being labelled “crazy” for life, which is a completely mistaken belief since, in reality, going to the emergency room in these cases is not a failure, but rather an opportunity to seize the momentum and mental openness that arise in these moments of great fragility and emotional investment, so as to intervene immediately, before the patient returns to their apparent state of calm and hides all their discomfort under a cold protective armour that makes the therapeutic relationship even more difficult (17).

It should always be emphasised that treatment does not end with the resolution of the emergency, that psychotropic drugs can be useful for managing and reducing some of the most significant and urgent symptoms, but that they are only a symptomatic treatment, as true recovery from mental illness is achieved through the restoration of a solid and healthy identity via psychotherapy. During this process, it is also essential to help the patient lose their identification with the illness, which would prevent them from recognising the possibility of a complete recovery. It is therefore necessary to make them understand that they are not mentally ill, but have a mental illness, which can be eliminated with appropriate intervention. Obviously, this requires a considerable effort on the part of the patient during psychotherapy, which will have the task of breaking the unhealthy, often unstable, balance that has been created over the years and confronting the patient

[94] Very similar behaviours were observed in 1980 in just psychiatric patients (4-7).

with very uncomfortable truths that must be addressed gradually in order to achieve recovery.

4. Data analysis and results

This study collects data from 399 patients who were admitted to the Emergency Department of the Tor Vergata Polyclinic with a positive toxicological test. The information available, collected in a database, included age, gender, date of admission, triage code upon admission, reason for admission, outcome, and length of stay in the Emergency Department, the results of the toxicological test, whether the patient had other admissions for the same reason, and whether a psychiatric disorder was already known in the patient's medical history. The aim was to study any statistically significant differences in the population in terms of age, gender, substances used, correlation with road accidents and psychiatric disorders.

4.1. Exploratory analyses

The distribution by day of the week was 57 visits on Mondays (14.3%), 38 on Tuesdays (9.5%), 50 on Wednesdays (12.5%), 57 on Thursdays (14.3%), 64 on Fridays (16.0%), 59 on Saturdays (14.8%) and 74 on Sundays (18.5%).

It is important to emphasise that Sundays have the highest number of admissions, and it is easy to assume that this is due to the greater ease with which people can use or abuse substances on Saturday evenings.

With regard to the substances taken, excluding substances such as benzodiazepines administered for medical reasons, the substances found, including those taken simultaneously, are listed in Table 3 and shown, as a percentage distribution, in Figure 1.

A more detailed analysis can be obtained by considering the sample divided into age groups for both males and females. The age groups established are:

- minors, i.e. those under the age of 19;
- young people, i.e. those between the ages of 19 and 29;
- adults, i.e. those between the ages of 30 and 45;

· seniors, i.e. those over the age of 45.

The percentage distributions for age groups are shown in Figures 2a and 2b.

Table 3. Frequencies observed for substances also in poly-drug use for both females and males in the sample analysed.

PD	Combinations of substances present in the sample	Females	Males	Total
0	No substances except administered benzodiazepines	27	48	75
1.4	just cannabis	4	36	40
1.6	just barbiturates	2	1	3
1.8	just amphetamines	3	1	4
1.9	just alcohol	51	142	193
2	just cocaine	5	22	27
3.3	Cannabis and alcohol	2	7	9
3.4	Cocaine and cannabis	8	23	31
3.8	Cocaine and amphetamines	0	1	1
3.9	Cocaine and alcohol	0	5	5
4.3	Cocaine and crack	0	1	1
5.3	Cannabis, cocaine and alcohol	3	6	9
5.7	Cocaine, crack and cannabis	0	1	1
Sample size	**any substance**	**105**	**294**	**399**

Figure 1. Percentage distributions of substances in poly-drug use for both females and males in the sample analysed

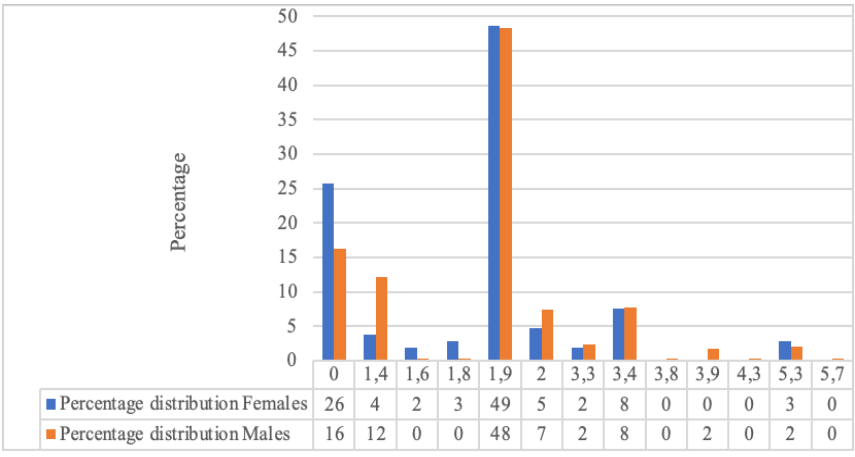
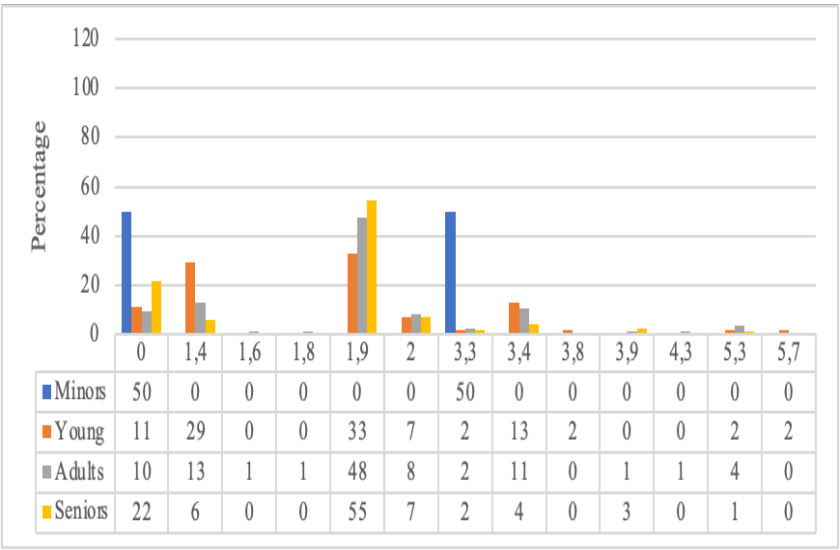
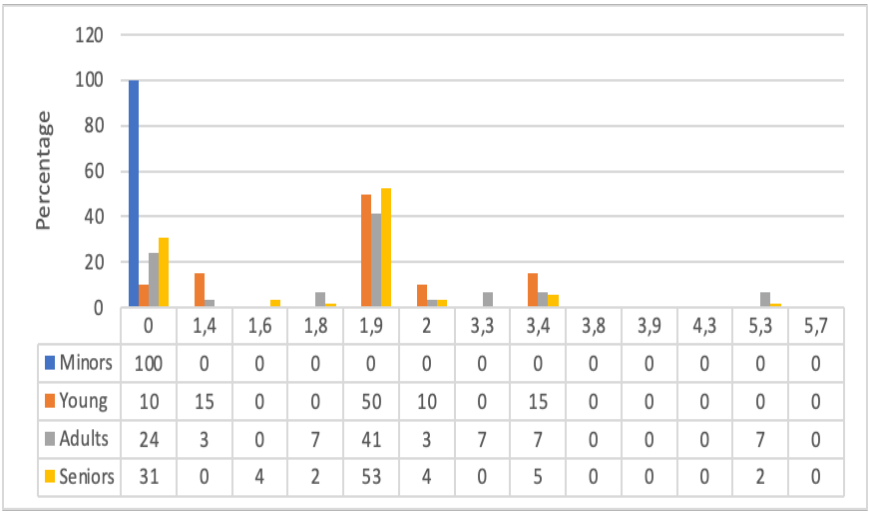


Figure 2a. Age groups percentage distributions for substances in poly-drug use related to males in the sample analysed



	0	1,4	1,6	1,8	1,9	2	3,3	3,4	3,8	3,9	4,3	5,3	5,7
Minors	50	0	0	0	0	0	50	0	0	0	0	0	0
Young	11	29	0	0	33	7	2	13	2	0	0	2	2
Adults	10	13	1	1	48	8	2	11	0	1	1	4	0
Seniors	22	6	0	0	55	7	2	4	0	3	0	1	0

Figure 2b. Age groups percentage distributions for substances in poly-drug use related to females in the sample analysed



	0	1,4	1,6	1,8	1,9	2	3,3	3,4	3,8	3,9	4,3	5,3	5,7
Minors	100	0	0	0	0	0	0	0	0	0	0	0	0
Young	10	15	0	0	50	10	0	15	0	0	0	0	0
Adults	24	3	0	7	41	3	7	7	0	0	0	7	0
Seniors	31	0	4	2	53	4	0	5	0	0	0	2	0

Apart from the two minors (males), one of whom uses nothing and the other one cannabis and alcohol, the distributions show interesting trends with respect to age group. The use of cannabis decreases with

age, as does the use of cocaine and cannabis, while alcohol use increases. The use of cannabis alone and cannabis and cocaine is also decreasing with age among females. Alcohol use is more prevalent among women than men and does not decrease with age. Of the total number of patients, 146 had a further visit to the Emergency Department for the same reason at the Tor Vergata Polyclinic (PTV), representing 36.6% of the total, which is a rather high figure considering that these patients may also have gone to other hospitals. During the period under study (from 01/01/23 to 20/05/23), however, 21 patients (5.3%) visited the PTV twice and 6 patients (1.5%) visited three times. These percentages are not particularly high, but it should be noted that the time frame is rather limited.

4.2. Psychiatric and non-psychiatric diagnoses

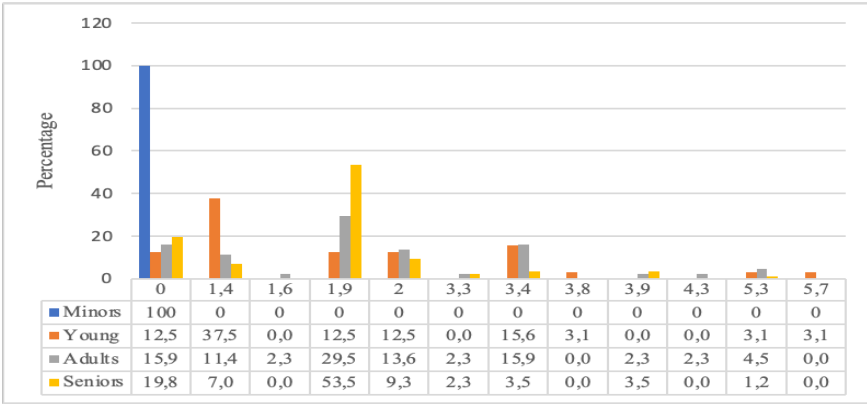
It is important to distinguish between admissions related to psychiatric diagnoses and other causes for both males and females, as well as admissions related to accidents, and to consider the substances involved.

Let us first consider psychiatric diagnoses for males and females. Figures 3a and 3b show the percentage distributions of substance use levels by age group for males and females. The total number of subjects with a psychiatric diagnosis is 231 (68 females and 163 males).

The proportion of psychiatric diagnoses is higher for females (0.65) than for males (0.55), but the difference is not significant.

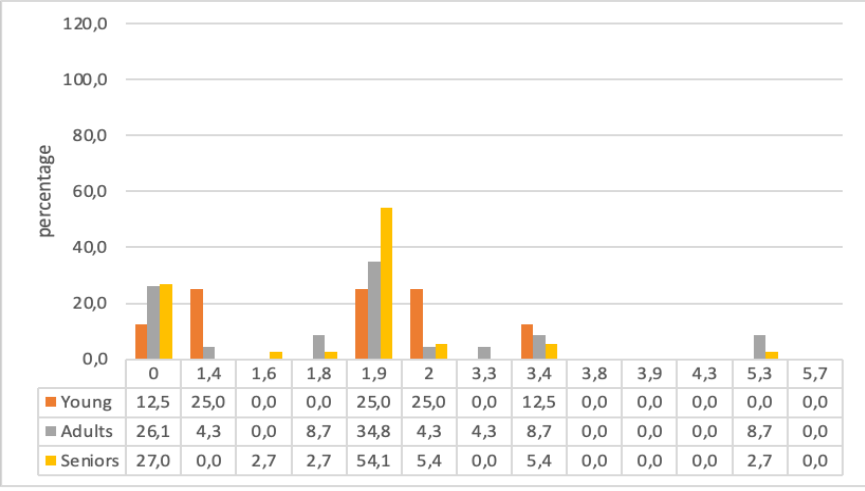
The most frequently reported disorders among the 231 patients in this sample were: depressive syndrome, with 44 cases, bipolar disorder, with 33 cases, borderline personality disorder, with 17 cases, anxiety disorder and psychosis, both with 16 cases, and schizophrenia, with 15 cases. In addition, 43 patients, or 18.6% of those with a psychiatric diagnosis and 10.8% of the total sample, reported having attempted suicide previously or at the time of admission to the emergency department.

Figure 3a. Age groups percentage distributions for substances in poly-drug use related to males with psichyatric diagnosis in the sample analysed (sample size 163)



	0	1,4	1,6	1,9	2	3,3	3,4	3,8	3,9	4,3	5,3	5,7
Minors	100	0	0	0	0	0	0	0	0	0	0	0
Young	12,5	37,5	0,0	12,5	12,5	0,0	15,6	3,1	0,0	0,0	3,1	3,1
Adults	15,9	11,4	2,3	29,5	13,6	2,3	15,9	0,0	2,3	2,3	4,5	0,0
Seniors	19,8	7,0	0,0	53,5	9,3	2,3	3,5	0,0	3,5	0,0	1,2	0,0

Figure 3b. Age groups percentage distributions for substances in poly-drug use related to females with psichyatric diagnosis in the sample analysed (sample size 68)



	0	1,4	1,6	1,8	1,9	2	3,3	3,4	3,8	3,9	4,3	5,3	5,7
Young	12,5	25,0	0,0	0,0	25,0	25,0	0,0	12,5	0,0	0,0	0,0	0,0	0,0
Adults	26,1	4,3	0,0	8,7	34,8	4,3	4,3	8,7	0,0	0,0	0,0	8,7	0,0
Seniors	27,0	0,0	2,7	2,7	54,1	5,4	0,0	5,4	0,0	0,0	0,0	2,7	0,0

As people get older, the number of individuals who do not consume substances, other than those for medical purposes, increases, as does alcohol consumption, while cannabis use decreases, as does the use of cannabis and cocaine.

Non-psychiatric diagnoses are less frequent than psychiatric ones, and among these we are interested in diagnoses for accidents and the possible link with the use and poly-drug use of psychotropic

substances. The substance most used is alcohol alone.

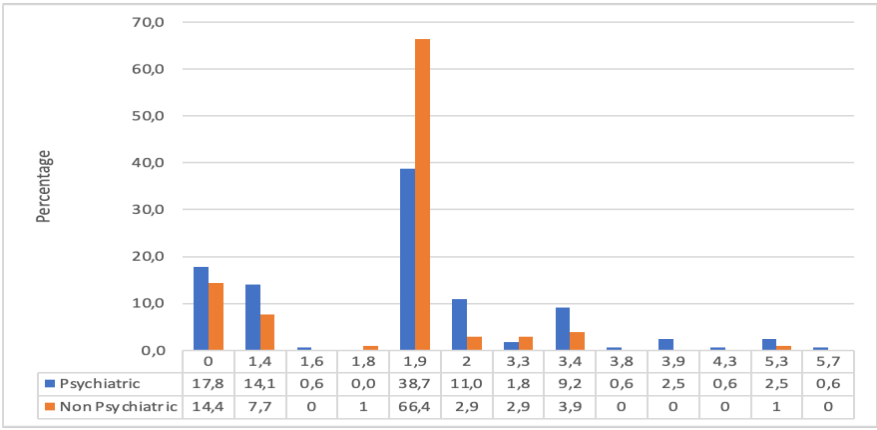
Only six females were admitted due to accidents, and the substance detected was alcohol alone. Only 28 males were admitted due to accidents, and the substances used were: alcohol in 25 cases, alcohol and cannabis in one case, and cannabis and cocaine in two cases. Of the 34 cases admitted due to accidents, 31 tested positive for alcohol alone, only 3 for cannabis and alcohol or cannabis and cocaine, and none for cannabis alone. The distribution of substances used differs significantly between those admitted without a psychiatric diagnosis and those with a psychiatric diagnosis; alcohol alone is anyway the most commonly used substance in every group. The percentages are shown in Figure 4a. Psychiatric patients show greater use of illegal substances, while non-psychiatric patients mainly use alcohol.

A hypothesis test can be performed on the percentage of alcohol use which, if significant, also implies the significance of illegal substance use in general without distinguishing between the different substances.

The test on the percentage of alcohol alone positivity in the two groups is significant at 1 per cent, with the result that the total percentages of illegal substance use in the two groups are also significantly different.

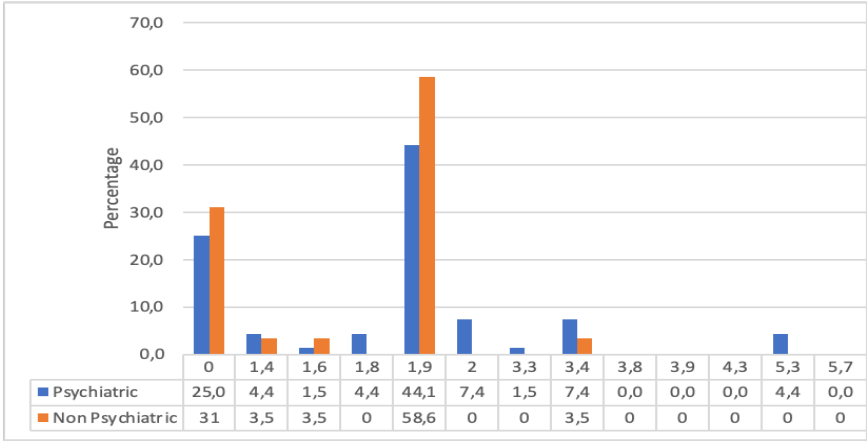
Even for females, there is greater alcohol use alone in non-psychiatric cases and greater use of illegal substances in psychiatric cases, although the differences are not significant (Figure 4b).

Figure 4a. Percentage distributions for substances in poly-drug use related to males with psychiatric and non psychiatric diagnosis in the sample analysed



	0	1,4	1,6	1,8	1,9	2	3,3	3,4	3,8	3,9	4,3	5,3	5,7
Psychiatric	17,8	14,1	0,6	0,0	38,7	11,0	1,8	9,2	0,6	2,5	0,6	2,5	0,6
Non Psychiatric	14,4	7,7	0	1	66,4	2,9	2,9	3,9	0	0	0	1	0

Figure 4b. Percentage distributions for substances in poly-drug use related to females with psychiatric and non psychiatric diagnosis in the sample analysed



	0	1,4	1,6	1,8	1,9	2	3,3	3,4	3,8	3,9	4,3	5,3	5,7
Psychiatric	25,0	4,4	1,5	4,4	44,1	7,4	1,5	7,4	0,0	0,0	0,0	4,4	0,0
Non Psychiatric	31	3,5	3,5	0	58,6	0	0	3,5	0	0	0	0	0

4.3. Outcomes of interventions

There are several possible outcomes from the Emergency Department. The possible outcomes are: discharge to home, discharge to outpatient facility, hospitalisation, transfer, refusal of hospitalisation, voluntary departure/no response to call, death. By far the most frequent outcomes in the study population were voluntary departure (123 patients) and discharge to home (102 patients), as shown in Table 4. In contrast, there

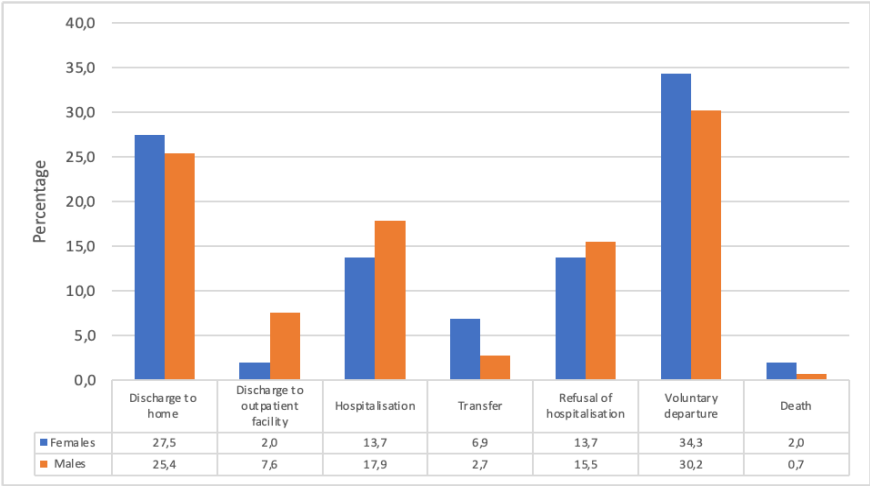
were a total of 4 deaths in the emergency department across the entire sample, although there is no information on patients admitted once they entered the destination wards, as the medical records are managed by the ward in question.

Table 4. Outcomes from the Emergency Department.

Outcome	Females	Males	Total
Discharge to home	28	74	102
Discharge to outpatient facility	2	22	24
Hospitalisation	14	52	66
Transfer	7	8	15
Refusal of hospitalisation	14	45	59
Voluntary departure	35	88	123
Death	2	2	4
Total	102	291	393

The percentage distribution for males and females is shown in Figure 5. No significant difference.

Figure 5. Percentage distributions related to outcomes from the Emergency Department for males and females.



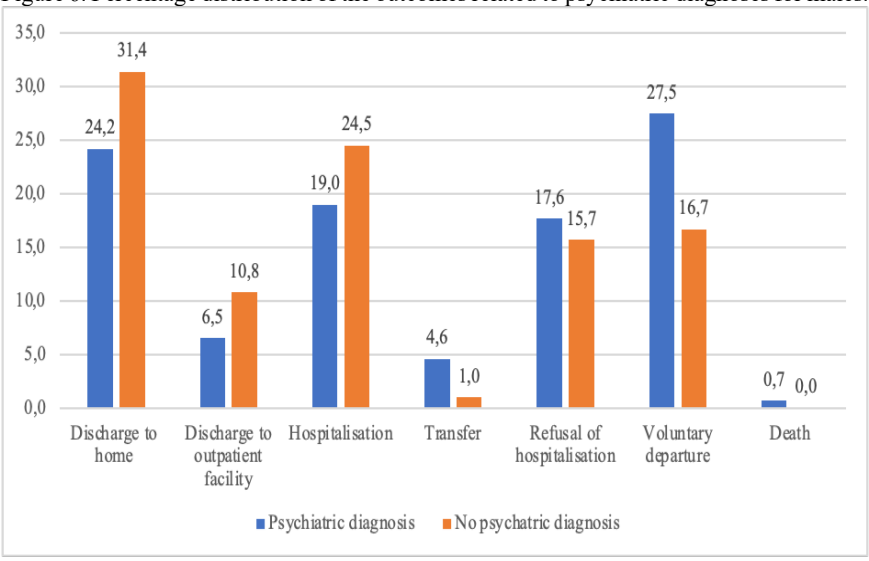
Among the 66 hospitalised patients, equal to 16.5% of the sample (which becomes 20.3% if patients transferred to other hospitals are also considered), the majority were admitted to the PDTS (Psychiatric Diagnosis and Treatment Service), representing 32%, of the total

number of hospitalised patients, followed by 13%, who were assigned to the orthopaedic ward, 8% to the intensive care, internal medicine and neurology wards, and 7% to the infectious diseases ward.
It is of great interest to analyze the outcome for male and female patients with psychiatric diagnoses and those with other diagnoses. Table 5 shows the outcomes for males with a distinction based on psychiatric diagnosis. In Figure 6 are reported the percentage distributions.

Table 5. Outcomes for males related to psychiatric diagnosis.

Outcome	Psychiatric diagnosis	No psychatric diagnosis	Total
Discharge to home	37	32	69
Discharge to outpatient facility	10	11	21
Hospitalisation	29	25	54
Transfer	7	1	8
Refusal of hospitalisation	27	16	43
Voluntary departure	42	17	59
Death	1	0	1
Total	153	102	255

Figure 6. Percentage distribution of the outcomes related to psychiatric diagnoses for males.



Similar results for females are shown in Table 6 and Figure 7.

For both males and females, the most frequent outcomes are discharge

to home and voluntary departure, for each diagnosis. It should be noted that these trends were also present for the outcomes of psychiatric inpatients in 1980 (4-6), as shown in Figure 8. In this case, since they were hospitalized, the outcomes do not appear as the Refusal of hospitalization while ti Discharge to outpatient facility was of course not available.

In particular, voluntary departure is the most worrying point because it consists of voluntary discharge without medical discharge and may also be followed by a new hospitalization shortly thereafter, as was the case for psychiatric patients in the 1980s after the closure of mental hospitals.

Table 6. Outcomes for females related to psychiatric diagnosis.

Outcome	Psychiatric diagnosis	No psychatric diagnosis	Total
Discharge to home	21	6	27
Discharge to outpatient facility	1	1	2
Hospitalisation	9	6	15
Transfer	5	2	7
Refusal of hospitalisation	6	7	13
Voluntary departure	22	6	28
Death	1	1	2
Total	65	29	94

Figure 7. Percentage distribution of the outcomes related to psychiatric diagnoses for females.

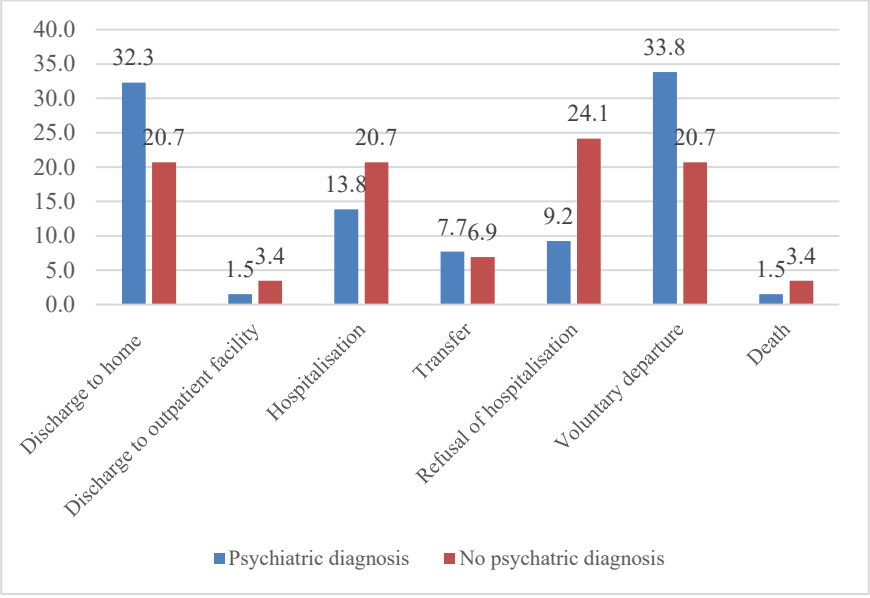
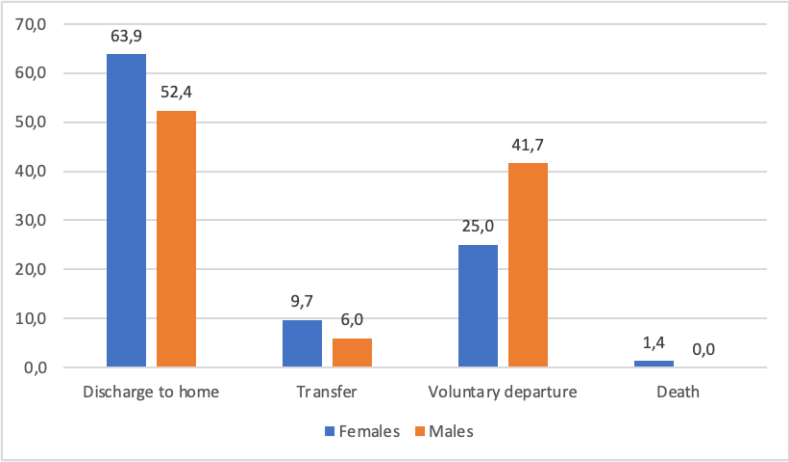


Figure 8. Percentage distribution of outcomes related to psychiatric hospitalized patients in 1980.



5. Summary and suggestions

This is a single-centre observational study that evaluated the distribution of certain variables within a sample of emergency department patients with positive toxicology tests. Analysis of the results shows that the majority of the sample was male, in line with national data, although the gap was smaller in this study. In fact, men accounted for almost 75% of the total, while data from the Ministry of Health show that this figure reaches 85% (18).

The prevalence of the male population, which is higher than that of females, can be explained by several factors: first of all, because they are more likely to be exposed to environments where it is easier to obtain substances and because they are more inclined to interact with strangers. Women, in fact, tend to be naturally more wary of unfamiliar and potentially dangerous situations, coming into less contact with high-risk contexts. Furthermore, in today's society, it is almost inconceivable for men to show signs of mental distress due to the strong prejudices that exist in this regard, and it takes a great deal of self-confidence to overcome these cultural limitations and ask for help. This is why turning to substances as a form of self-medication may seem like an easier route, while admitting to having a problem with abuse or addiction is not easily recognised as something that needs to be treated. Furthermore, especially among younger school-age children, substance use is often seen as an added value to emphasise one's personality and

stand out from others, due to the associated element of transgression. In this situation, initial contact with substances may occur as an attempt to stand out and attract attention among peers.

The average age in this study was slightly higher than the national data, with a difference of about 5 years. In any case, the age groups most affected are confirmed to be those over 45 and adults (30-45), and this data is certainly influenced by the fact that the average age of the population in Italy is quite high. Furthermore, since this is not a paediatric hospital, it is not possible to make a comparison with data relating to adolescents.

Admissions occurred mainly at the weekend, i.e. Friday, Saturday and Sunday, although this data is not statistically significant when compared with the rest of the week. Undoubtedly, for most people, especially occasional users, substance use occurs at the weekend, when people can afford to let themselves go and have fun, which is why an increase in admissions at this time of the week was to be expected.

In most cases, these were orange codes, which are often difficult to manage, since the primary cause of admission was psychomotor agitation. Prevention also means reducing the likelihood of these events occurring and of patients and/or healthcare professionals having to experience unpleasant and, in some cases, even violent situations, thereby reducing the mental burden in these environments for all parties involved.

Admissions due to road accidents, accounting for 9.5% of the total, although among the leading causes of admission, are much lower than the rate of psychiatric comorbidity. Of course, it is necessary and appropriate to continue to run information campaigns on road safety and how it is compromised by substance use, but given the figures, much of the focus should once again be on maintaining and promoting individuals' mental health.

Considering the proportion involved in road accidents, in most cases these were people who tested positive for alcohol only (approximately 80%). This data contrasts sharply with another study conducted in Rome (38), in which alcohol was present in 25% of the sample. It may therefore be useful to increase the number and frequency of these studies in order to better understand the current situation and its evolution over time.

Compared to the total number of visits to the emergency room, the proportion of those who tested positive for drugs is much higher than

the national average: while the Italian average is 0.05%, in this study it is 2.6%, i.e. 52 times the national average. Of course, the average for a country is a single figure that must encompass millions of people, so there may be significant discrepancies depending on the location considered, especially in relation to the socio-economic and cultural conditions of the population residing in the area surrounding the hospital in question.

As regards admissions to PDTS from Emergency departments, however, the data are consistent, representing in both cases approximately 30% of patients admitted for substance use, i.e. the highest proportion of admissions. This data confirms the need for intensive research to better understand the psychopathological mechanisms underlying the development of addiction and the early recognition of at-risk family situations in which children and adolescents live, with the aim of providing healthy environments for growth that allow them to maintain their physiological state of health. Furthermore, it is essential to promote a culture in which mental health is seen as a basic requirement for life and not as a luxury enjoyed by a select few. Fortunately, this is already happening, especially among the younger generations, but further efforts are needed to ensure access to care services for all those who need them. All too often, we hear that, despite the need, people cannot begin psychotherapy because the cost in the private sector is excessive and there are not enough resources in the public sector. This aspect, although complex, must be changed, and it is necessary to invest in projects to create a healthier society in order to reduce the impact of mental illness on individuals. Doing so would not only improve the quality of life of the population but, from a more practical and economic point of view, would reduce visits to the emergency room for these reasons, thereby reducing the associated consumption of resources.

The distribution of the most commonly used substances also confirms the national and, more generally, European trend, with alcohol in first place, followed by cannabis and cocaine. The most frequent combination of substances was cannabis and cocaine. As illustrated in section 1.3, alcohol is an extremely popular drink in Western society and plays a role in socialising on most occasions: in this context, it is harmless and obviously explains the very high percentage of the sample that tested positive. However, since it is a legal substance (albeit only for those over 18 years of age), it is much easier to obtain excessive

quantities and encounter situations of acute intoxication, which can even be fatal (8). In this case too, it is essential to introduce awareness programmes aimed specifically at young people, not only to illustrate the damage caused by alcohol (which is often very well known) but above all to help them understand the deeper dynamics of the loss of self-integrity and the consequent risk of turning to substances as an attempt at self-medication. Furthermore, it would be interesting to give adolescents an insight into the psychological significance of binge drinking, making them aware on a conscious level that it is not simply a matter of student revelry but that it actually conceals an attempt to distance oneself from one's feelings and numb one's suffering.

Deaths in the emergency department accounted for 1% of the sample, representing a very small proportion of the total. The causes of death were not acute substance intoxication but other internal causes.

The rate of psychiatric comorbidity was approximately 58%. In accordance with the data in the literature, the most frequently diagnosed psychiatric disorders were depressive syndrome, bipolar disorder, borderline personality disorder, anxiety disorder, psychosis and schizophrenia. However, the data on antisocial personality disorder, which is frequently found in the literature but absent in this study, is discordant. Once again, it is clear that mental illness can manifest itself in very different ways, while maintaining the same psychopathological basis, namely the loss of affect. It is essential to raise awareness among healthcare professionals about the impact of mental illness on the population, seeking to progressively reduce the stigma associated with these patients and, in some cases, the neglect with which they are treated simply because they are more difficult to manage. Establishing an excellent relationship with the patient, even in emergency situations, is the basis of a relationship of trust that can contribute significantly to the patient's acceptance of the treatments and pathways proposed.

In 45.6% of cases, patients had a negative outcome, i.e. they left the hospital spontaneously without waiting for the necessary tests and treatment or refused the admission proposed by the staff. This data reflects the difficulties that can be encountered in treating patients who use substances, in particular with psychotropic diagnosis (Figures 6 and 7). Several factors may contribute to the patient's desire to leave the hospital, including a lack of insight into their illness, i.e. limited awareness that they have a problem, but also the long waits that often have to be endured in the emergency department and, probably, a

feeling of mistrust towards the facilities dedicated to treating this condition. It is important to reduce this high percentage of patients who leave because it represents a series of missed opportunities to put these patients in contact with local facilities and start recovery programmes, thus avoiding further dispersion and a sense of abandonment.

Significant differences emerged between the group of patients with a psychiatric diagnosis and those without. First of all, there was a difference in the distribution of substances used: in the first group, there was greater diversification, with a more marked positivity for cocaine, cannabis and cocaine plus cannabis, while in the second group, alcohol was significantly more frequent than all the others. Furthermore, the frequency of alcohol consumption varies considerably, being much higher with increasing age in the group of psychiatric patients, whereas in the other group it is much more common among young people. Considering psychiatric patients, alcohol shares first place with cannabis and cocaine among young women, while among young men it is even less common than the use of cannabis alone and the combination of cocaine and cannabis. According to these data, it can be hypothesised that in non-psychiatric patients, alcohol consumption took place in rather ordinary and common contexts and that, as a consequence of probably excessive consumption, some event occurred that led the individuals to hospital.

Like all studies, this one also has limitations: first of all, the time frame considered is just under 5 months, which is relatively short, and although a lot of information has been gathered even so, it would be advisable to extend the observation period in order to analyse the rate of readmission and/or rehospitalisation of patients more accurately, analysing the impact that this condition has on hospitals and emergency departments. A longer observation window would also allow for the evaluation of any differences in the distribution of admissions depending on the time of year.

Another limitation is that triage information about patients' medical history may in some cases be limited, both because of the setting, where the work must necessarily be carried out quickly, collecting the data that is most relevant to the patient's condition at that moment, and because the patient may not provide all the information, either due to a sense of shame about their condition or due to the state of confusion and/or agitation that can be experienced during a visit to the emergency department.

Finally, as this is a single-centre study, the available data relate exclusively to the hospital in question. It is highly likely that many of the patients in this sample have visited at least once for the same reason at another of Rome's many hospitals. Taking this into account, the readmission rate in this study is undoubtedly underestimated, and data from other hospitals would need to be shared in order to better understand the burden that substance use disorders place on the healthcare system. This study can be considered a pilot study for planning multicentre and multiregional studies.

In the future, it would be interesting to design multicentre studies involving several hospitals in the same city but also involving other cities, in order to understand whether the data obtained are mostly universal or whether there are significant differences between the various regions studied. Furthermore, the sharing of data and resources could help to promote healthy competition between different hospitals, allowing for mutual improvement based on each other's experiences. As already mentioned, extending the time window would also allow for more information to be obtained for analysis and comparison between different hospitals, and repeating this type of study over time would allow for the evaluation of any changes in the problem as well as the effectiveness of various prevention programmes. Finally, it would be interesting to try to better understand the role of opioids in the Italian population, analyse the regulations governing their use and prescription, and compare them with what is happening in the rest of the world, particularly in the United States, which is facing a veritable opioid epidemic with catastrophic consequences for society and healthcare (9).

As a final consideration, it is essential to implement mental health promotion and prevention programmes, especially primary and secondary prevention, in order to identify as early as possible those at risk of developing a psychiatric disorder (including substance use disorder) and to initiate specific pathways to prevent this from happening.

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Appendix

Table A1: (from Bonnet et al., 2020).

Substances[3]	Harm to self	Harm to others	Total
Crack	2.3	1	3.3
Methamphetamine	2.3	0.9	3.2
Heroin	2.2	0.9	3.1
Alcohol	1.9	0.8	2.7
Cocaine	2	0.7	2.7
GHB	1.8	0.6	2.4
Amphetamines	1.8	0.6	2.4
Cathinones (Khat)	1.7	0.5	2.2
Synthetic cannabinoids	1.7	0.4	2.1
Propofol	1.6	0.4	2
Natural hallucinogens	1.6	0.4	2
Ecstasy	1.5	0.5	2
Ketamine	1.6	0.4	2
Barbiturates	1.6	0.3	1.9
Benzodiazepines	1.5	0.4	1.9
Cannabis	1.4	0.5	1.9
Psychotropic mushrooms	1.4	0.4	1.8
LSD	1.4	0.4	1.8
Nicotine	1.3	0.4	1.7
Opioidergic Analgesics	1.2	0.3	1.5
ZDrugs	1.2	0.3	1.5
Codeine	1.1	0.3	1.4
Tilidine/Tramadol	1.1	0.3	1.4
Methadone	1	0.3	1.3
Gabapentinoids	0.9	0.2	1.1
Buprenorphine	0.8	0.3	1.1
Methylphenidate	0.8	0.2	1
Flupirtine	0.8	0.2	1
NSAIDs	0.7	0.2	0.9
Triptans	0.6	0.1	0.7

[1] It should be noted, and this is clearly evident from the responses relating to the use of legal alcohol, that the prevalence estimates for the use of illegal substances are underestimated, especially for harder drugs, given that many questionnaires are not returned (about 65%), and this is mainly linked to more serious users. Therefore, the estimates are partly underestimates.

[2] Very similar behaviors were observed in 1980 in psychiatric patients (4-7).

[3] The highlighted substances are those that appear for the first time in the harm scores assessment

STUDY ON THE HEALTH IMPACT OF DRUG USE, WITH A FOCUS ON CANNABIS USE, BASED ON THE ITALIAN NATIONAL DATABASE OF HOSPITALISATIONS

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Summary

Background. The health consequences of drug use have so far been investigated mainly through studies focusing on specific subgroups, such as patients accessing emergency departments, and have largely concentrated on mortality and risks related to injecting drug use. The present study adopts an innovative approach by relying on official and comprehensive data covering all hospitalisations and hospitalised individuals in Italy.

Materials. Study period: 2006–2022.

Data source: the National Hospital Discharge Database. For each patient, the database records demographic information (e.g. sex, date and place of birth), the primary diagnosis and up to five secondary discharge diagnoses, coded according to the International Classification of Diseases (ICD-9-CM). Each record also includes information on drug use. The analysis focuses on the following substances: cannabis, opioids, cocaine, and alcohol abuse, and on the following disease groups: infectious diseases, neoplasms, and disorders of the cardiovascular, respiratory, and digestive systems.

Methods. "Cases" are defined as patients diagnosed as users of at least one of the substances listed above at their first hospitalisation during the study period (2006–2022). These individuals are compared with the hospitalised Italian population with no recorded drug use, which serves as the reference group.

The null hypothesis—that substance users have a higher probability of being affected by the above-mentioned pathologies—was tested using several statistical measures, including the Standardised Hospitalisation Ratio (SHR), odds ratios, and related indicators. Length of hospital stay and other relevant variables were also examined.

Results. The results allow substances to be classified according to the severity of their associated health consequences, both across the specific disease categories considered and in overall terms.

Conclusions. The great potential of the data set allows for further analyses of interest. In particular the possible use of the analysed data as basis for the estimation of High Risk Drug Users (HRDU) prevalence, possible classification of the various substances considered, both legal and illegal, in terms of the extent of the damage caused (most frequent comorbidities).

Keywords: Drug use, cannabis, opioids, cocaine, alcohol abuse, pathologies, infectious disease, tumors, cardiovascular, respiratory, urinary digestive systems.

Background

Drug use and its associated problems, in particular health consequences, are a complex phenomenon which changes over time, for various reasons: as prevalent drug use, secondary prevention, treatment methods for substance use and related diseases.

Most of the available results on drug-related diseases, apart from aspects related to mental illness[95], generally concern studies analysing **particular subgroups of people,** such as patients accessing Emergency Rooms, concerning blood-borne infectious diseases, or observational analysis (Degenhardt & Hall, 2015; Khalsa et al., 2008; United Nation, 2020 a;). Narrowing down to cannabis use, various applications are related to single case studies about the use of cannabis and specific consequences, such as bullous emphysema and spontaneous pneumothorax (Manasrah at al., 2021; Zithny et al., 2023). This issue was studied retrospectively also by Stefani et al. (2020), by reconstructing the use of cannabis, also together with tobacco, by telephoning subjects admitted to hospital in previous years. Further studies on pulmonary consequences of cannabis smoking, softer indeed than consequences of tobacco smoking[96], can be found online[97]; where it is also reported that "*As marijuana smoking prevalence increases in the United States, concern regarding its potential risks to lung health has also risen, given the general similarity in the smoke contents between marijuana and tobacco*", quoting from Tashkin (2018).

When checking other organs, very different results are obtained; for example in one recent work it is reported that **"*Conclusion:*** *Our findings revealed that regular marijuana male users were inversely associated with kidney stones. Marijuana use one to six times/week was inversely related to the risk of kidney stones in males*." (Xiang et al., 2023).

Similar broader results are reported in the interesting work by

[95] Specific work will be devoted on the basis of emergency room and admission data in specific hospital sectors, as dealt by EMCDDA in 2015, presently European Union Drugs Agency (EUDA), available at
https://www.euda.europa.eu/news/2023/new-analysis-sheds-light-drug-related-hospital-emergencies-europe_nb.

[96] Compare the scores on the health consequences of tobacco and cannabis reported in all papers where comparisons are made, such as the latest by Bonnet et al.2020.

[97] https://scholar.google.com/scholar?q=related:KyiPNth9BAsJ:scholar.google.com/&scioq=&hl=it&as_sdt=0,5

Bandara et al. (2024): "*A total of 50 articles met this review's inclusion criteria. The various studies were thematically organized into four themes: adverse outcomes related to cancer (n = 4), non-cancerous urogenital illness (n = 31), kidney transplant (n = 4), and therapeutic use of cannabis (n = 11). There were several non-cancerous urogenital illnesses associated with cannabis use, including acute kidney injury, urinary retention, rhabdomyolysis, and renal infarcts. The data found in this review suggest that cannabis use may not be a contraindication to receiving a kidney transplant. Finally, several studies highlighted some of the therapeutic applications cannabis may have on the genitourinary system."*

Moving on to cardiovascular diseases an important result is reported in Sebastian et al. (2024): "*Our analysis incorporated data from 17 studies involving a total of 1,902,481 individuals aged between 18 and 74 years, with a mean follow-up duration of 8.5 years. Upon pooled analysis, no statistically significant association was found between cannabis use and the risk of myocardial infarction compared to non-users, with an RR of 1.25 (95% CI: 0.91–1.71, p = 0.17). Similarly, while the risk of stroke showed no significant association with cannabis use (RR: 1.38, 95% CI: 0.88 to 2.16, p = 0.16), a statistically significant association was observed between ever use of cannabis and the composite of any adverse cardiovascular events (RR: 1.48, 95% CI: 1.16–1.90, p = 0.002)*."

Moving on to problems related to traumatic injury, one finds this result (Nasim Ahmed & Yen-Hong Kuo, 2023): "*Propensity matched analysis created 28,028 pairs. The analysis showed no significant difference in-hospital mortality between cannabis positive and cannabis negative groups (3.2% vs. 3.2%). The median length of hospital stay in both groups was not significantly different (4 [IQR: 3–8] vs. 4 [IQR: 2–8] days). No significant difference was found between the two groups regarding hospital complications except in pulmonary embolism (PE) with 0.1% less incidence of PE in the cannabis positive group compared to the cannabis negative group (0.4% vs. 0.5%). The incidence of DVT was identical in both groups (0.9% vs. 0.9%). Conclusion: Cannabis was not associated with overall in-hospital mortality or morbidity. There was a slight decrease in the incidence of PE in the cannabis positive group*."

A study that could have been of great interest because it was based on hospital data with a sample size of over 2,000,000 patients, is not

relevant because comparisons between cannabis users and non-users were conducted without stratification by age/gender group, despite the fact that cannabis users were found to be younger than non-users. However, the length of hospitalisation of users was shorter and the overall outcome was also better (Borja-Montes et al. 2024).

A further study was aimed to determine if prenatal cannabis exposure was associated with a greater likelihood of risk of parent-reported developmental delay at 12 months of age in a contemporary cohort, while adjusting for common confounding variables. The results: *"Participants in CU+ and CU- groups significantly differed on all sociodemographic variables. Prenatal cannabis exposure was not associated with any birth outcomes (ps >.05). Prenatal cannabis exposure was significantly associated with risk of parent-reported developmental delay on the communication domain (p ¼.02). This finding was not significant after adjusting for multiple comparisons. No additional domains were significantly associated (ps >.05)."*

The European Monitoring Centre for Drugs and Drug Addiction (EMCDDA[98]) shows recent findings on drug-related hospital ''emergencies'' from a network of sentinel hospitals across Europe (Italy not present). The data showed that the substances most commonly involved in ''acute'' drug toxicity events include heroin, cocaine and cannabis, but also prescription medicines were reported (EMCDDA, 2020a). Three quarters of patients resulted to be discharged directly from the emergency department, and almost half were discharged soon and only a minority of patients were admitted to hospital and one quarter of them required hospitalisation in the critical care unit for serious clinical features.

Some morbidities have also been regularly analysed by EMCDDA and concerned those related to problematic substance use and, in particular, injecting drug use, i.e. infectious diseases that can be transmitted through blood. Specifically, HIV and hepatitis B and C were monitored in the data analyses of the epidemiological indicator ''Drug Related Infectious Diseases (DRID)'' (EMCDDA, 2020b).

In any case among EMCDDA activities, data on hospitalised subjects, as those analysed here, have not yet been collected nor analysed, in order to investigate the type of diseases most closely related to the use of the substances.

[98] Presently European Union Drugs Agency (EUDA).

Materials

A strong point of the present study is that it has been conducted using exhaustive, official and nationwide collected data: the National Hospital Discharge Database (NHDB), regarding Italian hospital discharges, including both demographic and clinical data.

The NHDB collects data regarding all patients discharged (alive or dead[99]), therefore concerning all hospitalised patients, from any Italian hospital after an urgent or planned (diagnostic or interventional) admission.

For each patient, demographic data (e.g., gender, date, place of birth) as well as discharge diagnoses: the primary and up to five secondary diagnoses are recorded; diagnoses are codified according to the World Health Organization (WHO) International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM).

In the NHDB it is possible to take into consideration not only the HOSPITALISATIONS, not representative of individuals, but also the census of HOSPITALISED PERSONS.

In the NHDB, it is possible to consider not only HOSPITALISATIONS, which are not representative of individuals, but also to analyse HOSPITALISED PERSONS as a specific census.

The study is conducted by analysing hospitalised patients (statistical unit). Table 1 shows the total number of subjects (males and females) hospitalised in the period 2006-2022 stratified by age classes and gender, that is the total sample to be analysed.

Considering that the Italian population in the 17 years considered amounts to an average of 59,000,000, the annual individual hospitalisation rate results 4.22%. The hospitalisation rate can also be analysed by age group and gender, but it is more important to analyse the correlation of main comorbidities and illegal and legal psychotropic substances used.

Just to provide a short preliminary analysis, let us consider total hospitalised people in the period (2006-2022) reported in Table 1 and cannabis-only users among those hospitalised (Table 2) and the ratio with respect to the hospitalised people (Table 3).

[99]This means that all the hospitalised people are present in the data base.

Table 1. Individuals admitted to hospital (2006-2022).

Age classes	Male	Female	Total
0-19	4,034,191	3,230,877	7,265,068
20-39	3,260,944	3,843,584	7,104,528
≥40	13,212,785	14,793,049	28,005,834
Total	20,507,920	21,867,510	42,375,430

Table 2. Individuals, who exclusively use cannabis, admitted to hospital (2006-2022).

Age classes	Male	Female	Total
0-19	3,388	1,379	4,767
20-39	14,048	3,256	17,304
≥40	4,743	1,193	5,936
Total	22,179	5,828	28,007

Table 3. Distribution per thousand of hospitalised individuals who exclusively use cannabis (2006-2022).

Age classes	Male	Female	Total
0-19	0.8 ‰	0.4 ‰	0.7 ‰
20-39	4.3 ‰	0.8 ‰	2.4 ‰
≥40	0.4 ‰	0.1 ‰	0.2 ‰
Total	1.1 ‰	0.3 ‰	0.7 ‰

The figures shown in Table 3 are much lower than the percentages of cannabis users during the same period (around 11% in 2022 with respect to the Italian population)[100] and this is in line with the literature cited above, which shows that cannabis use often has a protective effect.

To complete the picture, it should be noted that the total number of individuals using any substance considered is only 2% of the total number of individuals hospitalised during the same period (Figure 1). Once again, a comparison with the data reported by EUDA on the prevalence of users of any illegal substance, approximately 12% of the population residing in Italy between the ages of 15 and 64, shows that most users are not at risk. It is also clear that hospitalised cannabis users represent a minimal proportion of hospitalised users of any psychoactive substance (Figure 2), rather than the majority, as is evident from EUDA data, given that users in general account for approximately 12% and cannabis users for 11% in the same period.

[100] https://www.euda.europa.eu/data/stats2025/gps_en

Figure 1. Prevalence distribution of any psychotropic substance hospitalised users

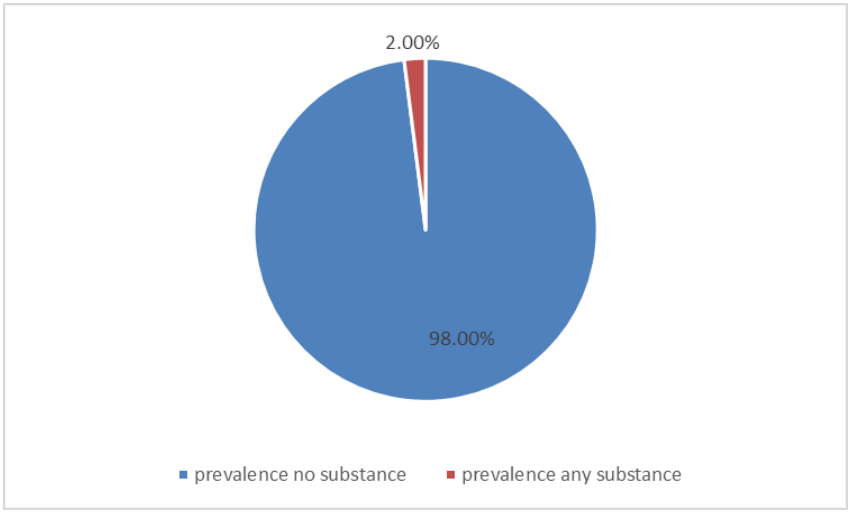
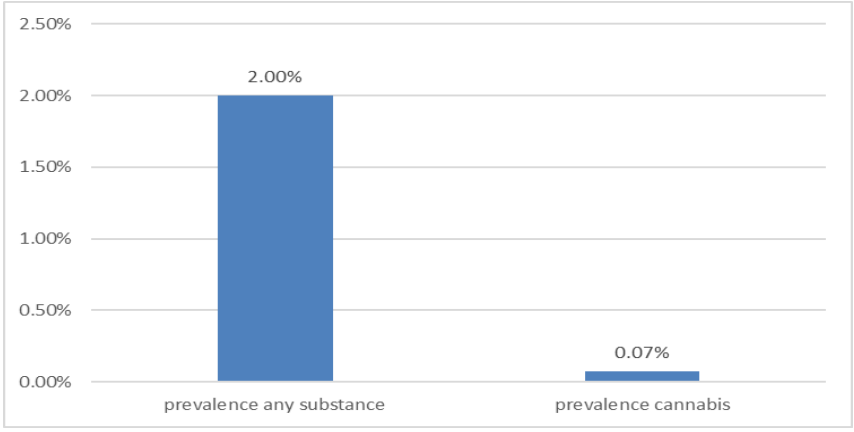


Figure 2. Comparison of prevalence of any psychotropic substance and just cannabis users



But now let's move on to the detailed analyses of comorbidities related to the use of illegal and legal psychotropic substances, with a specific focus on cannabis-only users a poly-drug cannabis users.

Methods

Case definition

For the purposes of this study, we considered 5 groups of substances used by hospitalised persons: opioids, cocaine, cannabis, alcohol and "others, not specified"; in particular, a focus on cannabis, cocaine, alcohol and opioid users was performed. The ICD codes of the diagnoses mentioning the use of substances considered in the study are presented in Table 4. Patients diagnosed with the selected ICD-9-CM drug-related codes, either reported as primary or secondary diagnoses in the discharge forms, are the "cases" analysed in the present study.

To perform a more detailed study, we took into consideration persons using a single substance and persons using many substances (referred to in the article as "poly-users"). In Table 4 we considered the substances following the order by less severity of consequences on health, derivable from the *scores harm to self and scores harm to others,* reported in Bonnet et al. (2020)[101]: cannabis (total score 1.9), alcohol (total score 2.7), cocaine (total score 2.7), opioids (total score 3.1).

[101] The Table is available in the Appendix.

Table 4. ICD9-CM codes of the drug user identification.

Substance involved in diagnosis	ICD9-CM	Description
Cannabis	304.3	Cannabis dependence
	305.2	Cannabis abuse
Alcohol	291	Disturbi mentali indotti da alcool
	303	Sindrome di dipendenza da alcool
	3050	Abuso di alcool
Cocaine	304.2	Cocaine dependence
	305.6	Cocaine abuse
Opioids	304.0	Opioid type dependence
	305.5	Opioid abuse
	965.0	Opiates and related narcotics
Other	304.4	Amphetamine and other psychostimulant dependence
	304.5	Hallucinogen dependence
	305.3	Hallucinogen abuse
	305.7	Amphetamine or related acting sympathomimetic abuse
	969.6	Poisoning by Psychodysleptics [hallucinogens]
	969.7	Poisoning by Psychostimulants
	304.1	Sedative, hypnotic or anxiolytic dependence
	305.4	Sedative, hypnotic or anxiolytic abuse
	967.0	Poisoning by sedatives and hypnotics

Statistical Analysis

For each group of patients, hospitalised for at least one diagnosis mentioning the use of the selected substances ("cases"), incidence rates, age-standardized with the direct standardization method, having the Europe 2013 Standard Population as reference, were calculated by gender. Age and gender distributions of incident cases and rates were described; the gender ratio (M/F) was calculated, and its behaviour was described over the study period.

Exploratory analyses were performed using the Statistical Analysis System (SAS) statistical software package, version 9.4.

Comorbidities

To determine the main comorbidities affecting hospitalised drug users, we went through all the discharge forms. This search covered a time frame of 5 years before the first admission having the mentioned

above drug related conditions as primary or secondary diagnoses.

For each comorbidity, the standardized hospitalisation ratio (SHR) as well as its 95% CI were calculated using the indirect standardization method, considering the hospitalised Italian population as reference, stratified by gender and age class. The SHR compares the number of patients hospitalised for specific diagnoses in the population of interest with the number of expected hospitalised patients with the same diagnosis. The average value of the population selected as reference is 100: SHR values less than 100 indicate a lower hospitalisation rate, whereas values greater than 100 indicate a higher hospitalisation rate due to a specific comorbidity (Manno et al., 2019; Unim et al., 2020). To be statistically significant, 95% CI for SHR should not contain the value 100. Next, also ODDS ratios were used, as test statistics, for inferential analysis to assess the influence of the use of the mentioned substances on the considered comorbidities.

In particular, H0: ODDS ratio>1 was considered as the basic hypothesis and H1: ODDS ratio≤1 as the alternative hypothesis. This tool allowed us to investigate whether the specific substance hospitalised drug users had a greater risk of hospitalisation corresponding to the investigated specific comorbidities (H0) as compared with the cohort of non-substance users hospitalised patients. If the null hypothesis H0 is not statistically rejected, it can be concluded that users of the specified substance have higher risk of hospitalisation for the specific pathology as the population.

To study the comorbidities affecting drug users, the main pathologies were selected: definitions and ICD9-CM codes are presented in Table 5.

Table 5. ICD9-CM diagnosis codes of comorbidities.

Comorbidities	**ICD9-CM**
Infectious and parasitic diseases	001-139
Malignant neoplasms	140-208
Diseases of the circulatory system	390-459
Diseases of the respiratory system	460-519
Diseases of the digestive system	520-579
Diseases of the urinary system	580-599

The pathologies considered concern physical illnesses and not mental illnesses. This choice is dictated by the insufficient information for the analysis of mental illnesses in the total dbase considered. Currently, the study of mental illnesses is conducted with the

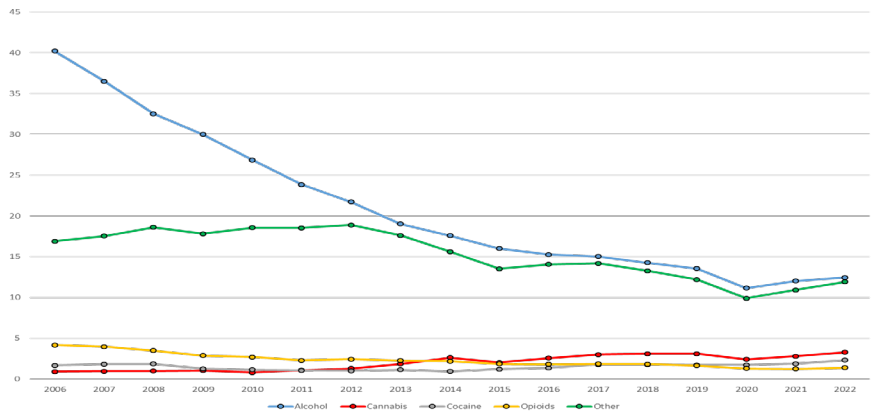
collaboration of emergency rooms and specific hospital sectors. The preliminary study is conducted at the Tor Vergata University polyclinic, a cluster sample, and will later be extended to other specific hospital facilities[102]. The comorbidities considered affect more than 60% of individuals hospitalised between 2006 and 2022. This is a significant number, given that other conditions such as gynaecological or andrological diseases and sexually transmitted infections are not considered in addition to mental illnesses.

Results

Trends of hospitalised users by type of drug and gender

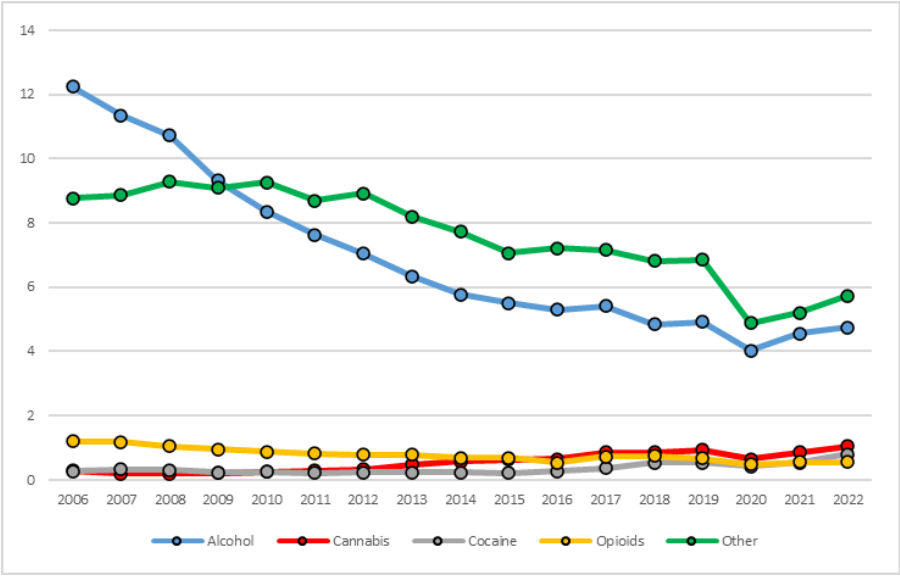
We considered the substances following the order by severity of consequences on health, derivable from the *scores harm to self,* reported in Bonnet et al. (2020): opioids (harm to self 2.2), cocaine (harm to self 2), alcohol (harm to self 1.9), cannabis (harm to self 1.4). We first considered the trend over time of these substances included in the diagnoses.

Figure 1. Trend of standardised rate of hospitalised subjects for diagnoses reporting substance use (standard population Europe 2013). Period 2006-2022– Men.



[102] Gaia Verdecchia, Thesis in Medicine, 7 July 2025.

Figure 2. Trend of standardised rate of hospitalisation for diagnoses reporting substance use (standard population Europe 2013). Period 2006-2022 – Women.



The trends are similar, although men are far more than women (Table 3), and they show a greater increase for cannabis since 2010 and since 2012 for cocaine and other substances, which should, in a future paper, be analysed specifically. As for women, the other substances rate increases less rapidly but is still regularly more present in recent diagnoses, since 2016; trends of cannabis and cocaine are quite similar to those for men, whereas opioids use is more clearly increasing after 2015. To explore further, let's consider the trend of the Male/Female indicator (Gender Ratio, showed in Figure 3).

The presence of women, compared to men, is clearly increasing for cocaine and opioids, partly also for cannabis in 2014-2015, and very little for alcohol, while the consumption of other substances shows the same behaviour. The annual incidence of hospitalised cannabis users is shown in Figure 4, where the sharp decline in 2020 is due to the Covid-19 emergency. The gender ratio is shown in Figure 5 for the age groups considered in this study.

Figure 3. Gender Ratio (M/F). Time trend 2006-2022.

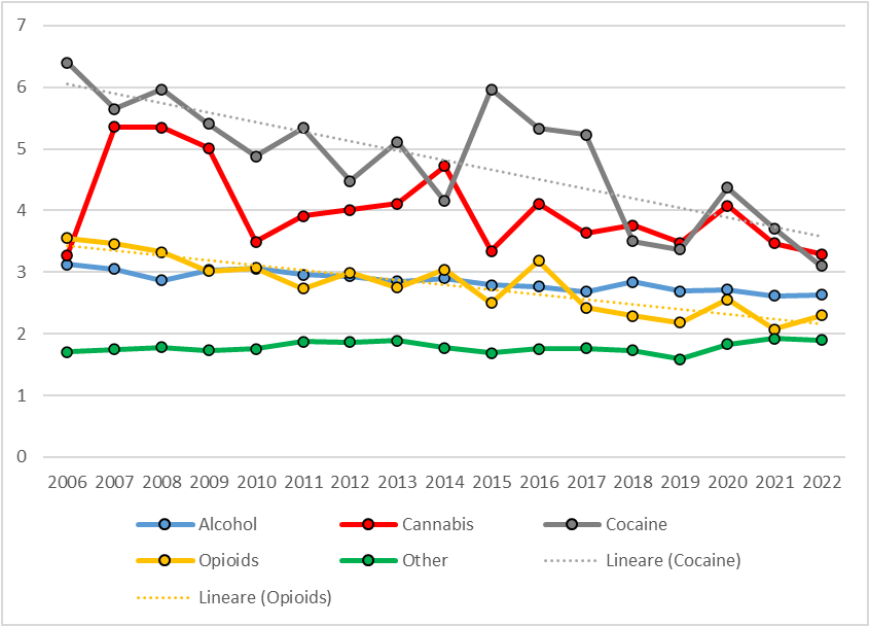
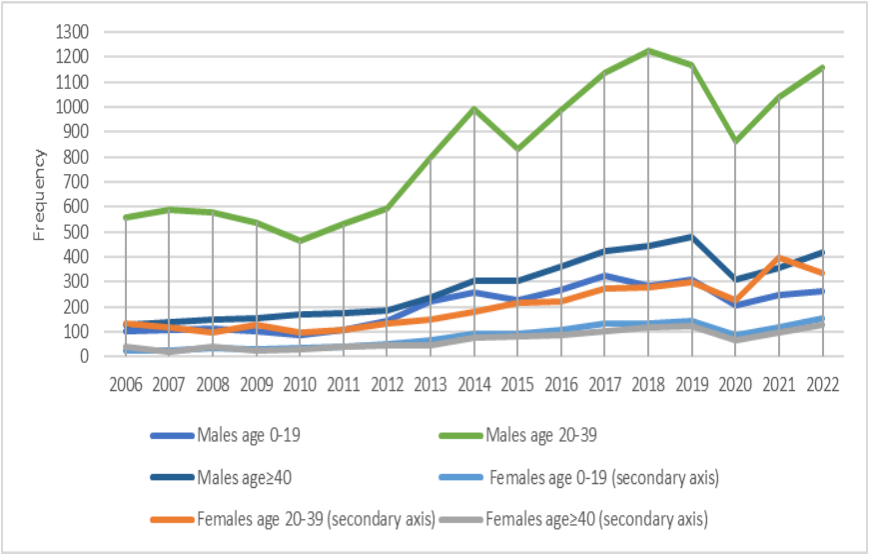


Figure 4. Hospitalised cannabis users. Time trend 2006-2022.



It is clear that the number of females consuming cannabis is increasing more significantly with respect to males and specifically in younger age groups (Figure 5). The percentage increases in the different groups are shown in Figure 6.

Figure 5. Sex ratio of hospitalised cannabis users. Time trend 2006-2022.

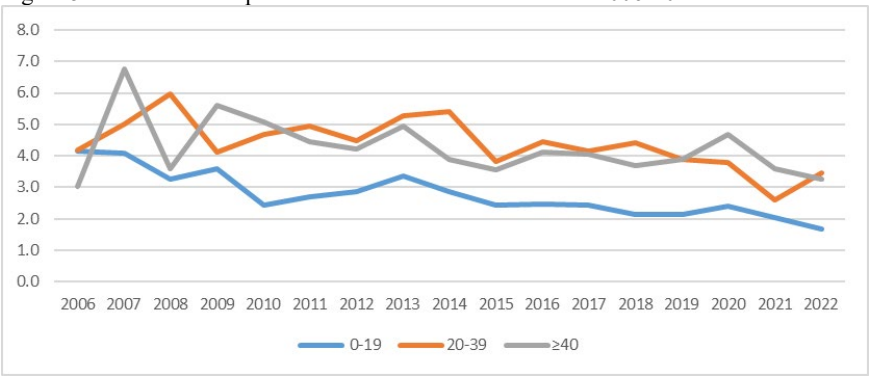


Figure 6. Percentage increase of hospitalised cannabis users from 2006 to 2022.

Demographic characteristics of hospitalised substance users

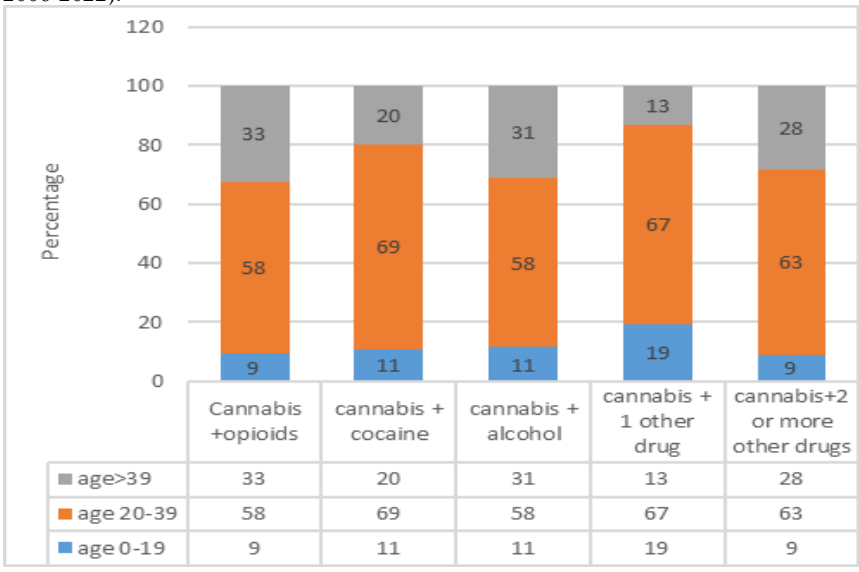
Considering the data altogether for the assessment of the association of the different substances with the different comorbidities reported in Table 5, taking into account gender and age group, the distributions of hospitalised subjects using a single substance, reported in Table 6, was obtained. Hospitalisations are always more in males than in females. The median age of the first age group, excluding cases under 3 years of

age and considering the two genders together, is equal to 16 years for all types of substance, for the second group it is about 30 years for opioids, cocaine and others, lower for cannabis (26 years). For the third age group it is about 46 years for opioids, cocaine and cannabis and 62 years for others[103].

As far as illegal substances are concerned, it is generally observed that the number of cases is beginning to increase from the age of 14 for males and from the age of 12 for females.

The frequency of hospitalised poly-drug cannabis users is shown in Table 7, where the percentage distributions by age group and gender are shown in Figure 7a and Figure 7b. Poly-drug use refers to the number of people who consume a substance, cannabis in the present analyses, along with at least one other different substance.

Figure 7a. Percentage of poly-drug use of hospitalised male cannabis users by age (Period 2006-2022).



	Cannabis +opioids	cannabis + cocaine	cannabis + alcohol	cannabis + 1 other drug	cannabis+2 or more other drugs
age>39	33	20	31	13	28
age 20-39	58	69	58	67	63
age 0-19	9	11	11	19	9

[103] Many substances considered to be "other substances" are used for medical purposes even if not authorised by a doctor.

Figure 7b. Percentage of poly-drug use of hospitalised female cannabis users by age (Period 2006-2022).

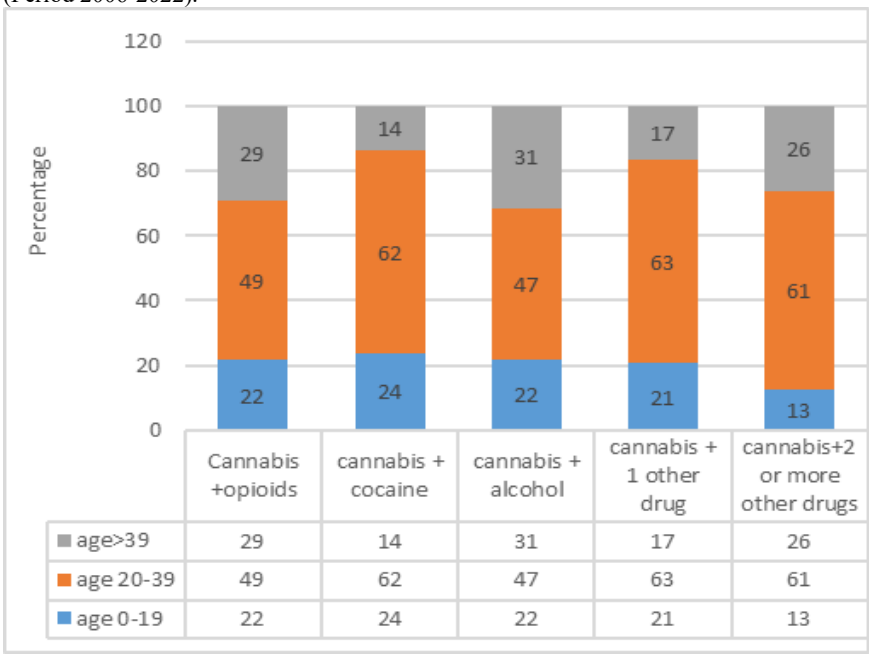


Table 8 shows the ratio (in percentage) of the frequency of poly-drug use with respect to only cannabis use; in general, female hospitalised drug users have a higher frequency of poly-drug use involving cannabis than males. This phenomenon is also observed in at-risk adolescent users, while the opposite is observed in surveys of high school students [Chapters 7 and 8].

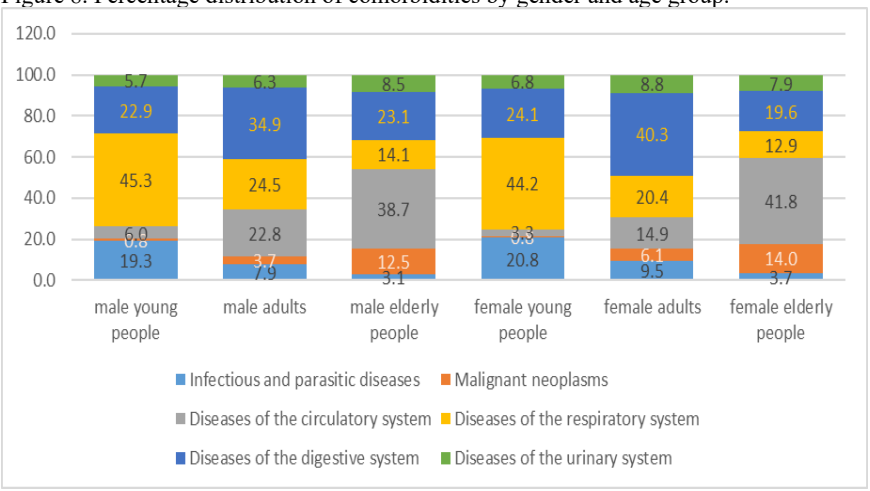
As Table 8 shows, the most frequent association among hospitalised cannabis users is with alcohol, while associations with cocaine and only one other substance, not explicitly considered, are lower, and the association with opium is much lower.

Comorbidity analysis

Let us first consider the distribution of comorbidities among males and females of different age groups. Figure 8 shows the distribution of comorbidities by gender and age group.

The data clearly shows that there are significant differences between age groups, but much less between genders.

Figure 8. Percentage distribution of comorbidities by gender and age group.



To explore comorbidities related to drug consumption, we first considered data related to a single substance use and then those related to poly-drug use. Table 9a and Table 9b show the comorbidities and the corresponding SHR values and ODDS ratio, with significant ones bolded[104], for only opioids or only cannabis consumers. With regard to female opioid users, it is clear that for two morbidities, the probability of being hospitalised for those over the age of 19 is higher than the probability for the Italian female population; for males, only one pathology is more frequent for those over the age of 19 and one for those over the age of 39.

As regards cannabis-only users, no pathology is more frequent than in the Italian population for either females or males of any age.

For the other substances analysed (Tables in the appendix), it was found that for those who only use cocaine, individuals over the age of 39, show a higher level of hospitalisation than the Italian population in terms of infectious diseases. For those who only consume alcohol, individuals over the age of 39 show two critical morbidities: infectious diseases and digestive diseases.

[104] Complete analytical results are available upon specific request.

As the tables show, infectious diseases were the diagnoses with the highest risk, especially for opioid but also for cocaine users. Within this large group of diseases there were numerous pathologies in excess in both genders: infectious intestinal diseases, tuberculosis, HIV, viral diseases with rash, other virus diseases and chlamydia (data not shown). A particularly significant finding is that women present greater risks than men. These aspects will be studied in depth in a future work in which survey data on HRDU will also be considered for analysing how they get finances to purchase substances; it is known, for example, that females also use prostitution to finance their consumption (Ricci and Rossi, 2013).

It should be borne in mind that the hypothesis test, as set up, could only highlight the greater risk associated with the use of a specific substance, compared with the lesser or equal (not lesser) risk in the setting adopted. In the case of cannabis use, if the test is set up by comparing the greater or equal risk with the lower risk, it is found that cannabis, used alone, is protective in many cases, as also reported in many of the mentioned studies reported in Background.

The first conclusion drawn from the analyses is that cannabis used alone has no negative effects on the morbidities analysed; on the contrary, in many cases, it has protective effects.

It should be also considered that the assessment for cannabis refers to cases where it is not legalised. Therefore, the level of pollution of the substance is also included in the harm, as shown by the experiment reported in the report [28].

The substance available on the black market can also be altered, with the THC content increased at will to make it particularly potent and trigger a craving for use, which can also lead to psychological problems, as reported in the news[105].

Analyses of comorbidities for other substances, not considered in this study, and for poly-drug use of cannabis and other substances, will be reported in another study currently in progress. Preliminary analyses are briefly reported in the Appendix.

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105 https://milano.corriere.it/notizie/cronaca/26_marzo_19/milano-la-trappola-della-cannabis-rinforzata-sugli-adolescenti-aumenta-i-disturbi-psichiatrici-0915f9ea-c690-4d61-9077-c5189a6caxlk.shtml?refresh_ce

Tables

Table 6. Number of hospitalised single substance users by age and gender – (Period 2006-2022).

Table 6

Age	Opioids		Cocaine		Cannabis		Alcohol		Other and Not Specified	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
0-19	423	358	604	400	3388	1379	5297	3355	2241	1468
20-39	9185	2828	10728	2882	14048	3256	29990	9994	13942	6507
≥40	9609	3127	6441	1256	4743	1193	87545	28694	71348	38801
TOTAL	**19217**	**6313**	**17773**	**4538**	**22179**	**5828**	**122832**	**42043**	**87531**	**46776**

Table 7. Number of hospitalised cannabis poly-drug users by age and gender – (Period 2006-2022).

Table 7

Tabe **Age class**	**Cannabis**		**Cannabis**		**Cannabis**		**Cannabis**		**Cannabis**		**Total**	
	+Opioids		**+Cocaine**		**+Alcohol**		**+ 1 other Drug**		**+2 or more other drugs**			
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
0-19	45	35	198	119	322	175	375	83	510	192	1450	604
20-39	279	80	1276	312	1619	371	1306	251	3574	918	8054	1932
40+	156	47	363	69	871	250	255	67	1604	399	3249	832
TOTAL	**480**	**162**	**1837**	**500**	**2812**	**796**	**1936**	**401**	**5688**	**1509**	**12753**	**3368**

Table 8. Ratios (in percentage) of the frequency of poly-drug use with respect to only cannabis use.

Table 8.

Age class	Ratio (in percentage)													
	Cannabis +Opioids/ Cannabis		Cannabis +Cocaine/ Cannabis		Cannabis +Alcohol/ Cannabis		Cannabis + 1 other Drug/ Cannabis		Cannabis +2 or more other drugs/ Cannabis		Any drug used and cannabis/ Cannabis ratio	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
0-19	1.3	1.0	5.8	8.6	9.5	12.7	11.1	6.0	15.1	13.9	42.8	43.8
20-39	2.0	2.5	9.1	9.6	11.5	11.4	9.3	7.7	25.4	28.2	57.3	59.3
>39	3.3	3.9	7.7	5.8	18.4	21.0	5.4	5.6	33.8	33.4	68.5	69.7
Any age	**2.2**	**2.8**	**8.3**	**8.6**	**12.7**	**13.7**	**8.7**	**6.9**	**25.6**	**25.9**	**57.5**	**57.8**

Table 9a. Comorbidities analysed in relation to opioid-only users by gender and age.

Opioids

Age class	Infectious and parasitic diseases				Malignant neoplasms				Diseases of the circulatory system			
	Males		Females		Males		Females		Males		Females	
	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio
0-19	187.35	0.93	123.60	0.65	61.86	1.24	71.52	1.39	28.09	0.74	43.99	0.70
20-39	**380.48**	**4.84**	**416.67**	**5.45**	24.17	0.25	31.08	0.28	56.07	0.52	99.99	0.94
>39	**475.20**	**4.79**	**358.83**	**3.89**	69.83	0.25	66.71	0.51	69.06	0.24	87.98	0.55
Age class	**Diseases of the respiratory system**				**Diseases of the digestive system**				**Diseases of the urinary system**			
	Males		Females		Males		Females		Males		Females	
	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio
0-19	74.34	0.38	45.79	0.21	33.02	0.35	32.41	0.43	57.60	0.38	65.01	0.68
20-39	89.09	0.86	**118.32**	**1.27**	56.34	0.50	67.18	0.63	60.54	0.62	78.51	0.79
>39	123.41	0.69	**144.59**	**1.31**	80.63	0.62	111.00	1.05	74.00	0.32	**126.70**	1.06

Table 9b. Comorbidities analysed in relation to cannabis-only users by gender and age.

Table 9b

Cannabis

Age class	Infectious and parasitic diseases				Malignant neoplasms				Diseases of the circulatory system			
	Males		Females		Males		Females		Males		Females	
	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio
0-19	29.07	0.12	32.16	0.16	3.81	0.08	0.00	0.00	13.17	0.35	11.30	0.18
20-39	20.88	0.19	27.10	0.28	5.21	0.05	6.42	0.05	10.09	0.08	10.14	0.08
>39	38.54	0.24	67.30	0.31	10.73	0.03	6.91	0.04	13.93	0.03	17.57	0.04
Age class	**Diseases of the respiratory system**				**Diseases of the digestive system**				**Diseases of the urinary system**			
	Males		Females		Males		Females		Males		Females	
	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio
0-19	16.83	0.07	15.31	0.07	14.03	0.14	18.68	0.24	19.75	0.13	30.38	0.31
20-39	11.88	0.10	14.58	0.14	9.74	0.07	13.71	0.11	13.37	0.12	17.39	0.17
>39	16.63	0.06	26.47	0.09	12.05	0.07	17.66	0.11	10.35	0.04	23.13	0.08

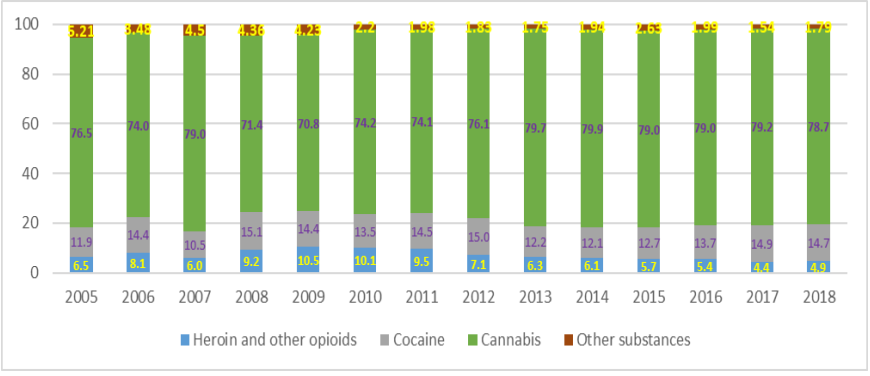
Considerations on general population users of illegal substances and hospitalised illegal drug users

It is important to ascertain which specific population of drug users is close to those discharged from hospitals, in order to be able to use the available data to estimate proxy prevalence and health risk substances for broader analyses.

Let us first take into account the characteristics, in relation to the substances used, of the general population of users. The estimate of the average proportions of use of illegal substances in the period under consideration, comes from data on users of illegal substances reported by police operations and provided by the Italian Ministry of the Interior. Such data have been analysed and shown in the Final Report of the project Eranid-IDPSO[106].

For the substances, whose impact on hospitalisation we studied, we obtained that, in the general population, opioids users are less than 10%, cocaine users are about 15%, and cannabis users are 77% on average; we can also see that users of sedatives and other substances do not appear, as shown in Figure 9, extracted from the final scientific report of the project Eranid-IDPSO. The almost complete lack of sedatives and other substances is also due to the fact that users of such substances, particularly NPS and medical substances taken without a prescription, are usually not reported by the police reports.

Figure 9. Percentage distributions of substances identified as primary substance of use among subjects reported by police during 2005-2018.



[106] https://www.ce3s.eu/main-results-of-eranid-idpso-project/

Taking into account the distribution of "classic" substances among the hospitalised users (Table 6) we obtain that: Opioid users represent about 34%, Cocaine users 29% and Cannabis 39% (Figure 10 a) and the distribution of the same substances in the general population is quite different (Figure 10 b).

Figure 10a. Percentage distribution of hospitalised illegal drug users.

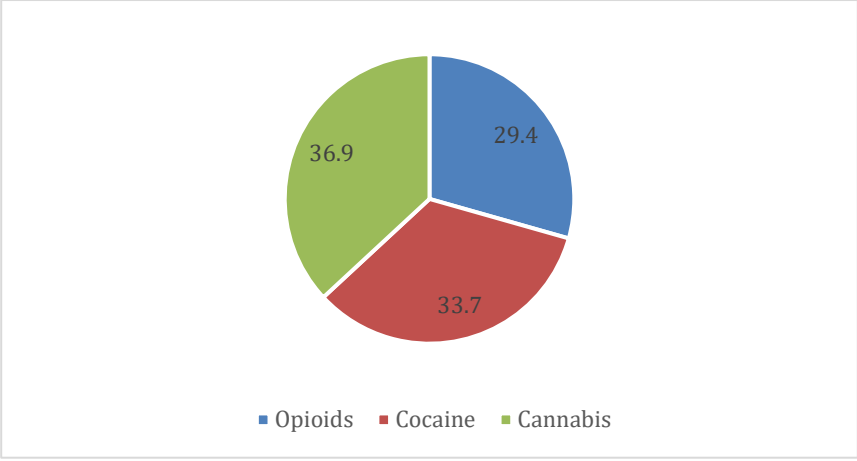
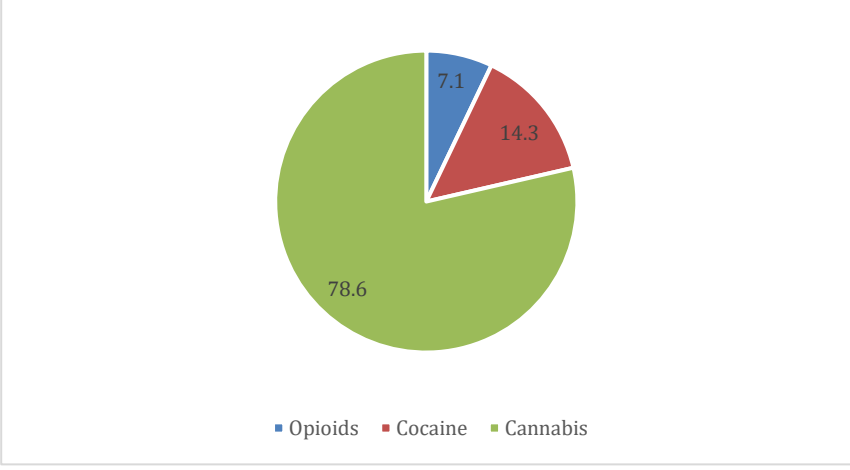
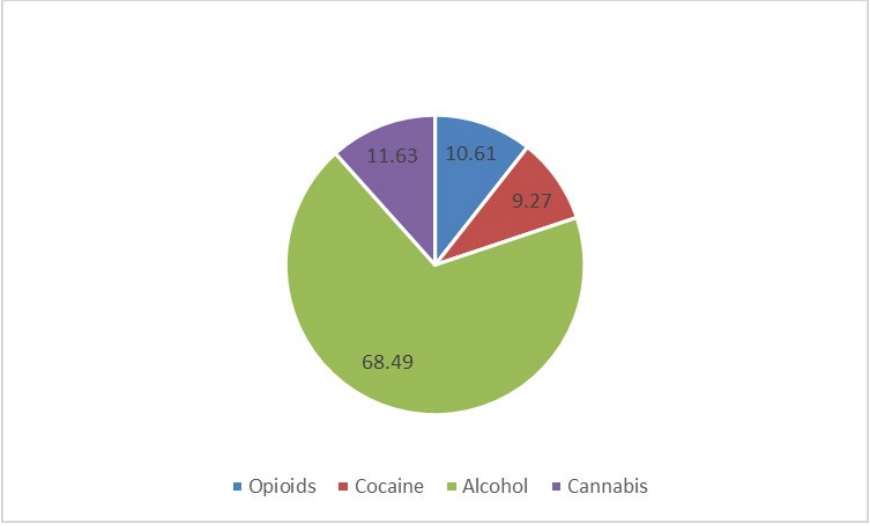


Figure 10b. Percentage distribution of general population drug users (EUDA statistical bulletin).



It is clear that the distribution of drugs, used by hospitalised users, is obtained as a transformation of the general user substance distribution, mainly according to the scores of harm to self (Bonnet et al., 2020), which essentially measure the health consequences of substance use. Given that we are considering drug users hospitalised, this shows even more the limited morbidity effects of cannabis compared to cocaine and, especially, to opioids. For completeness, the pie chart for hospitalised patients, which also includes alcohol, is shown in Figure 11.

Figure 11. Percentage distribution of hospitalised drug users including also alcohol.



A further consideration can be made concerning how the population of hospitalised subjects, with diagnoses comprising also the use of illegal psychotropic substances, shows a distribution of substances similar to that found in the estimates of subjects in the population of high-risk drug users (HRDU), in which the weight of heroin and opioids is greater than that of the other substances, followed by cocaine and at the bottom by cannabis. This suggests that national hospital discharge data can be considered as an important information source for the estimation

of HRDU indicator[107], both individually and integrated with other sources, as it will be discussed in a future work.

Conclusions

Studies on the health consequences related to the use of cannabis, cocaine, alcohol and opioids are still few (Degenhardt and Hall, 2012 and 2015) and mostly focused on mortality risks (Calabria et al.,2010) and injecting use risks: literature concerning the burden of diseases caused just by substance abuse is poor.

The large study of hospitalisations in the period 1999-2019 in Australia (Chrzanowska et al., 2021) which is of great interest is not of the same type as our present study with respect to methodology since ‘*’A drug-related hospitalisation refers to hospital care with selected principal diagnoses of substance-use disorder or harm due to selected substances. Hospitalisations where the diagnosis of drug-related harm or disorder is additional to the principal diagnosis, such as problems related to certain chronic conditions, have been excluded and, as aforementioned, hospitalisations where alcohol or tobacco comprise the principal diagnosis are not included.’’*

Our present study is based on hospital discharge data, that are exhaustive for the Italian population: therefore, it gives an interesting contribution to the knowledge of the health status of Italian drug users and allows comparison with the health status of the general population by identifying specific comorbidities.

Among the main findings, there are confirmations of results already obtained in other studies, such as the presence of comorbidities linked to infectious diseases, which will be studied in detail in the future, but certainly the most frequent to be found will be HIV, HCV and HBV.

It should be borne in mind that the first epidemic wave of serious heroin use in Italy came to light at the end of the 1980s because users developed AIDS and were identified in hospitals and emergency rooms.

The first years of the AIDS epidemic were characterised by the high frequency of transmission linked to injecting heroin use; in those years HIV-positive individuals were 70% heroin users, and this remained the case throughout the 1990s. This, among other things, made it possible to use data on the incidence and prevalence of AIDS cases as the basis

[107] https://www.euda.europa.eu/data/stats2024/pdu_en

for estimating the prevalence of problematic drug users, in particular heroin users (Rossi, 1999).

The different impact of substances on health problems leading to hospitalisation was expected according to the substance scores by Bonnet et al. (2020) and was clear.

Based on previous works, such as that by Ventura et al. (2015) and the one by Colasante et al. (2019), where specific indicators were introduced and used to evaluate poly-drug use that turned out very common, it was expected to observe poly-drug use among hospitalised subject as indeed was observed.

The new aspects concern the diseases associated with the different substances. Indeed, an excess of infectious and parasitic diseases was expected among opioid users, most of whom are injecting drug users, while other comorbidities are 'new information'.

A similar study was conducted in Italy using the database of multiple causes of death: the analysis of drug-related conditions has highlighted as strongly related causes the mental and behavioural causes disorders, in particular those related to alcohol consumption; higher relative risks were also observed for viral hepatitis, cirrhosis and fibrosis of the liver, AIDS and endocarditis (Grippo et al, 2015).

It was also expected to observe that individuals using only cannabis have the same hospitalisation profile as the general population, not showing excesses of specific diseases.

Infectious and parasitic diseases resulted significantly more prevalent among cocaine users than in the general population; however, the SHR value is much lower than the corresponding value for opioid users. We believe that this type of information is extremely useful both in the scientific environment and for directing communication and therapeutic prevention and interventions.

Infectious and parasitic diseases are certainly, to a large extent, the classic diseases that are also studied by EUDA and assessed with the DRID indicator in Europe, in particular, HIV, hepatitis B and C, but it would be important to go in depth and we plan to do so shortly. Substantial differences are possible between men and women and between opioid and cocaine users. Additional comorbidities for opioid users, especially women, will also be studied in further specific studies.

Work will also be devoted to investigating the substances classified as "other" in this paper, which account for more than 20% of hospitalisations for men and more than 30% for women, as shown in

Table 6.

Information from the analysed data will also be integrated with information from other administrative data sources in analyses of the costs of health and care policies for users of licit and illicit drugs.
Another further study will be conducted to evaluate the health impact of drug use by integrating information from specific drug treatment and overdose death data.

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Appendix

Table A1: Harm to self and Harm to others scores (from Bonnet et al., 2020)[108]

Substances	Harm to self	Harm to others	Tot
Crack	2.3	1	3.3
Methamphetamine	2.3	0.9	3.2
Heroin	2.2	0.9	3.1
Alcohol	1.9	0.8	2.7
Cocaine	2	0.7	2.7
GHB	1.8	0.6	2.4
Amphetamines	1.8	0.6	2.4
Cathinones (Khat)	1.7	0.5	2.2
Synthetic cannabinoids	1.7	0.4	2.1
Propofol	1.6	0.4	2
Natural hallucinogens	1.6	0.4	2
Ecstasy	1.5	0.5	2
Ketamine	1.6	0.4	2
Barbiturates	1.6	0.3	1.9
Benzodiazepines	1.5	0.4	1.9
Cannabis	1.4	0.5	1.9
Psychotropic mushrooms	1.4	0.4	1.8
LSD	1.4	0.4	1.8
Nicotine	1.3	0.4	1.7
Opioidergic Analgesics	1.2	0.3	1.5
ZDrugs	1.2	0.3	1.5
Codeine	1.1	0.3	1.4
Tilidine/Tramadol	1.1	0.3	1.4
Methadone	1	0.3	1.3
Gabapentinoids	0.9	0.2	1.1
Buprenorphine	0.8	0.3	1.1
Methylphenidate	0.8	0.2	1
Flupirtine	0.8	0.2	1
NSAIDs	0.7	0.2	0.9
Triptans	0.6	0.1	0.7

[108] The highlighted substances are those that appear for the first time in the harm scores assessment

Table A2

Opioids

Age class	Infectious and parasitic diseases				Malignant neoplasms				Diseases of the circulatory system			
	Males		Females		Males		Females		Males		Females	
	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio
0-19	187.35	0.93	123.60	0.65	61.86	1.24	71.52	1.39	28.09	0.74	43.99	0.70
20-39	**380.48**	**4.84**	**416.67**	**5.45**	24.17	0.25	31.08	0.28	56.07	0.52	99.99	0.94
>39	**475.20**	**4.79**	**358.83**	**3.89**	69.83	0.25	66.71	0.51	69.06	0.24	87.98	0.55
Age class	Diseases of the respiratory system				Diseases of the digestive system				Diseases of the urinary system			
	Males		Females		Males		Females		Males		Females	
	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio
0-19	74.34	0.38	45.79	0.21	33.02	0.35	32.41	0.43	57.60	0.38	65.01	0.68
20-39	89.09	0.86	**118.32**	**1.27**	56.34	0.50	67.18	0.63	60.54	0.62	78.51	0.79
>39	123.41	0.69	**144.59**	**1.31**	80.63	0.62	111.00	1.05	74.00	0.32	**126.70**	1.06

Cocaine

Age class	Infectious and parasitic diseases				Malignant neoplasms				Diseases of the circulatory system			
	Males		Females		Males		Females		Males		Females	
	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio
0-19	17.25	0.07	27.88	0.13	21.32	0.43	15.74	0.31	21.32	0.57	34.15	0.54
20-39	64.14	0.63	74.99	0.77	7.43	0.07	4.68	0.04	33.08	0.29	41.75	0.37
>39	**143.95**	0.96	**193.42**	0.92	18.37	0.05	18.24	0.09	50.04	0.14	41.03	0.09
Age class	Diseases of the respiratory system				Diseases of the digestive system				Diseases of the urinary system			
	Males		Females		Males		Females		Males		Females	
	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio
0-19	31.50	0.14	21.61	0.09	11.60	0.12	13.08	0.17	46.70	0.30	13.31	0.14
20-39	33.42	0.29	47.01	0.46	23.52	0.18	25.08	0.21	42.91	0.42	41.61	0.41
>39	62.07	0.26	88.28	0.32	35.06	0.21	41.83	0.26	42.19	0.15	44.72	0.14

Alcohol

Age class	Infectious and parasitic diseases				Malignant neoplasms				Diseases of the circulatory system			
	SHR	Males ODDs ratio	SHR	Females ODDs ratio	SHR	Males ODDs ratio	SHR	Females ODDs ratio	SHR	Males ODDs ratio	SHR	Females ODDs ratio
0-19	34.08	0.15	35.74	0.18	7.65	0.15	7.95	0.15	20.21	0.50	16.26	0.26
20-39	81.70	0.82	87.92	0.86	12.48	0.13	10.61	0.11	40.31	0.37	46.76	0.46
>39	**114.47**	0.91	**132.04**	0.87	33.70	0.20	26.13	0.19	80.44	0.45	80.39	0.39
Age class	**Diseases of the respiratory system**				**Diseases of the digestive system**				**Diseases of the urinary system**			
	SHR	Males ODDs ratio	SHR	Females ODDs ratio	SHR	Males ODDs ratio	SHR	Females ODDs ratio	SHR	Males ODDs ratio	SHR	Females ODDs ratio
0-19	30.70	0.14	29.69	0.13	32.66	0.31	23.79	0.36	35.92	0.24	27.75	0.27
20-39	38.61	0.33	47.03	0.43	89.53	0.76	80.97	0.89	29.76	0.30	62.19	0.60
>39	82.77	0.53	83.52	0.47	**119.68**	**1.36**	**137.20**	**1.26**	47.08	0.28	79.83	0.43

Other

Age class	Infectious and parasitic diseases				Malignant neoplasms				Diseases of the circulatory system			
	SHR	Males ODDs ratio	SHR	Females ODDs ratio	SHR	Males ODDs ratio	SHR	Females ODDs ratio	SHR	Males ODDs ratio	SHR	Females ODDs ratio
0-19	56.88	0.35	60.78	0.43	27.93	0.49	21.55	0.35	49.37	1.12	88.42	1.26
20-39	73.82	0.73	77.77	0.77	34.82	0.34	40.28	0.39	96.49	0.96	**127.88**	**1.31**
>39	59.65	0.50	82.40	0.74	43.25	0.32	44.00	0.39	**138.19**	**2.02**	**128.61**	**1.57**
Age class	Diseases of the respiratory system				Diseases of the digestive system				Diseases of the urinary system			
	SHR	Males ODDs ratio	SHR	Females ODDs ratio	SHR	Males ODDs ratio	SHR	Females ODDs ratio	SHR	Males ODDs ratio	SHR	Females ODDs ratio
0-19	65.92	0.40	76.68	0.51	35.45	0.36	43.55	0.54	65.71	0.47	76.32	0.79
20-39	81.88	0.78	**121.80**	**1.26**	42.44	0.35	55.82	0.50	40.54	0.40	79.95	0.79
>39	**115.08**	0.98	**162.86**	**1.77**	52.03	0.38	69.07	0.60	51.13	0.37	82.43	0.71

Cannabis

Age class	Infectious and parasitic diseases				Malignant neoplasms				Diseases of the circulatory system			
	Males		Females		Males		Females		Males		Females	
	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio
0-19	29.07	0.12	32.16	0.16	3.81	0.08	0.00	0.00	13.17	0.35	11.30	0.18
20-39	20.88	0.19	27.10	0.28	5.21	0.05	6.42	0.05	10.09	0.08	10.14	0.08
>39	38.54	0.24	67.30	0.31	10.73	0.03	6.91	0.04	13.93	0.03	17.57	0.04
Age class	Diseases of the respiratory system				Diseases of the digestive system				Diseases of the urinary system			
	Males		Females		Males		Females		Males		Females	
	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio	SHR	ODDs ratio
0-19	16.83	0.07	15.31	0.07	14.03	0.14	18.68	0.24	19.75	0.13	30.38	0.31
20-39	11.88	0.10	14.58	0.14	9.74	0.07	13.71	0.11	13.37	0.12	17.39	0.17
>39	16.63	0.06	26.47	0.09	12.05	0.07	17.66	0.11	10.35	0.04	23.13	0.08

Preliminary results on cannabis poly-drug use.

Tables A3 show the distribution of poly-drug use conditioned by age group and of age groups, for males and females, conditioned by type of poly-drug use.

Table A3 a. Percentage distributions of poly-drug use conditioned by age group.

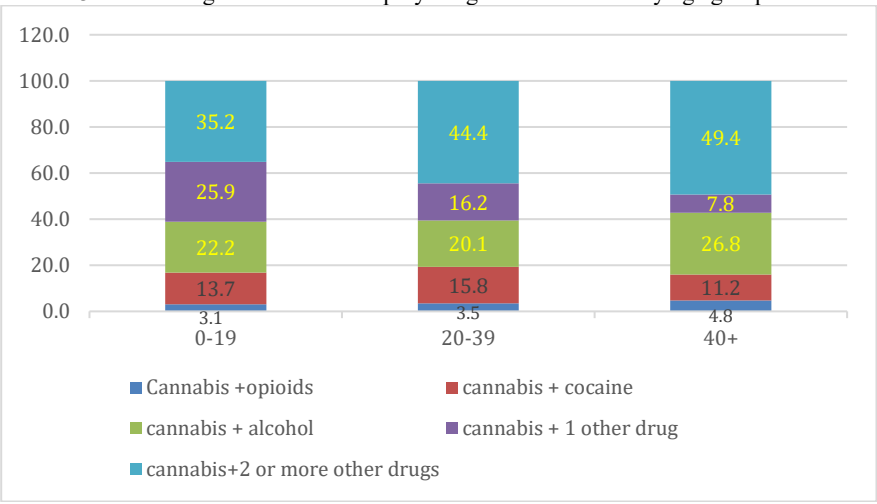
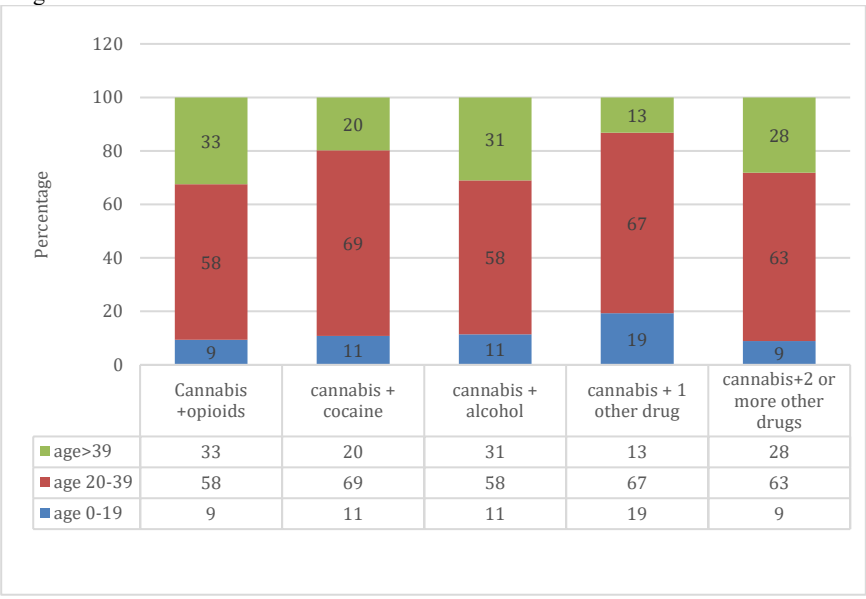
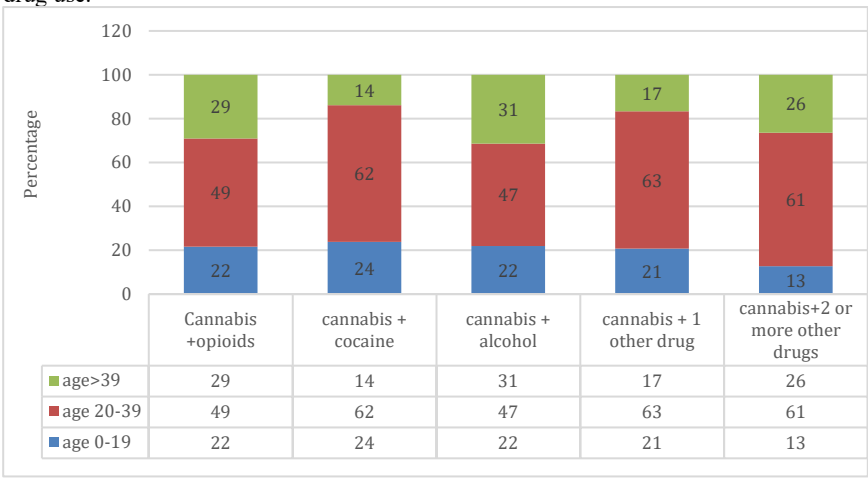


Table A3 b. Percentage distribution of age groups, for males, conditioned by type of poly-drug use.



	Cannabis +opioids	cannabis + cocaine	cannabis + alcohol	cannabis + 1 other drug	cannabis+2 or more other drugs
age>39	33	20	31	13	28
age 20-39	58	69	58	67	63
age 0-19	9	11	11	19	9

Table A3 c. Percentage distribution of age groups, for females, conditioned by type of poly-drug use.



	Cannabis +opioids	cannabis + cocaine	cannabis + alcohol	cannabis + 1 other drug	cannabis+2 or more other drugs
age>39	29	14	31	17	26
age 20-39	49	62	47	63	61
age 0-19	22	24	22	21	13

With regard to the comorbidities considered, no SHR or ODDS ratio values are significant for the use of cannabis and opioids. The same applies to poly-drug use involving cannabis and cocaine, cannabis and alcohol, cannabis and one other substance, while just cannabis and at least two substances is significant for infectious diseases.

This implies that poly-drug use involving cannabis and one other substance is presumably not very intensive, otherwise one would have to assume that cannabis has a strong protective effect compared to other substances.

WHO GETS WHAT? THE APPARENT UNEFFECTIVENESS OF THE WAR ON DRUGS. THE ITALIAN CASE

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Introduction

More than half a century has passed since 1971, when the then US President Richard Nixon declared drug as the main problem affecting American Society and enforced a repressive anti-drug policy that his successors, up to this day, were to follow. The abduction and arrest of the Venezuela president, Nicolas Maduro, on the 3rd of January 2026, follows the path of anti-drug policies and paves the way to an articulate discussion about both their effectiveness and their real purposes.

The official goal of the War on Drugs, that is the prohibition of drug consumption, has not been achieved. The hundreds of millions of substance users scattered across the world can choose between a wide range of drugs, provided by many different illegal actors. On the other hand prisons are crammed with inmates who serve drug-related sentences. Moreover, all the politicians who claim to be tough on drugs, as an articulation of their law and order program, are likely to increase their electoral consent, or even to rise to power. A trend that follows the real purposes of the War on Drugs, as John Ehrlichmann, the for advisor of Richard Nixon, revealed in 1994: the presidential administration of the time focused on drugs for two reason: to deflect the attention of public opinion from the dramatic situation the US army was facing in Vietnam and to criminalize both left wing activists and African Americans, who opposed the war in Indochina.

This chapter will focus on the apparent un-effectiveness of the War on Drugs, paying particular attention to the Italian case. Italy has the highest percentage of prison population incarcerated for drug-related

crimes (www.associazioneantigone.it). Whereas repressive policies have not reached their manifest goal of stopping the production, commercialization and consumption of psychotropic substances, they have though reached their latent aims of reinforcing state apparatuses and legitimizing those social and political actors whose moral entrepreneurship relies, partly and totally, on their anti-drug stances. A successful strategy that was enacted both at home and abroad. Italy stands out as a paradigmatic case. In particular, the anti-drug wars, deployed both at home and abroad discriminatory policies, that, as well as violating a wide range of civil liberties, such as the presumption of innocence and the right to free individual choice, reinforce ethnic and racial prejudices against minorities. Both in the preventive and in the repressive stage, the process of typification of drug pushers, dealers and consumers results into the discrimination of migrants, activists, people with alternative lifestyles. Anti-drug policies, in the case of Italy, make up an important articulation of the securitarian narrative, providing meaningful arguments to legitimize law and order policies.

This chapter will discuss in depth the discriminatory dynamics triggered by the War on Drugs. In the first session, the core of the analysis will focus on the inner consequences of the War on Drugs. Police forces massively clampdown on migrants, minorities and political dissenters, linking them to the use and commercialization of substances. Consequently, the number of jailed persons related to drugs has skyrocketed. This is mainly due to the social and cultural prejudices spread across Europe and North America, which are reflected in the way police forces operate. Whereas mass incarceration hits minorities and marginal groups, criminal organizations are thriving more than ever, making huge profits out of the drug-related business.

The second session will discuss the political aspect of the War on Drugs. Anti-Drug champions easily gain a positive public reputation, either when working in the social domain or in the political spheres. The enforcement of stricter anti-drug laws, the promise of toughness, the parades of raids in rough areas, reinforce the position of politicians, police officers, judges, media pundits and NGOs who claim to “fight drugs”. They reinforce each other through a circular speech that relies more on rhetoric than on empirical evidence, but proves successful to their aims, while discriminating large parts of society. The conclusion will argue for the need of reverting the trend by ending the war on drugs. Most of our

1.The bio-politics of prohibitionism: criminalization and mass incarceration

The control of substances, especially the aspects related to consumption, falls within the domain of bio-politics (Foucault, 2007; Zizek, 2002). Contemporary politics work through an active role of power in shaping both individual and collective behaviours, so as to make them predictable and manageable. In the post-industrial society we live in, characterized by the prevalence of consumption over production (Baumann, 2002), a major contradiction exists. On the one hand, individual, unleashed consumerism is encouraged, and regarded as the measure of individual success and social inclusion. On the other hand, the access to the goods to be consumed is regulated by the binary in/out logic underpinning neo-liberal ideology. We are thus facing a *bulimic* scenario (Young, 2008; 2009), wherein a sharp selection takes place.

Only affluent individuals and social groups are admitted to the enjoyment of global consumption, whereas a wide mass of people, devoid of those either material or symbolic resources necessary to access the arena of global consumerism. An exceeding population (De Giorgi, 2001), belonging to the lower and marginal layers of society, which is kept under control by the deployment of the control network. This is the case of migrants (Dal Lago, 1999), who are jailed for committing crimes that, in the overwhelming majority of the cases, are related either to clandestine migration or to drug-related facts. We are facing a vicious circle, so that the lack of legal status, insofar as it hampers the possibility of integration, forces a significant number of migrants into drug-related street crimes.

Migrants are not the only target of the drug-related securitarianism. The so-called *decreto anti-rave* (anti-rave decree), was the first bill the then new government had issued and that was passed by Parliament (www.sistemapenale.it). Following a tragic episode occurring in October 2022 in Modena, the bill forbids public meetings of more than 20 people gathering for recreational purposes. The decree does not specify why 19 people are not dangerous whereas 20 are. Moreover, it is not clarified how one can tell a casual meeting from a rave. The goal of the anti-rave decree is that of discouraging public gathering of crowds, so as to make it difficult to rally for the purpose of protesting. Such a provision, finally, paved the way to the more stricter *ddl*

sicurezza (security law), that severely punishes sit ins and street blocks for purpose of political protests.

Regardless of the consequences of the new decree, what it is important to focus upon concerns the overlapping between substance users and political activists. The individual choice of taking up an eccentric lifestyle is regarded as a problematic, threatening attitude, by a power that proposes a narration based on the adherence to the traditional values of God, Homeland and Family, although they are no more the wherewithal of contemporary lifelines. An alternative lifestyle, especially if publicly claimed and shown, puts at risk the dominating fabric of power relations, and must be repressed. The tragic cases of Federico Aldrovandi and Riccardo Magherini (Scalia, 2023), stand out as examples of this overlapping. Both men were stopped by the police while under the effect of drugs. In order to stop their panic crises, they were massively beaten with truncheons and the forced to stand face down on the floor under the foot of a police officer, until they died. The reports show the prejudices of the officers against the victims, and their constant referring to them as "junkies" and "subversives", especially in the case of Federico Aldrovandi.

These two cases pave the way to the development of a reflection about the typified practices of police forces, whose activities face a paradox. On the one hand, they are supposed to enforce the respect of the rule of law. Their isolation from society (Reiner, 1985), their being part of a separate, independent apparatus, wearing uniform and badges in order to be recognizable, their possession of special weapons, results, at the end of the day, in a disproportionate amount of power, combined with an exclusive identity. Such a combination of power, isolation and identity, provides police forces with the prerogative of acting as street-level bureaucrats (Bittner, 1967; Lipsky,1968). Police officers intervene in a specific situation, such as one related to the use of substances, according to their own criteria, and not by following the law. We are relating to that police culture (Reiner, cit.; Chan, 2008; Waddington, 1999) that is shaped by a combination of on-the-field activity, popular narrations and from the experience, convictions and representations they receive from their older colleagues.

Police officers, when dealing with drug users, will adopt the criteria they learned from their older colleagues, as well as those they created from their daily experience and their representation of reality. It is by this token clear how police officers follow the dominant representation

of substance users as subversive, delinquent people, devoid of any morality or principles. Such a representation is endorsed by the anti-drug laws, as well as by the hostility of substance users themselves, whose experience with police forces has often been negative, triggering the vicious circle of deviance amplification (Cohen, 1971): the more substance users are deemed as deviants by police, the more their hostility against law will grow. This gap will enhance the repressive attitude by officers, also fuelled both by the law and by their representation and idea of substance users. Such conflict takes places in a domain of uneven power relations, as substance users are the outsiders whereas police forces embody the enforcement of law and enjoy the support of large strata of public opinion.

The last element of this scenario is provided by mission (Reiner, cit.). Police officer feel their practices legitimized both by their role and by the dominating common sense. The public wants substance users to be removed from the urban space. Police is vested with the authority to do it. Moreover, both the expertise and the story-telling training they had from older colleagues, endorses their clamping down attitudes on substance users, thus justifying even rude, violent and abusive manners. We are facing an approach based on stereotypes, that meets the demand of security, or the request of an immediate answers by those social groups who advocate a law and order approach to provide a reassuring answer to their fears (Simon, 2007) caused by living in an "uncertain" society (Baumann, 2002). Police forces play the role of mediators between the fears of those social group who require security and desire (Deleuze and Guattari, 1982), or the plurality of demands, expectations and aspirations that characterize the complex contemporary social scenario. Police officers are required to rationalize social patterns, but they have not either the awareness or the know how to do it. And, one could argue, it is pretty a hard and quite puzzling task to clear out complexity from society. Social contexts are plural, dynamic, changing, multifaceted, whereas police forces are characterized by conservative mindset and pattern of values, that draws on the deposits of power (Cohen, 1985) they reach back from the past experience of their predecessors. The conflict between police and desire is therefore a consequence of the refusal to acknowledge complexity under the drive of rationalization, that result into the typification of individual, groups, behaviours, and in the labeling (Becker, 1963) of those who enact eccentric lifestyles. Ethnic profiling, brutalities, prosecution and

discrimination of diversity result from this lack of communication.

The social foundations of biopolitical prohibitionism would be weak if they were not reproduced and reinforced in three different domains: the first is the political sphere, as both the State and other political actors play an active role in the construction of a pattern of criminalization, under the slogan of law and order. The second domain is that of public discussion, with a more and more aggressive and profit driven media apparatus that both creates (Simon, 2007) and circulates fear for the purpose of audience. Politics and media, with the production of prohibitionist and criminalizing discourses, feed each other. The third relevant domain is that of the so called third sector (Rifkin, 1995), teeming with a plurality of actors (volunteers, rehabilitation centres, professionals) who manage to carve for themselves a space for economic and public status. These dynamics will be discussed in the following sessions.

2. From the *homo sacer* to the *homo infirmum.* Bipolitics in action

Political power, unlike what the dominant contractualist theory argues (Rawls, 1971), relies on uneven power relations (Foucault, 1996; Lefevbre, 1978). Material, symbolic and relational unevenness make up the fabric of societies, and influence both the setting and the consolidation of political sphere. Tilly (1982) has shown how the construction of European modern states follows the pattern of conflicts between armed groups, whereby the winners that impose their rules. The winning group is a cluster of coalition that sets the rules and enforces them (Becker, 1963, cit.), although one cannot imagine a rigid pattern, as social changes constantly shake the foundations of the political sphere, and groups who were outside the border of social inclusion can be eventually incorporated (Rokkan, 1961).

Despite this possibility of integration, the dialectic between inclusion and exclusion still characterizes the pattern of work of the political sphere. On the one hand, all who do not comply with the dominating pattern of value, interests and aims of the political community, will be removed from society, insofar as they are deemed as a danger for public order. On the other hand, their mere existence will justify the need to accrue repressive powers and thus legitimizing the sovereign (Schmitt, 1994). The removal of the abnormal Henri

Lefevbre argues about (1978, cit.), alternates with the homo sacer (Agamben, 2017), that is the existence of a space of deviance out of which power can find its own self-legitimization and impose it over society, through the circulation of an hegemonic narration (Lukes, 1972) that makes domination acceptable.

The space of *homo sacer* includes all the individuals and groups who are considered as dangerous classes (Chevallier, 1977): migrants, roma people, sex workers, political opponents, substance users, swell the ranks of those whose behaviour must be stigmatized as negative example, in order to prevent their diffusion in society. But, at the same time, dangerous classes are necessary both to justify and to encourage the growth and the work of the repressive apparatus. The control of bodies, that is the active manipulation of individual behavior through the enforcement of policies aimed at promoting and encouraging conformist, socially shared attitudes, has always been a constitutive part of state power (Foucault, 1976). Prisons, asylums, that is the whole cohort of total institutions (Goffman, 1962), developed under the drive to both control and direct lifestyles and sexual orientation of the population towards a productive and traditional family-oriented pattern of life.

The control of psychotropic substances has been a crucial part of biopolitical, for various reasons: firstly, because of the changes they bring about in perception of reality, which might stimulate the choice to take up a lifestyle that is not inclined to productivity. Secondly, because addiction would cause excessive costs to national health system. Thirdly, because matters of public order. Aggressions, assaults, street crimes, might be a consequence of an excessive use of substances. Fourthly, because illegal actors, making huge profits out of the substance market, pose problems in relation to the presence of paramilitary, organized groups, as well as under the aspect of fiscal revenues that are not intercepted by State apparatuses.

Such problems are not, though, a consequence of the use of substances by itself, but of other problems that States itself create. Firstly, the enforcement of anti-drug policies, since 1920s, but, especially, since 1970s, has run across class, race and cultural biases. Raids, arrests, prosecutions are always made among the ranks of marginal and deprived social groups, whereas the use of substance among integrated, affluent social groups has never been considered or treated like a major problem. Anti-drug policies are usually intertwined

with mass incarceration (Wacquant, 2011), zero tolerance security policies (De Giorgi, 2000) and xenophobic stances that relate substances with mass immigration and the threat posed by people who belong to *alien* cultures. Secondly, if one wants to analyze the relation between the use of substances and the rise of criminal organizations (Astorga, 2016), the responsibility of prohibitionist policies would soon come to the fore. Organized crime has thrived upon the banning of substances, as well as on the lack of articulated policies of information and regulation focused on substance users that could prevent abuses. Moreover, drug trafficking is integrated in the financial flow of global economics, with a specific structure and labour division that recalls that of legal economics (Ruggiero, 1996). The links between "dirty" and "clean" economics are never severed, as in the case of Verona in 1980s (Arlacchi & Lewis, 1989), when the market of heroin revolved around local entrepreneurs and shopkeepers, who invested in the trafficking and were active in commercializing the substance and setting up the distribution network.

Production, commercialization and consumption of substances, far from being the bad side of economics and society, are part of a revolving doors mechanism, wherein it is difficult to tell legal from illegal actors. Finally, the policies of control of substances follow an asymmetrical pattern, as it is based more on matters of principles than on empirical evidence (Nutt, 2012). In relation to the social harm the use of psychotropic substance would cause, for example, the impact of legal issues such as alcoholic, spirits and tobacco is either neglected or scarcely considered, whereas cannabis and other substances with a limited impact on society are being criminalized on the ground of stale, race-biased explanations. The exotic origin of the prohibited substances, as well as the nationality of street pushers, match the alleged alternative lifestyles that are led and promoted by their users. We are facing and ideological approach, which relies on the combination between the interests of political actors and the growing media industry, as next session will show.

3. Crime pays. Politicians, media and moral entrepreneurs

Richard Quinney (1977) highlighted the productivity of crime as a public discourse. The existence of crime and criminals allows the

deployment of a massive state apparatus that ensures the employment of at least one tenth of public servants. The network of crime-related legal jobs is even wider than this, spanning to academic, journalists, lawyers, entrepreneurs, NGOs (as we will see), politicians, media entertainers.

Politicians have used the issue of urban security, which the use of substances is an articulation of, to increase their electoral consent and build their political force upon. Or they have used the categories of urban security and anti-mafia crusades to deal with political adversary. This the case of United States of America, and their abduction of Maduro. A practice that looks like being the updated version of what happened in 1847, when the American soldiers abducted the then Mexican president, Antonio Lopez de Santa Ana, and forced him to sign a peace treaty that deprived Mexico of more than the half of its territory. More recently, the Operation Condor (1977-1981) and the Merida Initiative (2012) in Mexico, the Plan Colombia in 1999, had been the harbingers a new way to control what the Americans call their backyard. Illegal drug trafficking became the excuse to send "military advisors" in the countries where allegedly illegal cultivation, production and commercialization is made. The territory is militarized, local police forces and armies cooperate with the DEA in chasing drug trafficker, but many innocent people die and in the end, the patrol of those countries by the American government and the deterioration of life conditions, as well as human rights violations, in those areas were special operations are carried out (Cedillo, 2021).

In the case of Italy, we can refer to the 39/1990 Act, known as *Legge Jervolino-Vassalli,* and to the 49/2006 Act, known under the name of *Fini-Giovanardi Act.* Both the bills have caused the massive criminalization of drug users, both because of the reduction of the amount of substances allowed for personal use (*modica quantità*) and as a consequence of the enforcement of measures that result into a labeling of substance user. The temporary revoke either of the passport or of the driving license, the introduction of such measures as forcing those sentenced for the use of drugs into a probation period as an alternative to imprisonment, the blood and urine control they must undergo while under probation, result into a stigmatization of substance users. Moreover, prisons have been overcrowded because of the substance-related crimes. The issues related to the use of substances proves to be an easy tool for the champions of penal populism

(Anastasia, 2022), who draw from the moral panic that develops around the narration about the use of substances to carve a central role in politics both for themselves and for the political forces they belong to (Tarchi, 2022).

Substances are normally related to non-conformist, eccentric behaviors, and their supposed origin from East Asia and South America gives them an exotica flavor that is soon to be related to their sale on the street, often by migrants. Such mainstream approach combines xenophobia with those conservative views of society who associate moral degradation to eccentric lifestyles. It is a widespread attitude across the political spectrum, also due, in the Italian case, to the excessive attention paid to the aspect of "legality". This term relates not to the rule of law as a crucial aspect of modern democracies, but rather to the request to abide by the laws, regardless of their content and of their possible unfairness, that spread across wide parts of Italian left-oriented public opinion since 1980s, as a development of the so-called *quesione morale* (moral issue) launched by the then Communist secretary, Enrico Berlinguer (Valentini, 1989).

The idea of "legality", in Italy, marches hand in glove with the massive presence of criminal organizations within politics and economics (Santino, 2005; 2017). As criminal organizations, Cosa Nostra at the beginning, the Camorra and the 'Ndrangheta currently, play a capital role in the production and commercialization of substances, consumers are regarded as a sort of indirect supporters of the mafias, allowing them to thrive through their demand of psychotropic stuff. It comes by this token easy for politicians to justify their anti-drug stance through an alleged anti-mafia commitment, and to hold substance users as morally responsible for the success of criminal organizations. The toss of the coin of the legality-oriented narration consists of the support for magistrates, judges and police officers who are supposed to work to fight the mafia. Consequently, even street pushers are an articulation of organized crime, both because they are supposed to have been smuggled in Italy by criminal organizations (Becucci, 2023) and because they sell those substances that the mafia produce and commercialize. Anti-drug stances, at the end of the day, are the shortcut to justify law and order policies, as well as to build political careers and gain public consent. It is paradoxical that this narrative develops through an inversion of the relation between causes and consequences. The dominant discourse relies on the

assumption that it is the mafias to encourage and fuel the consumption of substances, whereas, historically, criminal organizations became the main dealers after the latter were prohibited across the world and consumers underwent a massive campaign of moral degradation and penal prosecution. The possibility of changing policies is hardly considered, if not to be depicted as dangerous because of the free availability of substances.

Securitarian anti-drug policies are strongly connected to the production of a public narrative around criminal organizations that ends up with the criminalization of users. The borders between political actors (politicians, judges, magistrates, police officers) and media industries are more and more blurred, with the former swelling the ranks of opinion makers that, through a ceaseless literary production and constant presence in TV shows, connect the anti-mafia commitment to the prohibition of substances and the criminalization of users (Gratteri & Nicaso, 2015; 2025). Following the path opened in mid 1980s by a popular TV fiction, criminal organizations are depicted as giant octopuses grasping society, and the use of substances is presented as a consequence of this supposed grasp.

Besides public officers, so-called investigative journalists and novelists (Saviano, 2006; 2014), produce fictional works that provide, in the middle range, the ground for formats that tell the public the ruthless stories of supposed criminal groups and their bid for power and wealth. TV fictions and show that, as well as being popular, fuel an anti-drug rhetoric that goes on stage either on political talk shows or in public initiatives, and shapes the perception and representation of politicians as well. More than this the latter base their claims on substances, organized crime and migration on what opinion makers, popular literature, and TV shows have been arguing, regardless of any empirical evidence, or through a manipulation of it. A vicious circle of mutual legitimation, where representations and moral convictions overcome reality, becomes consequently the dominating narration about substances, neglecting and, more often, denying the individual rights of users and the presumption of innocence, as well as the rights to defense.

Such a pattern also characterizes international politics, as policing overlaps relation between states. The abduction of the Venezuela president, Nicholas Maduro, has conveyed the message of force by the US president, Donald Trump, through the use of media. The

deployment, of special squads landing in Caracas, swiftly and abruptly taking the alleged narco-president away to the USA, recall one of those action movies or TV series where soldiers or police forces with special equipment and training fight the rogues and protect the community.

We are facing a more sophisticated model of moral entrepreneurship (Becker, cit.), where politicians, public officers, writers, novelists, TV pundits endorse each other while dodging the problems related to the criminalization of the use of substances. There is, though, another layer of moral entrepreneurship one cannot neglect. Non-profit organizations, such as anti-mafia groups and residential units where users are allocated, account for an important part of the criminalization process. Both catholic and secular organizations have been thriving on prohibitionism, as the get public funds for their treatment activities, gain from the fees paid for by their patients' family, receive a strong support by the media for their alleged humanitarian activities. Some of these organization have also increased their popularity thanks to media fictions portraying their long-time ranging activities. Their approach, based on the stigmatization of both the substances and of the consumers is not considered. On the contrary, it is regarded by the current government as a potential resource to be used in a perspective of alternative punishment, in order to reduce the overcrowding of prisons. Humanitarian approach becomes by this token an auxiliary resource of the penal system, that helps the development of penitentiary business (Christie, 1997).

The new frontier of moral entrepreneurship, in the domain of substance use, is a peculiar combination of humanitarianism, repression, morality, out of which many different actors carve their space of public reputation and economic success. Unlike what happened in the past, the dimension of entertainment provided by the media industry plays a capital role for the reproduction and popularity of anti-drug narratives. We are facing a fiction (prohibitionisms), supported by many fictions. In changing Richard Quinney's intuition, one could argue that crime, not only pays, but also makes one popular. At the expense of civil and political liberties.

Conclusions

This chapter has discussed the apparent ineffectiveness of anti-drug policies. The discussion has highlighted the contradiction of the context we have dealt with. On the one hand, anti-drug policies are ineffective. Substances are largely used by diverse social groups and individuals. Street crimes related to the retail drug market have not disappeared. Criminal organizations keep on thriving on the demand of substances, as well as on the illegal status of such market that, because of the high risks, makes the prices higher and profits even more richer. Moreover, because of the lack of regulations in the processing of substances, because of the lack of checks in the quality, the amount of users who get ill or die from use and abuse is still high. Finally, prisons and the penal system in general, deal with high numbers of street crimes related to illegal drug markets. A hundred years later, prohibitionism has definitely lost its battle.

On the other hand, what is ineffective for public health, public order and civil liberties, proves to be effective for moral entrepreneurs. The network of penal and judicial institutions is supported by third sector in its effort to marginalize and criminalize substance users. More than this, the media industry proves more than a moral support, by producing those formats through which the prohibitionist narrative circulates among public opinion and produces an hegemonic common sense. The role of media, in the contemporary, communication-shaped society, plays an even more central role within these dynamics. In a more and more fragmented society, devoid of shared common values, incapable of imagining and trying a radically alternative organization, media shows, based on sensational, spectacular scoops and representations of reality, become the main connecting element. Consequently, a rational, evidence-based, in-depth discussion about crucial issues of social life, are banned from the spectrum of possibilities, insofar as they are not exciting and thrilling, and do not bring about a rise in audience and share. The representations of reality proposed by the media are mostly based on prejudices and stereotypes, resulting into the discrimination and criminalization of specific individuals and social groups, who are otherized on the ground of race, class, sexual orientation, political ideology and lifestyles, and pushed at the border of society. The old ideological and moralistic patterns lay the foundations over which show-business based criminalization is built.

Everything seems to work well: police forces ride the areas at risk and arrest members of the dangerous classes. Magistrates and judges investigate and sentence to longer and harsher sentences either substance users or pushers. Third sector actors deal with their treatment, while politicians can claim their success in front of the public. And the audience soars, as more and more crime-based formats are proposed, telling about a supposed enforcement of legality. There is, though, one thing that does not work at all. It is civil and political liberties. It is unfair, as well as unjust, to be treated as a criminal, lost one's own reputation, undergo treatments that not recognize freedom of choice. It is not possible to accept that cities must be militarized under the apparent threat of a rising wave of crime to be treated as a military matter. It is not acceptable to abduct presidents of other states while sleeping in their bed. And treat all this as a never-ending show. All the entertainments end, or lose their appeal at some point. What comes next? Not another show, if possible. It would be better to have a future of liberty, tolerance and mutual respect. If it is still possible.

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WAR ON DRUGS IN ITALY: INEFFECTIVENESS SUPPORTING CORRUPTION MEASURED BY EU SUPPLY INDICATORS

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1. Introduction

The evaluation of drug policies, has some EU tools at its disposal in the last 10 years:

- estimate of the effectiveness of supply reduction measures;
- estimate of market value.

Such estimates constitute new qualitative and quantitative indicators, derived by the European Commission following two international conferences[109] and the efforts of various working groups; specifically, these are the "European key indicators on drug market, crime and supply reduction," or "Supply Indicators" for short (1).

The following section will mainly use data collected in Italy to provide extensive documentation, but also drawing on some EU data on the level corruption (2).

This text focuses primarily on indicators of supply reduction, whose

[109] The need to scale up the monitoring of illicit drug supply in Europe is an important component of the EU Drugs Action Plan 2009–2012 (Action 67). The conference will provide the necessary technical support to enable the EU institutions to endorse a set of key European indicators in the fields of drug markets, drug-related crime and drug supply reduction. The event will bring together national and international experts to review a drafttechnical proposal on the indicators drawn up by the EMCDDA. It will also identify the elements required for defining a roadmap for moving forward in this area of recognised importance to European drug policy.

trends over time clearly show the ineffectiveness of Italy's drug policy, in all its forms, which is based mainly on the repression of production and trade. It presents rigorous and novel analytical results, which should form the preliminary knowledge base for the development and monitoring of laws and policies. The ideological approaches used in Italy to date, which lack scientific basis, have had extremely negative and also very costly consequences.

An important and particularly incisive indicator will be used, which is not yet standardized at European level but can be obtained for Italy through statistical processing of data on prison incidence. This allows the ratio between the number of people reported and the estimated workforce in the market to be assessed, possibly for each substance. This indicator has the added advantage of leading to assessments consistent with qualitative estimates (source: Anti-Mafia Investigation Directorate) of the very low proportion, in value, of drugs seized compared to the total, which can be assessed from the trend in retail prices of the various substances (3,4,5).

This confirms the overall assessment of the ineffectiveness of the current prohibitionist policy and the repression that results from it, as well as the absolute scientific ignorance of those who manage this policy (6). Before going into detail, here is a significant quote from the Anti-Mafia Investigation Directorate report 2015 (page 354), specifically regarding cannabis:

> DIA report page 354:
> *To understand the scale that the consumption of so-called soft drugs has now reached, it suffices to note that, given that, as mentioned above,* ***the quantity seized is at least 10-20 times lower than that consumed****, it is reasonable to assume that the market sells approximately between 1.5 and 3 million kg of cannabis per year, a quantity that satisfies a huge market demand.*
> *By way of example, the quantity indicated allows each Italian citizen (including the elderly and children) to consume approximately 25/50 grams per capita (equivalent to approximately 100/200 doses) per year. Indeed, faced with figures such as those just seen—and without any ideological, prohibitionist, or anti-prohibitionist prejudice—we have a duty to point out to those responsible that, objectively, and despite the system's best efforts to combat the spread of cannabinoids, the repressive action has been a total failure (rectius: of the effects of the latter on the spread of the drug in question).*
> *And when we talk about 'maximum effort' in this specific enforcement action, we mean that - without prejudice to the ever-possible qualitative*

improvements, i.e., rationalization or adjustments in the use of resources - currently, the national repressive and investigative system, which this Office observes from a privileged position, is literally unable to increase its efforts to better and more effectively repress the spread of cannabinoids. This is for the simple reason that, today, with current resources, it is neither conceivable nor desirable to commit additional resources and personnel to the global fight against drugs, including all drugs (a commitment that already absorbs enormous human and material resources, so that moving additional personnel and resources to this front would leave other virulent criminal emergencies, such as those represented by mafia-type crime, extortion, trafficking in human beings and waste, corruption, etc., 'uncovered' and without investigative response to other virulent criminal emergencies, such as those represented by mafia-type crime, extortion, trafficking in human beings and waste, corruption, etc.). Nor is it conceivable to shift resources within the same front, i.e., from combating the trafficking of (lethal) 'hard' drugs to combating the trafficking of 'soft' drugs. This would clearly be a grotesque contradiction.

It can therefore be said that the raw statistical and quantitative data indicate, in this specific area, the emergence of a phenomenon that is now endemic, widespread and developed everywhere, not dissimilar, in terms of its roots and social diffusion, to the consumption of legal substances (but whose abuse can be equally harmful) such as tobacco and alcohol.

The situation is aggravated by the fact that the trend can reasonably be expected to continue to grow, not only for historical and social reasons, but also in view of the reduced deterrent effect of criminal laws concerning so-called soft drugs, as confirmed by the recent ruling no. 32/2014 of the Constitutional Court, which essentially does not allow for arrest in flagrante delicto.

Therefore, given this situation, which highlights the objective inadequacy of any repressive measures, it will we are talking about a market that is now unified even in the drug sector), it is appropriate to decriminalize the matter, taking into account the fact that, in balancing conflicting interests, it will be necessary to consider, on the one hand, the methods and measures that are concretely (and not abstractly) most suitable for guaranteeing, even in this area, the right to health of citizens (especially minors) and, on the other hand, the impact that decriminalization would have in terms of reducing the burden on the judicial system, freeing up resources available to law enforcement and the judiciary to combat other criminal phenomena, and, finally, drying up a market that, at least in part, is the preserve of aggressive criminal organizations.

The quote was included to show how the Anti-Mafia Investigation Directorate, being fully aware since 2014 of the ineffectiveness of general repressive measures on the trade in substances, proposed a reasonable type of intervention that would be more effective in reducing the trade and, consequently, the use of the most dangerous substances, while reducing repression on soft drugs. The type of repression proposed can be called "general harm reduction" in drug supply. We must also consider the comparison mentioned with alcohol and cigarettes, which is also in line with all scientific studies evaluating the consequences of the use of different substances on oneself and others, as reported and used in chapters 5 to 9 above.

Unfortunately, if the approach to anti-drug laws and policies in a country, such as Italy, is purely ideological, science is viewed as it was in the Middle Ages if it proposes scientifically based interventions, and there is a risk of being treated like Galileo by Pope Paul V. It took many centuries for the Church to publicly acknowledge its error.

2. Quantitative analysis of repression based on incidence and prevalence in prisons over 33 years (1991-2024)

The quantitative analyses will be presented mainly in graphical form so that they are easier to understand.

2.1 Incarceration (incidence?)

The official present government report to parliament states that:

> *Over the decades, Italy has accumulated experience and expertise in this area, as well as a wealth of knowledge, and has therefore become a model for many countries in terms of regulatory solutions, both substantive and procedural, and in terms of the* ***effectiveness of enforcement measures,*** *without this resulting in the penalization of people undergoing treatment for addiction.*

If they were able to connect and analyse the data scientifically, They would understand that the effectiveness of repressive measures is very low and, naturally, their ineffectiveness is very high.

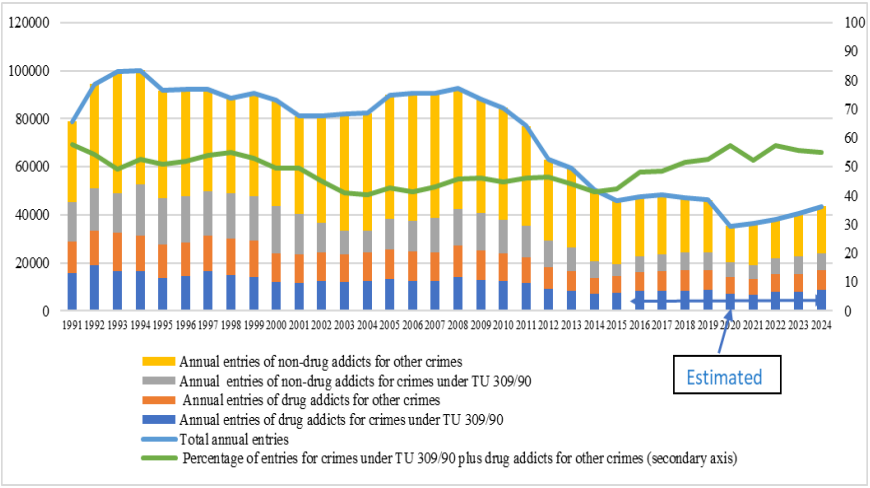
Figure 1 shows the time series of prison admissions broken down by offences and persons of interest for the current study.

The data table is reported in the appendix.

It should be noted that the total number of entries does not refer to different individuals, as each individual may enter and exit multiple times during the period considered. The number of individuals entering is therefore generally lower than the number of entries reported, as explained in detail in Chapter 9 regarding hospitalisation and the incidence of hospitalised patients, as shown by Table 1 reporting the entries in prison sentences handed down to certain drug dealers in 2009 (art 73 TU 309/90).

Anyway the incidence rate will be considered using the proxy 'prison entries'. As regards prevalence, however, the data provided correspond to prevalence indicator.

Figure 1. Annual entries in prison under TU 309/90 and other crimes with a focus on drug addicts[110]



Certainly, the DAP, which is also a national observatory, should provide the data used here[111] and could show the trends in prison admissions and entries for TU 309/90 in a correct, complete and, above all, comprehensible manner. With simple scientific work, it could also be derived information of great interest. Quantitative legal analyses of

[110] Data source: Department of Prison Administration (DAP) in connection with various EU and national projects.

[111] Received for various projects with national bodies and ministries, the UN, the European Commission, the European Parliament, the EMCDDA and the European Union over the last 35 years.

the various laws in force in Italy since 1991 and their consequences are reported in [1]. Data, as those reported reported in Table 1, are use to estimated the total number of dealers in Italy, as it is shown later.

Tabella 1. Numero di ingressi in carcere per art. 73 TU 309/90 per soggetto nel 2009.

Number of entries per subject Article 73	2009			
	Italians	Strangers	Total	of which women
1	15.501	11.331	26.832	1.995
2	334	387	721	39
3	12	17	29	-
4 and above	1	1	2	-
Total subjects	15.848	11.736	27.584	2.034

As can be seen in Figure 1, the number of entries is not affected by the pardon granted in 2006; on the contrary, it seems to be more affected by the law 49/2006 on drugs (2006-2013), even if it is starting to decrease since 2008. Both laws were enacted in 2006:

- On 21 February 2006, the law 49/2006. It was an Italian law that radically reformed drug legislation, equating the penalties for possession and dealing in soft drugs (as cannabis, hashish) with those for hard drugs (as heroin, cocaine) [1].
- On 31 July 2006, a pardon was granted for all offences committed up to 2 May 2006, for a maximum of three years for prison sentences and a maximum of €10,000 for fines alone or combined with prison sentences.

Since 2020, the entry rates have all risen slightly, as has the percentage rates under Law 309/90, including drug addicts with offences other than those under Article 73, with this percentage reaching the initial level of 1991.

The impact of the anti-drug law, TU 309/90, can be assessed by considering those imprisoned under Article 73 and also drug addicts imprisoned for other offences, which are generally theft committed out of the need to acquire money to buy drugs.

Almost all who end up in prison are poor people forced to deal drugs on the street or commit petty theft; they do not operate at a high level.

To highlight the impact of “anti-drug” laws, we analyse only prison admissions (Figure 2) and then prevalence, related to Article 73 of Law 309/90 and subsequent versions, both more repressive, as represented

in Figure 3 extracted from [1].

The overall trend of incarcerations is downward, with a few brief reversals since 2005 and with the entry into force of the 2006 law until 2008, when it began to decline until 2015, with only minimal increases thereafter until 2024.

Figure 2. Prison admissions in relation to offences under Article 73 of Law 309/90 and subsequent three versions.

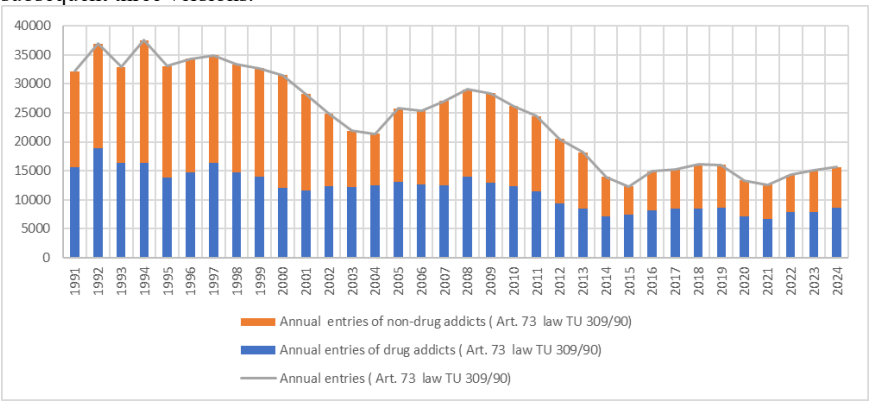
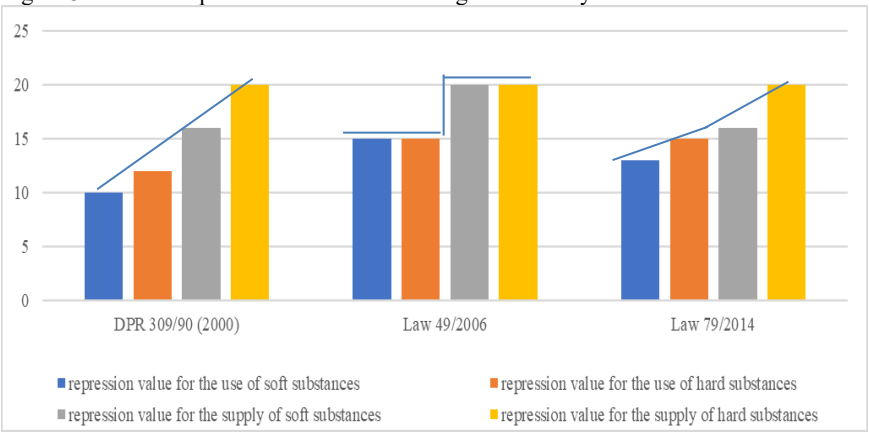


Figure 3. Level of repression of the various drug laws in Italy.



Global repression value:
DPR 309/90: 58
Law 49/2006: 72
Law 79/2014: 66.

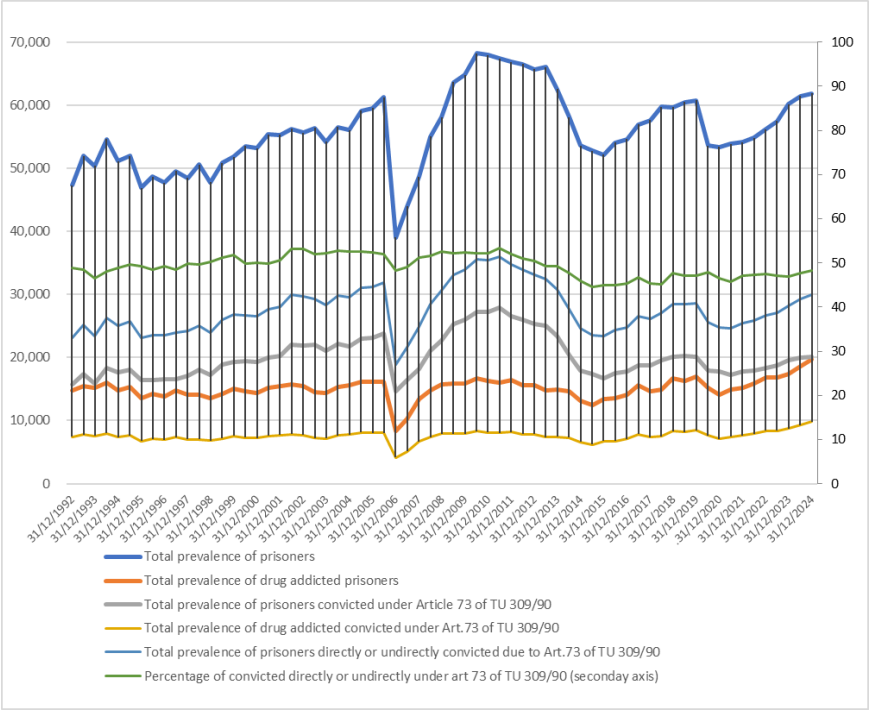
To deepen the analysis, prison prevalence must also be used.

2.2 Prison prevalence

Unfortunately, the data provided by DAP on prevalence (presence), collected twice a year (30 June and 31 December), are less detailed than those on prison admissions (proxy of incidence) because they do not explicitly provide the different types of offences for which individuals are imprisoned alongside being drug addicts.

For this reason, we will only consider possible scenarios for subsequent analysis. Figure 4 shows the semestral time series of prison prevalence, according to the first scenario (using the same probability to divide drug addicts as for the incidence study, where it was provided).

Figure 4. Annual time series of prison prevalence, according to the first scenario.



The impact of the 2006 pardon is clearly visible, but in any case, prevalence increased overall (Figure 5) until 2011. It then decreased

until 2015 and has since been increasing again, albeit very slowly.

The average length of imprisonment L is calculated from the combined use of prevalence and incidence and results:

L(average)=Prevalence/ Incidence

The result is shown in Figure 6.

As is clear, the average length of imprisonment, for those incarcerated for offences against Article 73 of the various anti-drug laws, has increased during the period analysed.

It should be noted that the average duration we have calculated is underestimated, since the denominator is not exactly the incidence but the proxy used, i.e. the number of admissions to prison and not the number of people admitted.

Figure 5. Prevalence of prisoners convicted under Article 73 of TU 309/90.

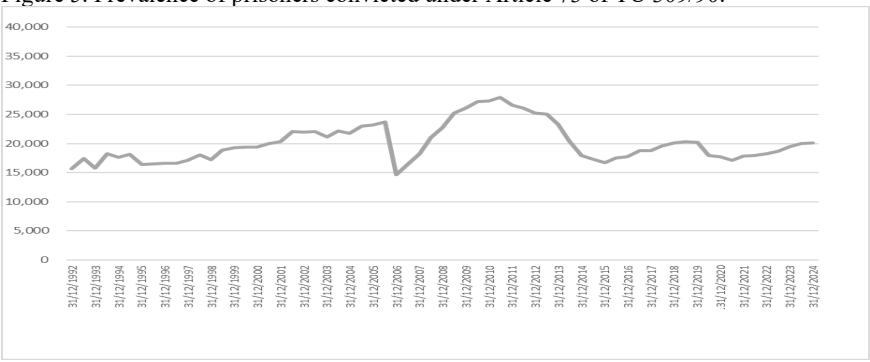
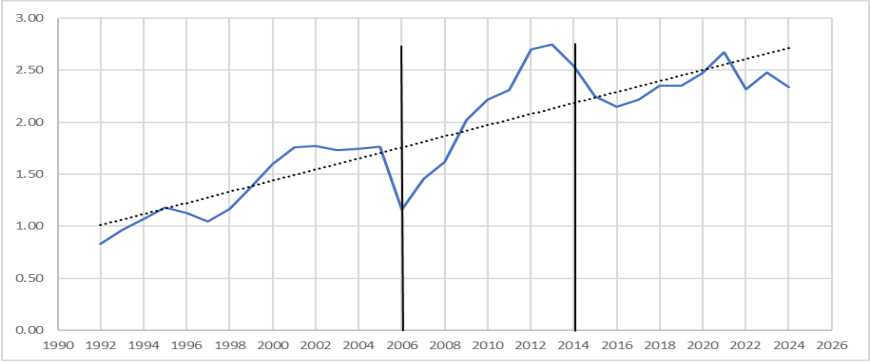


Figure 6. Average length of stay in prison (years).



The length of imprisonment has been increasing on average from

1992 to 2024. The pardon significantly altered the trend in a short period of time, but just some months before the pardon came into force, the most anti-scientific law (Law 49/2006) was enacted, which equated the consequences of both the use and sale of both soft and hard drugs (Figure 3). As can be seen from the figure, during the period in which this law was in force, the length of imprisonment increased rapidly. Only after the current law (Law 79/2014), which reintroduced different penalties for soft and hard drugs (Figure 3), came into force, the length of imprisonment begin to fall again, before rising again, but more slightly[112]. This latter trend may also be due to an increase in violence among drug dealers, as well as among the organisations that regulate the market.

It would be possible to evaluate the average length of imprisonment for drug addicts or for the total prison population, but this seems less interesting than the evaluation carried out in relation to Article 73 of each law in force, always identified by citing the first (309/90).

2.3 Ineffectiveness of repressive measures in Italy.

The DAP data, which reports multiple admissions of individuals for offences under Article 73 TU 309/90, allows for an estimate of the prevalence of the population of drug dealers at risk of prosecution and imprisonment[113].

A classic method is used: Zelterman's estimator, reported in full in [3] and [4], and the results are shown in Table 2, which also reports the total number of prosecutions (source: DCSA[114] for EU projects) and the total number of prison admissions (source: DAP for EU projects with updates), from which the levels of effectiveness of both can be derived.

[112] The continuous increase, albeit slight, in prison sentences could also be linked to the current prison overcrowding. In a recent event, drug addicts, now undergoing treatment at the Villa Maraini therapeutic community in Rome, read their report stating that overcrowding leads to further crimes being committed in prison. This could lead to longer prison sentences [2].

[113] In this case, the total number of individuals entering and the total number of re-entries were used as the basis for the estimate, which therefore makes the estimate lower than if subsets of the data were used: women, men, Italians, foreigners and other stratifications, as the probability of re-entry is not the same for all groups. However, given that the primary interest is only to determine the order of magnitude, the overall data were used.

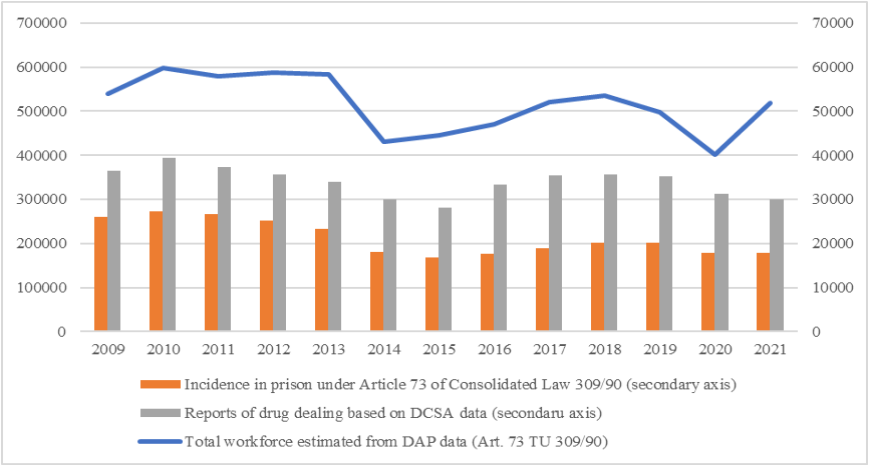
[114] Central Directorate for Anti-Drug Services

Table 2. Total workforce (Art. 73 TU 309/90) and effectiveness of enforcement operations.

	Total workforce estimated from DAP data (Art. 73 TU 309/90)	Incidence in prison under Article 73 of Consolidated Law 309/90	Prosecution of drug dealing based on DCSA data	Percentage effectiveness in prison admissions	Percentage effectiveness in prosecution
2009	539119	28369	36581	5.3	6.8
2010	599271	26141	39340	4.4	6.6
2011	579356	24452	37226	4.2	6.4
2012	587999	20465	35617	3.5	6.1
2013	584293	18151	34041	3.1	5.8
2014	430152	13972	30036	3.2	7.0
2015	445031	12284	28047	2.8	6.3
2016	471158	13356	33267	2.8	7.1
2017	519815	14139	35517	2.7	6.8
2018	535510	14128	35745	2.6	6.7
2019	497813	13677	35292	2.7	7.1
2020	401839	10952	31335	2.7	7.8
2021	518189	10350	30083	2.0	5.8

It should always be remembered that, in reality, the levels of effectiveness assessed in this way are slightly higher than the actual levels, given that both prosecutions and prison admissions may concern a smaller number of individuals (repeat offenders). Figures 7 and 8 show the relevant graphs.

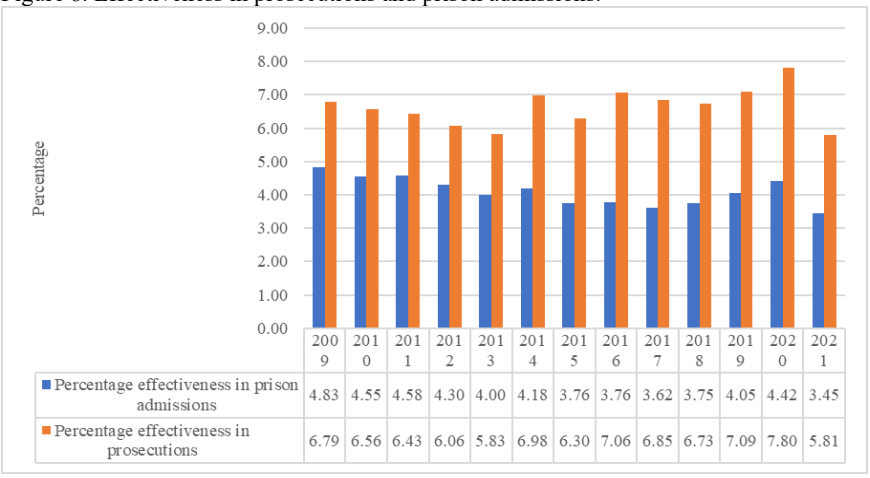
Figure 7. Workforce for retail drug dealing (Art. 73 TU 309/90) and prosecutions and prison admissions.



As can be seen, there are two periods in which there has been a decrease in both the workforce and the incidence of imprisonment. These are the years 2014 and the years around 2020. The first is due to the change in the law from Law 49/2006 to Law 79/2914, which is less repressive. The second period refers to the COVID-19 pandemic, which has slightly halted drug dealing. The effectiveness is essentially the same (Figure 8).

It is well known that if prices do not increase significantly from one year to the next, repression in the year has not been effective, as shown also in [5]. We present Table 3, i.e. the table on average prices reported in the 2023 Report to Parliament, and update the data for 2024 with the information reported in the 2025 Report to Parliament.

Figure 8. Effectiveness in prosecutions and prison admissions.

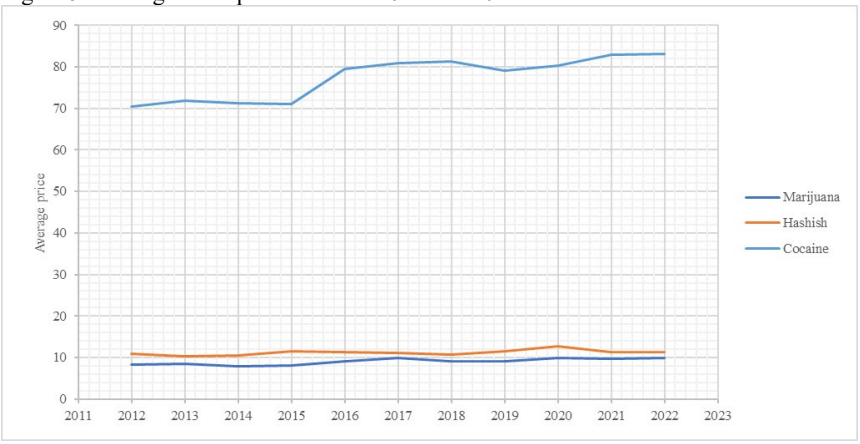


In Figure 9 presenting the data from Table 3, regarding the most expensive substance (cocaine) and the least expensive substances (marijuana and hashish), are shown (2012-2022). The increase in retail price per dose for cocaine (2012-2024) is 18%, while for marijuana and hashish is 11.6% and -3.7% respectively. Apart from hashish which is negative, the others are very low, considering that inflation has been much higher overall in the 13 years. All the positive differences are lower than inflation except amphetamines, used by few individuals, with an increase of 56.7%.

Table 3. Average retail price between 2012 and 2024.

	Average cost per dose or per gram per year											
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2024**
Marijuana	8.36	8.43	7.97	8.07	9.05	9.85	9.06	9.19	9.94	9.63	9.83	9.33
Hashish	10.89	10.35	10.50	11.42	11.30	11.08	10.66	11.55	12.74	11.32	11.28	10.7
Brown heroin	41.70	41.20	39.14	38.41	42.83	45.73	43.83	41.97	47.13	41.23	41.1	39.17
White heroin	62.00	61.50	60.25	57.14	48,93	40.95	45.70	54.37	54.10	53.21	53.54	52.12
Cocaine	70.54	71.81	71.18	71.08	79.51	80.96	81.30	79.10	80.22	82.99	83.06	76.96
Ecstasy	18.75	16.62	15.89	15.97	18.66	15.85	16.88	17.35	17.56	18.88	19.26	22.6
Amphetamines	16.80	16.05	27.35	37.70	37.78	41.29	40.42	34.76	23.44	25.29	33.02	26.32
Methamphetamines	-	-	-	-	-	-	19,29	25.29	35.05	30.06	32.38	-
LSD	-	-	-	-	24.06	21.17	27.12	29.21	24.24	23.90	25.23	25.17

Figure 9. Average retail price between 2012 and 2022.



It should be observed that the price of crack is not reported; crack has much more serious effects than cocaine use and whose use involves individuals who are very different from cocaine users. It is rather serious that politicians working (?) on drug policy show that they are unaware of this specific problem.

To conclude this topic, it can be said that repression in Italy has proven to be ineffective in reducing the black market, as already reported in the DIA report cited at the beginning of the chapter.

To complete the picture, it is also necessary to mention the cost of repression, which weighs on all Italians, but since it is not possible to include it here, reference is made to [7].

2.4 The supply indicator: estimate of the market value funding high level corruption.

Estimating the size of the hidden illegal market is important for assessing the effectiveness of laws and policies aimed primarily at reducing supply. The estimation methods are described in detail in chapter 10 of Bentham's book [8] and are better possible when different extensive and significant data is available as in [9].

In reality, we have already seen that in Italy this policy has always had zero results, but the size and monetary value of the illegal market can be useful for assessing the hidden phenomenon of corruption, which is closely linked to the drug market, where the profits are mainly

used to carry out high-level corruption and are closely linked to market size, has already seen in [10-13].

The market estimate can be calculated using the method publicly used by Eurostat and, for Italy, by Italian National Institute of Statistics, ISTAT [14]. It is based on estimating the prevalence of consumers with different levels of usage, using surveys in EU countries.

Prevalence estimates obtained through surveys, conducted via postal questionnaires, in person or online, produce underestimates because they fail to capture the most serious consumers, as can be understood by comparing the data in chapters 6 and 7. However, this is the method used in Europe. Another method is based on the sentence in bold in the DIA citation at the beginning of the chapter, which states that the quantity of substance seized corresponds to 5% or 10% of the substance imported, so the substance on the market corresponds to the substance seized multiplied by 19 or 9. In this approach, multiplying the seized substance by 19 and by 9 an interval estimate is obtained, which can be reduced to a point estimate by taking the average value, or the interval estimate can be used.

Both methods assess market trends are available in and were used in an Eranid-IDPSO project in Italy[115]. Here the official EU method is used.

In Table 4, the official italian market estimates on more used substances, regarding retail expenditure in billions are reported.

Looking at the total, we can see that the increase from 2011 to 2023 is 39%, which is higher than inflation over the same period. It can be considered that this trend can be used as a trend for the high level of corruption, which cannot be assessed by prisoners under Article 74 of TU 309/90, precisely because it is distorted by corrupt practices [10, 11 and references there].

Table 4. Retail expenditure on substances in billions according to official Italian estimates.

	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
cannabis	3.4	3.7	4	4.2	6	4.4	6.3	6.3	6.6	6.5	6.6	6.6	6.5
cocaine	6.4	6.45	6.5	6.1	4.5	6.5	4.9	5.1	5.1	4.5	4.9	5.2	4.9
heroin	1.6	1.75	1.9	2.3	2.9	2.5	2.8	3.1	3.3	2.7	2.9	3.0	3.7
thers	1.3	1.5	1.7	1.8	1.7	1.9	1.8	1.7	1.6	1.1	1.1	1.6	2.0
Total	12.7	13.4	14.1	14.4	15.1	15.3	15.8	16.2	16.6	14.8	15.5	16.4	17.2

[115] Main results of ERANID-IDPSO project (Ce3S.eu)

2.5. Indirect corruption qualitative indicators: the tip of the corruption iceberg.

Hidden elements, sometimes directly visible due to serious consequences, include the awarding of contracts, without a real tender process, only to individual companies directly or indirectly linked to the underworld involved in the black market for drugs.

Companies, often operating under front men, are directly implicated in workplace accidents. The employees who often die are almost never formally employed, are often foreigners, from EU countries in construction or non from EU in agriculture, and their company is often involved in subcontracting. Every day there are cases, especially in construction, where safety equipment was not even present. Often there are cases reported in the newspapers.

Legal consequences are slow to arrive and often do not affect the criminal organisation and the real boss.

This topic can be explored further by considering the economies of different EU countries and, in particular, examining GDP and, above all, year-on-year changes, but this will be addressed in a future article.

2.6. Corruption and low level stories

The extension of corruption at any level is confirmed by data collected as part of the very large international project 'ALICE Rap'[116] in which an important aspect was devoted to crime, law enforcement costs and low-level corruption (bribery).

A great deal of information, on the market and corruption linked to drug dealing and consumption, was gathered through interviews with individuals, who had committed crimes and were incarcerated. Among other things, they were asked whether they knew of any cases of corruption involving the police and judiciary in exchange for lighter treatment. The countries in which the information was collected are Germany, Slovenia, and Italy. Table 1 shows the data collected on corruption.

[116] https://cordis.europa.eu/project/id/266813/it

Table 1. Proportion of drug dealers across prisons who have heard of bribery.

	Yes	**No**	**Don't know**	**No answer**	**Did not answer**
Italy	69%	31%	-	-	-
Slovenia	82%	9%	-	9%	-
Germany	74%	11%	5%	5%	5%

Institutions identified as corrupt (ALICE Rap)

Dealers were also asked about what kinds of officials they had heard other dealers were bribing. In answering this question, the respondents identified officials hailing from a wide variety of institutions. In order to compare the responses across countries, Table2 aggregates these responses into three main institutional categories: law enforcement, customs and border, and the judiciary.

Table 2. Main categories identified by dealers as recipients of bribes.

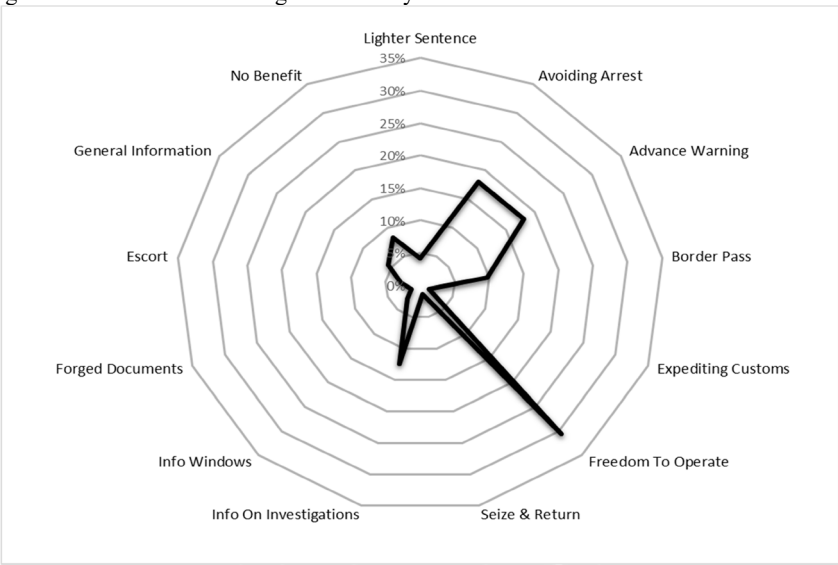
	Law	***Customs and Judiciary enforcement***	***Border officials***
Italy	*54%*	*11%*	*13%*
Slovenia	*66%*	*34%*	*34%*
Germany	*58%*	*21%*	*11%*

The percentages represent the proportion of all respondents from that country who positively identified any given category of officials as receiving bribes, not only those who mentioned they have heard about bribes being given. Some inmates identified multiple institutions so the percentages can sum to more than 100%.

Benefits from corruption

The nature of benefits dealers perceived to flow from bribing public sector officials are wide and varied across countries, as shown in the radar charts for each individual country below (Figures 2-4).

Figure 2: Benefits from bribing identified by Italian dealers[117].



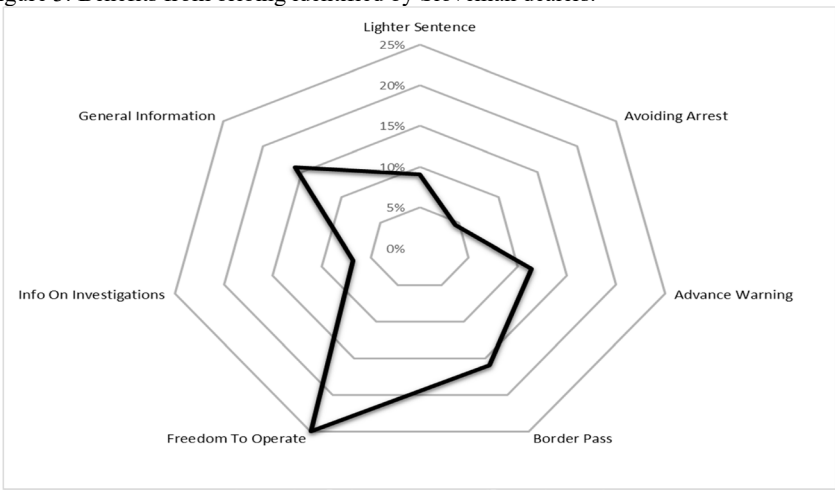
The percentages of Italian dealers who had no answer to the question of benefits, would not answer, or did not know were 10%, 1%, and 6% respectively.

The first graph concerns Italy and, as can be clearly seen, the main point considered is the freedom to operate without consequences. Let's say that this aspect is often heard in news columns, the second three points are also related as they report Advance Warning, Info On investigation and Avoiding Arrest.

This also confirms what was reported in the analysis of prison data and is also confirmed by multiple admissions for a very large population in the data provided by the DAP.

[117]The category 'freedom to operate' includes: "no inspections/law enforcement looking the other way and police protection".

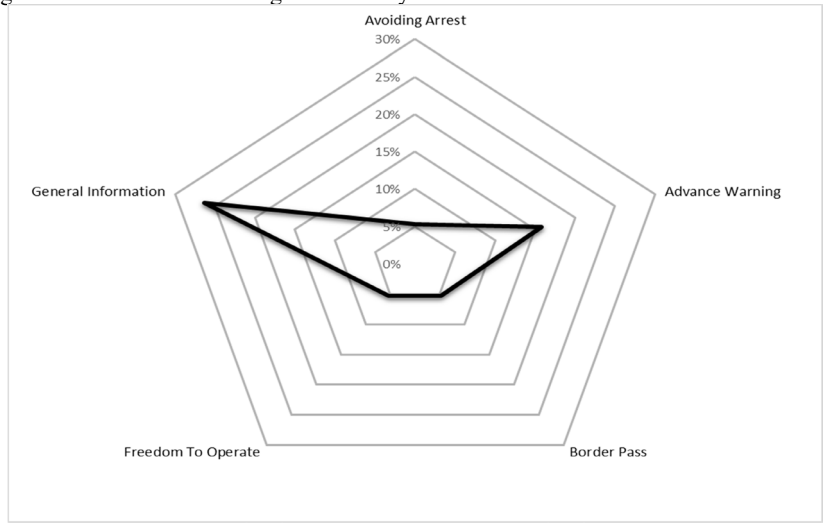
Figure 3: Benefits from bribing identified by Slovenian dealers.



The percentage of Slovenian dealers who had no answer to the question of benefits was 39%.

As we do not have data and information on retail drug market in Slovenia, we can only note that the number of possibilities considered in the graph is lower than that in the graph for Italy.

Figure 4: Benefits from bribing identified by German dealers.



The percentages of German dealers who had no answer to the question of benefits or did not answer were 42% and 5% respectively.

As far as Germany is concerned, we note that the number of possibilities is still decreasing and only two seem to be of interest: General Information and Advance Warning. The instinctive reaction is to think that the level of corruption in Germany is much lower than in Italy. In fact, this is precisely what international reports on corruption say.

Brief conclusions

To conclude this chapter, it must be said that, at both national and international level, the war on drugs has only resulted in huge expenditure and no results. Looking more closely at the details in the other chapters, it must also be said that it is time to legalise so-called soft drugs and, as Umberto Veronesi has argued:
Cannabis Use: It is not totally harmless...but it has a very low risk level, …..less than alcohol and about the same as nicotine

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Table A1. Incidence data.[118]

year	Annual entries of drug addicts for crimes under TU 309/90	Annual entries of drug addicts for other crimes	Annual entries of non-drug addicts for crimes under TU 309/90	Total annual entries
1991	15628	13206	16526	78781
1992	18891	14309	18009	94318
1993	16406	16145	16463	99544
1994	16425	15040	21090	100207
1995	13875	13654	19190	91763
1996	14693	13563	19623	92340
1997	16347	14791	18572	92398
1998	14733	15520	18627	88718
1999	13984	15131	18684	90486
2000	12103	11970	19393	87576
2001	11557	12016	16628	80958
2002	12351	11867	12510	81217
2003	12163	11546	9702	81793
2004	12461	11830	8895	82275
2005	13103	12438	12674	89887
2006	12639	11998	12760	90714
2007	12502	11869	14483	90441
2008	14055	13342	14993	92800
2009	12879	12227	15490	88066
2010	12316	11692	13825	84641
2011	11508	10924	12944	76982
2012	9349	8876	11116	63020
2013	8487	8056	9664	59390
2014	7085	6725	6887	50217
2015	7420	7044	4864	45823
2016	8245	7827	6675	47342
2017	8494	8100	6772	48144
2018	8544	8223	7556	47185
2019	8586	8256	7466	46211
2020	7177	6915	6205	35280
2021	6674	6425	5968	36537
2022	7896	7613	6411	38125
2023	7877	7615	7172	40661
2024	8593	8279	7077	43489

[118]Red written numbers are estimated on the basis of original data from previous years which enabled the estimation of the probability of being a drug addict with a criminal record under Article 73 of TU 309/90 or with another type of criminal record. The data in Figure 1 are calculated from those in this Table. Anyone can make this estimate, based on data provided in previous years, and see that the 95% confidence interval is very limited, confirming the possibility of using the point estimate.

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