

Original article

Cannabis: A cognitive illusion[☆]



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ABSTRACT

Introduction: The vision of cannabis as a soft drug is due to the low risk perception that young and old people have of the drug. This perception is based on erroneous beliefs that people have about the drug.

Objective: To compare the beliefs of cannabis use and consequences among adolescents with a lifetime prevalence of cannabis use and those without a lifetime prevalence of cannabis use.

Method: Quantitative, descriptive and cross-sectional study with a probability sample of 156 high school students who completed an *ad-hoc* questionnaire that included sociodemographic data and 22 questions about the beliefs that young people had about cannabis use and its consequences.

Results: The lifetime prevalence of cannabis use was 13.5%. The prevalence group consisted mostly of males. Statistically significant differences between different groups and different beliefs were found. The group with no lifetime prevalence of cannabis use perceived higher risk as regards the damage that cannabis can cause to memory, other cognitive functions, neurons, mental health, and general health. The group with a lifetime prevalence of cannabis use perceived a lower risk as regards the use of cannabis, and think that intelligent people smoke cannabis, and that cannabis has positive effects on the brain, increasing creativity and is used to cure mental diseases.

Conclusions: Those who used cannabis once in their life perceive the use of the substance as less harmful or less potential danger to health compared to those who never consumed. In fact those who consumed at some time even have beliefs that suggest positive effects in those people that consume it.

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Cannabis: una ilusión cognitiva

R E S U M E N

Palabras clave:

Cannabis
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Introducción: La visión del cannabis como una droga blanda responde a una baja percepción de riesgo que jóvenes y adultos tienen de la droga; esta percepción se funda en creencias erróneas acerca de la droga.

Objetivo: Comparar las creencias acerca del cannabis, su uso y sus consecuencias en adolescentes con prevalencia de vida de uso de cannabis y aquellos sin prevalencia de vida de uso de cannabis.

Método: Estudio cuantitativo, descriptivo y transversal que evaluó una muestra probabilística de 156 estudiantes de enseñanza secundaria con un instrumento *ad-hoc* que incluyó datos sociodemográficos y 22 preguntas acerca de las creencias que tienen los jóvenes sobre cannabis, su uso y sus consecuencias.

Resultados: Se hallaron diferencias estadísticamente significativas entre los diferentes grupos y las diferentes creencias. El grupo sin prevalencia de vida de uso de cannabis percibe mayor riesgo del daño que puede ocasionar el cannabis en la memoria, otras funciones cognitivas, las neuronas, la salud mental y la salud general. El grupo de prevalencia de vida de uso de cannabis percibe menos riesgo del uso de cannabis y piensa que la gente inteligente fuma cannabis, que el cannabis tiene efectos positivos para el cerebro, que aumenta la creatividad y que se utiliza para curar enfermedades mentales.

Conclusiones: Quienes consumieron cannabis alguna vez en la vida perciben el uso de la sustancia como menos nocivo o con menor potencial de peligrosidad para la salud que quienes nunca consumieron. De hecho quienes consumieron alguna vez incluso tienen creencias que sugieren efectos positivos en los seres humanos que consumen.

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Introduction

Cannabis sativa, the main active component of which is Δ -9-tetrahydrocannabinol, is the world's most widely used illegal drug.¹ Epidemiological research carried out over the past 10 years indicates that regular cannabis use, amounting to 10 or more cannabis cigarettes per month² during adolescence and adulthood, may have adverse effects.³ 30–50% of substance abuse problems begin in childhood and adolescence.⁴ In Colombia, 11.5% of the population aged between 12 and 65 years has tried marijuana, and the age at onset of consumption is 17.6 years,⁵ with some studies reporting younger ages.⁶

The fact that cannabis is the most widely used illicit drug by young people is due, according to various authors, to the false belief that the drug might only result in minor harm.^{7–10} Beliefs are ideas or generalisations used to interpret reality and are based precisely on references such as personal experiences, information received from others, imagination and inferences.¹¹

Distorted beliefs lead to a subsequent low risk perception, and this plays a vital role with regard to behavioural intention, as people make situational decisions (such as whether to use or not) based on their beliefs or ideas regarding the consequences this will have (positive or negative).¹²

The literature suggests that cannabis use can cause various disorders and alterations in multiple organs and systems, as well as in different areas and functions.^{13,14} Cannabis use can

affect the brain from both a structural and functional point of view, with abnormalities evinced in the hippocampus, amygdala and axonal connectivity.^{15–17}

As regards mental health, scientific evidence suggests a strong association between cannabis use and the onset or worsening of mental disorders such as schizophrenia,^{1,18–24} bipolar disorder,^{25–30} depression,³¹ anxiety attacks³⁰ or panic disorders³² and dependence.^{26,33–35}

The neuropsychological effects of cannabis use have also been widely studied over the past few years³⁶ and it is understood that its use might affect (at least temporarily) short-term memory, working memory, sustained attention, response inhibition capacity, decision making, consequence assessment and the interaction between cognitive events and emotions.^{37,38} The inhibition of these functions might be seen in different spheres, such as a poor academic performance among adolescents^{13,14,39–42} and, although not exclusive to young people, poor driving performance, with high accident and mortality rates recorded.^{43–45}

Cannabis use is also associated with respiratory-type problems such as dyspnoea, pharyngitis, aphonia and asthma exacerbation.⁴⁶ Moreover, and as a result of the substances added by cannabis traffickers (such as silica sand and glass powder), problems such as pneumonitis, mouth ulcers, throat pain and coughs are reported.⁴⁷

Conversely, the positive effects of using the substance generate controversy, at least with regard to creativity. Green et al. suggested in their study that at least 50% of cannabis users

reported an increase in creativity while in a state of acute intoxication⁴⁸; however, other studies⁴⁹ suggest that subjects intoxicated with highly potent cannabis show worse performances in the creative sphere.

As regards the medicinal use of cannabis, a few medicinal products have been legalised; dronabinol and nabilone (USA) are indicated for chemotherapy-induced nausea and vomiting and AIDS-related anorexia and weight loss; nabiximols (Canada) is indicated for cancer-related pain and neuropathic pain in multiple sclerosis; and rimonabant (Europe) for reducing appetite in obesity.^{50,51}

Beyond the approved indications, according to certain studies there are cannabis derivatives that promise positive effects on glaucoma, epilepsy,⁵² stress, anxiety, insomnia, poor concentration, depression,⁵³ multiple sclerosis,⁵⁴ Crohn's disease and inflammatory bowel diseases,⁵⁵ and which act as anti-neoplastic agents with an anti-tumour effect.⁵⁶

In spite of the foregoing, the idea that marijuana is a soft drug with few harmful effects has persisted for some time now. This is in line with the low risk perception among young people and adults,²⁶ at least with regard to certain aspects, which is supported by false beliefs and perceptions.^{12,57-59}

Of the people who try cannabis, many know nothing about the substance, its use or consequences; there is a gap between the beliefs surrounding the substance and the reality backed by scientific evidence.

In their respective studies, Okaneku et al. and Merryll report that, among adolescents, cannabis use is perceived to be less hazardous by males, which might explain why they are the heaviest consumers.^{60,61}

Moreover, Manrique-Morales et al. found in their study that consumers have a higher number of positive beliefs regarding cannabis use, such as that consumption is not linked to intellectual or behavioural alterations, has no negative effects on health, does not cause addiction and is also beneficial for certain diseases.⁶²

Another similar study found that young people have contradictory impressions of cannabis. On the one hand, they believe that users can go crazy (although this belief changes once consumption has begun) and, on the other, that marijuana is not bad because it does not have any visible physical consequences, is linked to artistic inspiration, is associated with boldness and a lack of pain and also that it is medicinal.⁸

These beliefs not only affect individuals, but also collectives, as they have led the majority of debates and policies on legalisation to take place and culminate without taking into account the impact of cannabis use on young people or considering scientific data on the subject.⁷

Studies like this one have been conducted in Colombia and other countries. However, on the one hand, they are always carried out with qualitative designs to assess social perceptions and, on the other, they never compare the beliefs of those who have used the drug at least once and those who have not.

In light of the above, studying beliefs is extremely important as it may indicate highly effective objectives for preventive and educational interventions targeting adolescents. The objective of this study is to describe and compare perceptions surrounding cannabis, its use and consequences among adolescents between the ages of 13 and 18 who attend state secondary schools and have or have not used cannabis.

Objectives

To compare beliefs on cannabis, its use and consequences among adolescents between the ages of 13 and 18 who attend state secondary schools with and without a lifetime prevalence of cannabis use.

Material and methods

Design

A quantitative, cross-sectional descriptive study.⁶³

Participants

A probability sample of 156 secondary school pupils (Colombian school grades 6-11) from the city of Montería (Córdoba, Columbia) was assessed using a probability-based sample design (43.6% female). The mean age of the sample was 15.2 ± 1.5 (range 13-18) years. The entire sample was distributed according to the lifetime prevalence of cannabis use (13.5% had used cannabis versus 86.5% non-users).

The inclusion criteria comprised the submission of an informed consent form signed by the pupil's parents/guardians and being aged between 13 and 18 years.

Instruments

To assess the different study variables, an *ad-hoc* instrument was used, which included: (a) socio-demographic data (age, gender, school grade, household members, number of siblings, country of origin, economic stratum, sum of money given to pupils by their parents each week, sports practice and tobacco and alcohol consumption), and (b) a questionnaire on beliefs regarding cannabis, its use and consequences. This questionnaire was produced based on a questionnaire used in a similar study on a population of Argentinian adolescents.⁵⁹ The questionnaire comprised 22 items (Table 1). Each of the questions has a Likert-type response option (1, totally disagree; 2, disagree; 3, undecided or unsure; 4, agree; and 5, totally agree).

Procedure

Before commencing data collection, the investigators asked the school's permission to access the sample. With the school's approval, visits were carried out in each class and pupils were informed of the study's objectives, scope, procedures and potential risks. Each pupil received an informed consent form which they had to return signed by their parents or guardians within one week at the latest. Of the 750 informed consent forms issued, consent was obtained from the parents/guardians of the 156 students who ended up participating in the study.

Assessments were conducted for two weeks at the school itself, with two different investigators collecting the data over several sessions lasting approximately 45 min each.

Table 1 – Beliefs regarding cannabis, its use and consequences.

Item	Mean	Mann–Whitney U test	Z	p (two-tailed)
1. Does using marijuana harm your memory?				
NLP	82.52	874.5	-3.105	<0.01 ^a
LP	52.64			
2. Does using marijuana damage cognitive functions such as attention, decision making and risk perception?				
NLP	81.68	988.0	-2.366	0.01 ^b
LP	58.05			
3. Does smoking marijuana affect the lungs?				
NLP	80.26	1180.5	-1.361	0.17
LP	67.21			
4. Does smoking cigarettes (tobacco) affect the lungs more than smoking marijuana?				
NLP	78.83	1373.5	-0.242	0.80
LP	76.4			
5. Does smoking marijuana lead to dependency?				
NLP	79.75	1248.5	-0.901	0.36
LP	70.45			
6. Can smoking marijuana affect the neurons?				
NLP	81.73	981.5	-2.437	0.01 ^b
LP	57.74			
7. Does smoking marijuana affect mental health?				
NLP	81.6	999.0	-2.376	0.01 ^b
LP	58.57			
8. Can smoking marijuana trigger a mental disorder such as anxiety, depression or schizophrenia?				
NLP	79.87	1232.5	-1.036	0.30
LP	69.69			
9. Do drug traffickers enhance the potency of marijuana so that its effects are stronger and to make it harder to give up?				
NLP	80.8	1107.5	-1.665	0.09
LP	63.74			
10. Is the marijuana sold on the street always pure?				
NLP	77.19	1240.0	-0.964	0.33
LP	86.95			
11. Can using marijuana lead to legal problems?				
NLP	79.98	1217.5	-1.124	0.24
LP	68.98			
12. Is marijuana a dangerous drug?				
NLP	82.16	923.0	-2.868	<0.01 ^b
LP	54.95			
13. Does smoking marijuana harm your health?				
NLP	80.86	1099.5	-1.897	0.05 ^a
LP	63.36			
14. Does marijuana have positive effects on the brain?				
NLP	74.65	898.0	-2.774	<0.01 ^b
LP	103.24			
15. Does marijuana increase creativity?				
NLP	74.07	819.0	-3.219	<0.01 ^b
LP	107			
16. Is marijuana less harmful than alcohol and tobacco?				
NLP	75.91	1067.5	-1.879	0.06
LP	95.17			
17. Do intelligent people smoke marijuana?				
NLP	75.27	982.0	-2.405	0.01 ^b

– Table 1 (Continued)

Item	Mean	Mann–Whitney U test	Z	p (two-tailed)
LP	99.24			
18. Does marijuana have medicinal effects?				
NLP	75.89	1065.0	-1.879	0.06
LP	95.29			
19. Is marijuana used to cure mental illnesses?				
NLP	75.2	972.0	-2.380	0.01 ^b
LP	99.71			
20. Can frequent marijuana use affect your academic performance?				
NLP	78.59	1405.0	-0.068	0.94
LP	75.57			
21. Can frequent marijuana use lead to problems with your family, partner or friends?				
NLP	78.96	1356.0	-0.358	0.72
LP	75.57			
22. Can smoking marijuana affect your ability to drive?				
NLP	78	1350.5	-0.366	0.71
LP	81.69			
^a p < 0.05.				
^b p < 0.01.				

Data analysis

Once the data had been collected, they were tabulated and used to create a database with 156 participants.

For the statistical analyses, the SPSS statistics software (v. 23.0) for Windows was used (SPSS, Inc.). The first step was to perform descriptive analyses for the entire sample and their socio-demographic, familial and social variables. Next, the total sample was divided into two groups according to their lifetime prevalence of marijuana use, comparing the socio-demographic, familial and social variables between them.

The techniques used were frequency analysis, descriptive analysis, the Student's t test, Mann–Whitney U test and the χ^2 test. A p value of <0.05 was considered statistically significant.

The Cronbach's alpha internal consistency method was used to estimate the reliability of the instrument used to assess their beliefs. In this case, an α value of 0.88 was obtained, which indicates adequate reliability.⁶⁴

Results

The total sample (Table 2) consisted of 156 pupils (88 females and 68 males), with an average age of 15.2 years.

Lifetime prevalence of cannabis use was found to be 13.5% (n=21) versus 86.5% (n=135) who had never used the substance. There were no statistically significant differences in mean age or school grade between the groups.

It can also be observed (Table 2) that the lifetime prevalence of cannabis use group was mainly composed of males (14 [66.7%] versus 7 [33.3%]) compared to the group with no lifetime prevalence of cannabis use (81 [60%] versus 54 [40%]). The mean age at which the subjects from the lifetime prevalence of cannabis use group first tried the substance was 11.85 ± 5.13 years. As regards legal substance use within the

Table 2 – Socio-demographic data.

	Mean	Mann-Whitney U test	Z	p (two-tailed)
<i>Age</i>				
No cannabis use (n = 135)	77.15	1.235	-0.966	0.33
Cannabis use (n = 21)	87.19			
<i>Economic stratum</i>				
No cannabis use (n = 135)	77.4	1.269	-0.863	0.38
Cannabis use (n = 21)	85.55			
<i>School grade</i>				
No cannabis use (n = 135)	81.13	1.063	-0.061	0.06
Cannabis use (n = 21)	61.62			

Table 3 – Drug use.

	Total subjects (n = 156)	No cannabis use (n = 135)	Cannabis use (n = 21)	χ^2
<i>Gender</i>				
Female	88 (56.4)	81 (60.0)	7 (33.3)	5.256 ^a
Male	68 (43.6)	54 (40.0)	14 (66.7)	
<i>Does anyone in your family use legal drugs?</i>				
Yes	111 (71.2)	95 (70.4)	16 (76.2)	0.3
No	45 (28.8)	40 (29.6)	16 (76.2)	
<i>Does anyone in your family use illegal drugs?</i>				
Yes	30 (19.2)	20 (14.8)	10 (47.6)	12.591 ^b
No	126 (80.8)	115 (85.2)	11 (52.4)	

The values are expressed as n (%).

^a $p < 0.05$.

^b $p < 0.01$.

pupils' families, no statistically significant differences were detected. Nevertheless, differences were found on evaluating illegal substance use, and the families of the lifetime prevalence of cannabis use group were those with the highest consumption of this type of substance (Table 3)

Statistically significant differences were found in various beliefs regarding the negative and potentially positive health consequences that might be experienced by people using the substance.

Unlike the lifetime prevalence of cannabis use group, the group with no lifetime prevalence felt there is a greater risk of marijuana consumption damaging the user's memory and other cognitive functions. This group was also more convinced that marijuana use could affect neurons and mental health; they also saw marijuana use as potentially dangerous and harmful to health in general, unlike those who had tried the drug.

In contrast, those who had tried cannabis largely agreed with other items, with statistically significant differences compared to the pupils who had not. The lifetime prevalence of cannabis use group mostly mentioned that using marijuana can have positive effects on the brain, which may even increase creativity. Moreover, these pupils mostly stated that intelligent people smoke marijuana, and that the drug is also used to cure mental illnesses.

Despite there being no statistically significant differences among other items, in the scores of the group with no lifetime prevalence of cannabis use, greater agreement can be noted with regard to certain points, such as the effect of cannabis

on the lungs, legal problems related to consumption and the possibility of becoming dependent.

Discussion

The results of the study show a lifetime prevalence of cannabis use >13.5% (11.5%)⁵ and a strikingly lower age at onset of consumption (11.5 years) than the figure expressed in the latest Colombian National Study on Psychoactive Substance Use (17.6 years). However, while these discrepancies are significant from a clinical point of view, differences between the studies may be attributed to sample sizes. If consumption were to become regular, this decreasing age at onset implies graver consequences for future young consumers than for those who start using later on.

The study compared beliefs on cannabis, its use and consequences among pupils who had tried it at least once and those who had never tried it. As explained previously, beliefs depend on personal experiences, information received from others (family, friends, the media, etc.), imagination and/or inferences. It is worth mentioning that, among the study results, we also assessed whether the families of the groups compared used legal and illegal drugs. Those from the lifetime prevalence of cannabis use group indicated that their families used illegal drugs on more occasions. This is likely to cause the beliefs of this group to differ from the group with no lifetime prevalence of cannabis use, given that it is a way of transmitting the idea that using drugs, and illegal ones at that, is at least possible provided that someone else is using them.

Furthermore, the lifetime prevalence of cannabis use group consisted mainly of males. As explained by Okaneku et al. and Merrill, this is probably due to the fact that males perceive a lower degree of risk, which would thus drive them to try the substance.

On comparing these findings with those of other studies, differences in beliefs regarding cannabis, its use and consequences can also be found. Unlike the other group, the lifetime prevalence of cannabis use group believes that cannabis use has positive effects on the brain and that it is even used to cure mental illnesses. Evidence from other studies suggests the opposite, since using the substance would imply functional and structural problems in different parts of the brain¹⁵⁻¹⁷ as well as neuropsychological disorders,³⁶⁻³⁸ and may trigger or aggravate the onset of mental disorders.^{1,18-24}

The lifetime prevalence of cannabis use group mostly believes that using cannabis increases creativity, much like the adolescents from the Sierra et al. study, who believe it increases artistic inspiration. This aspect remains subject to debate as there is no definitive answer.

As regards intellectual performance, Manrique-Morales et al. indicated that the young people from their sample believed that using cannabis did not affect their intellectual capacities. In this study, the adolescents who reported having consumed cannabis even believe that cannabis is used by intelligent people. Although there is no evidence in the literature of intelligent people being the predominant cannabis users, it is known that use, and particularly prolonged use, affects intellectual functions.³⁴⁻³⁶

In contrast, the pupils who have never consumed cannabis believe that use does represent a risk to mental health, cognitive functions and neurons, and that it is potentially dangerous and harmful to health.

In summary, the differences between these two groups regarding beliefs on cannabis, its use and consequences may firstly stem from the fact that the lifetime prevalence of cannabis use group had already had at least one experience of consumption, which might have downplayed their negative beliefs and enhanced the positive ones. Secondly, such differences may be due to the fact that this group consisted mainly of males, with it now being known that they have a lower risk perception regarding drugs. Thirdly, a relative with a history of cannabis use (past or present) might stimulate and/or reinforce positive and favourable beliefs in young people with regard to its use and consequences.

With respect to the first point, there may be other directions regarding the relationship between previous cannabis use and the beliefs that subjects uphold. One of these directions is having had positive and/or negative beliefs downplayed prior to consumption and thus trying the substance; another potential direction includes the former and, after trying the substance and not having any negative reactions, positive beliefs have been reinforced.

Conclusions

The results of this study indicate, on the one hand, that the lifetime prevalence of cannabis use is slightly higher than the figure resulting from national studies and that users are

mainly male. On the other hand, the age at onset of consumption is considerably lower than those expressed by the aforementioned studies.

Having relatives who use illegal drugs, being male and having tried cannabis at least once are associated with a change in beliefs. As such, it is not necessary to have consumed the drug recently or chronically to undergo such a change.

The beliefs maintained by the lifetime prevalence of cannabis use group are characterised by being less negative as regards the effects of cannabis on various health aspects (e.g. effects on organs and systems), which highlights the positive elements the substance might induce (e.g. increased creativity) as well as pain-relieving and curative effects (e.g. curing mental illnesses). Performing studies that assess the system of beliefs surrounding drug use with bigger samples in the region, which propose the design of intervention strategies and adolescent education, is both necessary and important so that state policies on public health may take these into account.

Limitations

The participation and types of responses given by some of the individuals assessed may be biased. As a minimum, non-response bias and volunteer bias were possible in this study: potential subjects who did not want to participate and were induced by their parents (who signed the informed consent) and subjects who were users but failed to state this in their responses. Likewise, it is likely that pupils using the drug did not hand over the informed consent form at home so as to avoid having to participate due to fear of their case being identified.

Ethical disclosures

Protection of human and animal subjects. The authors declare that no experiments were performed on humans or animals for this study.

Confidentiality of data. The authors declare that no patient data appear in this article.

Right to privacy and informed consent. The authors declare that no patient data appear in this article.

Conflicts of interest

The authors have no conflicts of interest to declare.

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