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Research

Long term marijuana users seeking medical cannabis in California (2001–2007): demographics, social characteristics, patterns of cannabis and other drug use of 4117 applicants

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Abstract

Background: Cannabis (marijuana) had been used for medicinal purposes for millennia. Cannabinoid agonists are now attracting growing interest and there is also evidence that botanical cannabis is being used as self-medication for stress and anxiety as well as adjunctive therapy by the seriously ill and by patients with terminal illnesses. California became the first state to authorize medicinal use of cannabis in 1996, and it was recently estimated that between 250,000 and 350,000 Californians may now possess the physician's recommendation required to use it medically. More limited medical use has also been approved in 12 additional states and new initiatives are being considered in others. Despite that evidence of increasing public acceptance of "medical" use, a definitional problem remains and all use for any purpose is still prohibited by federal law.

Results: California's 1996 initiative allowed cannabis to be recommended, not only for serious illnesses, but also "for any other illness for which marijuana provides relief," thus maximally broadening the range of allowable indications. In effect, the range of conditions now being treated with federally illegal cannabis, the modes in which it is being used, and the demographics of the population using it became potentially discoverable through the required screening of applicants. This report examines the demographic profiles and other selected characteristics of 4117 California marijuana users (62% from the Greater Bay Area) who applied for medical recommendations between late 2001 and mid 2007.

Conclusion: This study yielded a somewhat unexpected profile of a hitherto hidden population of users of America's most popular illegal drug. It also raises questions about some of the basic assumptions held by both proponents and opponents of current policy.

Methods

Development of standardized interview

The early discovery that nearly all applicants had tried (initiated) cannabis, alcohol, and tobacco during adolescence eventually led to selection of a standardized clinical interview (SCI) as the optimum way to obtain the basic information required to assess their past use of cannabis.

Data gathered using a prototype of the SCI to screen 622 consecutive new applicants between July 1 and December 31, 2002 were analyzed in a simple relational database.

Results were later reported at a May 2004 meeting and eventually published in 2005 [1]. Meanwhile, the original questions, in somewhat modified form, have been used to screen all new applicants including those seeking annual "renewals," from January 2003 on. Thus 199 of 951 (21%) of those originally screened with less searching examinations while the SCI was being developed, eventually served as their own controls. Their responses confirmed that they shared the same general characteristics as the others and also that the sensitive information sought would be provided only if specifically requested. In late 2005 a more sophisticated relational database was created and later customized with drop-down menus to allow responses to be entered directly into a laptop computer in real time, thus incorporating the database as an intrinsic part of the medical record.

Selection of areas of interest

Once the linkage between cannabis, alcohol, and tobacco had been appreciated, questions focusing on initiation and subsequent use of all three drugs were asked of several hundred consecutive applicants. The further discovery, that many had tried other "drugs of abuse" was explored by adding questions requiring yes-no responses about their initiations of 8 specific illegal agents. When patterns in personal histories suggested that family relationships and school experiences had also played a significant role in their adolescent drug initiations, the inquiry was broadened to include those areas. A prototype of the standardized clinical interview (SCI) became ready for clinical use by July 1, 2002.

Results
Demographics

4117 individual applicants were seen on as many as four occasions between November 2001 and June 30, 2007. All were seeking a physicians' approval of their use of cannabis; 3187 (77.4%), were male, ranging in age from 16 to 91 when first seen (median age 31). 930 (22.6%) were female, ranging in age from 16 to 89, with a median age of 36. The median age of the entire population was 32, reflecting both the smaller number of females and their somewhat greater age when first seen.

Table 1: Race/ethnicity of entire population (N = 3515). As subsequently shown by a more searching analysis, the composition of the applicant population has been changing steadily.

Caucasian	68.8%
African American	16.2%
Hispanic	8.1%
Asian	5.1%
Other	1.7%

Table 1 shows race/ethnicity for the entire population. Analysis by year-of-birth (Table 2) reveals more Asians and Hispanics among the younger applicants, reflecting the two groups that have been immigrating to California in the greatest numbers in recent years. Analysis by both age and race also revealed other differences.

Tables 3 and 4 summarize educational and occupational histories; Table 5 provides data on applicants who were unemployed when first seen. Overall, this population exhibited lower High School drop out rates and higher percentage of graduates than national averages. The percentages earning Bachelors' degrees and Doctorates are nearly identical to the national average, but only about one half as many had earned Masters' degrees.

Their occupations resembled US averages in some employment areas and were quite different in others (Table 4); in terms of non-occupational divisions (Table 5), a much smaller percentage are retirees, a finding that reflects both their relative youth and the paucity of applicants born before 1946.

Although the extremes of applicant age ranged from 16 to 91, only 3 were under 18 when first seen. The great majority (84.16%) were between 21 and 60, a finding further emphasized when the population is examined by year of birth (Table 6), a perspective that also discloses how few (4.53%) had been born before 1946. The overall male female ratio was nearly four to one (Table 7); however when examined as year of birth cohorts, it varies from over 5:1 for the youngest applicants to almost 3:1 for the oldest. Nearly 70% were Caucasians and 16% were Black, with sizable numbers of Hispanics and Asians (Table 1).

Table 2: Cohort analysis of race/ethnicity (N = 3185). Analysis of racial composition by year of birth cohorts also shows that the applicant population has reflected immigration trends.

	1936–1945	1946–1955	1956–1965	1966–1975	1976–1985
Caucasian	68.3%	76.6%	74.0%	65.4%	66.3%
African American	24.2%	17.5%	16.9%	19.0%	12.7%
Hispanic	5.0%	3.5%	4.8%	7.6%	11.6%
Asian	0.8%	1.0%	3.0%	5.5%	8.0%
Other	1.7%	1.4%	1.3%	2.6%	1.4%

Table 3: Highest Education Attainment over 25, Applicants compared to US Population (N = 936). In general, cannabis applicants compared favourably with national averages.

	Patient	US
Drop Out	11.1%	14.1%
Diploma	61.3%	49.0%
Associate	5.3%	8.8%
Bachelors	18.3%	18.4%
Master/Prof	2.7%	8.4%
Doctorate	1.3%	1.3%

Initiation and use of cannabis

An overwhelming majority (87.9%) of 3038 applicants queried about the details of their cannabis initiation had tried it before the age of 19, usually in the company of older siblings, cousins or peers. After subtracting those born before 1946, the percentage of applicants who had tried marijuana before the age of twenty went up to 90%. Some became regular users almost immediately, while others remained sporadic users for years (that interval was estimated by asking them when they first began to "buy their own").

Amounts and patterns of cannabis use

Essentially all applicants queried about their current use were consuming inhaled cannabis on a regular basis in

Table 4: Occupational divisions for employment for applicants and US population (N = 2092). The two groups are quite similar with the exception of Construction and Extraction, Office and Administrative Support, which are gender specific professions.

Occupational Divisions	Patient	US
Management	4.59%	4.57%
Business and Financial Operations	3.25%	4.15%
Computer and Mathematical	3.59%	2.27%
Architecture and Engineering	1.72%	1.83%
Life, Physical, and Social Science	.53%	.91%
Community and Social Service	1.67%	1.3%
Legal	.76%	.76%
Education, Training and Library	3.15%	.62%
Arts, Design, Entertainment Sports and Media	7.46%	1.29%
Healthcare Practitioner and Technical	1.58%	5.02%
Healthcare Support	2.82%	2.58%
Protective Service	1.34%	2.35%
Food Preparation and Service Related	6.98%	8.29%
Building and Grounds Cleaning and Maintenance	2.63%	3.33%
Personal Care and Service	2.15%	2.45%
Sales and Related	9.03%	10.69%
Office and Administrative Support	3.35%	17.49%
Farming, Fishing and Forestry	.72%	.34%
Construction and Extraction	18.36%	4.89%
Installation, Maintenance And Repair	8.56%	4.07%
Production	10.9%	7.87%
Transportation and Materials Moving	4.88%	7.36%

Table 5: Non-occupational divisions for applicants and US population (N = 494) The two groups are quite similar except for the relative scarcity of retirees in the applicant population.

Non-Occupational Divisions	Patient	US
Student	8.62%	8.86%
Disabled	3.56%	4.1%
Retired	3.44%	16.92%
Unemployed	3.48%	3.33%

amounts that varied considerably, but tended to remain stable over time. The range is from less than one sixteenth ounce per week to over one ounce, with about 70% estimating they consume between 1/8 and 1/4 oz./week. Almost 90% acknowledge daily, or near daily ("six days a week") use, with about 10% insisting their use is far less frequent, in the range of two to five days/week.

Mode of cannabis use

There was a decided preference for inhaled cannabis. Most had not tried edibles until their own recommendation, or that of a friend, gave them access to edibles from a club or dispensary. Only 50 of 830 (6%) questioned about edibles were using them on a regular basis. The reasons given were that edible effects were more difficult to control and more likely to be undesirable and/or prolonged.

Initiation and use of tobacco and alcohol

One of the more significant patterns revealed by comparing average initiation ages for cannabis, alcohol and tobacco within the context of birth cohorts was that the oldest Baby Boomers had tried cannabis at a considerably later age than their younger successors. By 1975, less than ten years after the "Summer of Love," in 1967, cannabis was being initiated by over half of all American adolescents at close to the same average ages they also were trying alcohol and tobacco (Table 8, Figure 1).

Essentially all applicants also admitted to trying alcohol. Nearly two thirds (64.3%) of the 1226 specifically queried about alcohol blackouts had experienced at least one and 6.26% admitted to four or more. Of 1214 applicants asked to compare their current alcohol consumption with their previous lifetime peak, 130 (10.7%) claimed to be

Table 6: Distribution by year of birth cohorts (N = 3946). This further emphasizes that one's birth cohort determines what drugs one can try during adolescence.

Before 1945	4.5%
1946–1955	14.6%
1956–1965	17.3%
1966–1975	25.9%
1976–1985	35.1%
After 1986	2.6%

Table 7: Birth cohorts and gender (N = 3906). Although women were outnumbered by men in each cohort, there were significant differences noted with age.

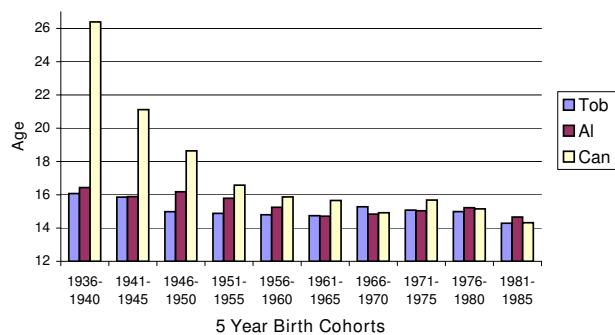|	Male	Female
1936–1945	73.4%	26.6%
1946–1955	68.6%	31.4%
1956–1965	72.5%	27.5%
1966–1975	80.1%	19.9%
1976–1985	82.5%	17.5%
? 1986	82.3%	17.7%

Figure 1
Average initiation age tobacco, alcohol and cannabis. Those born before 1940 were fewest in number; they had also tried cannabis at the oldest average age. Baby Boomers born after 1946 were the first large cohort, and their successors were still younger when they tried cannabis. The 61–65 cohort initiated cannabis, alcohol, and tobacco at essentially the same average age.

abstinent, 341 (28%) said they were drinking less than 5% of their lifetime peaks, and an overwhelming 1058 (87%) claimed to be drinking less than half as much. Most of those who noted little change from their lifetime peaks had been moderate drinkers to begin with. This is evidence that once cannabis was established as their drug of choice, this population's subsequent alcohol consumption diminished; both collectively, and as individuals, a finding that clearly deserves further evaluation.

A history of cigarette initiation, later followed by chronic use, was prevalent in this population. 2559 of 2741 (96.4%) applicants, when asked if they had ever tried inhaling a cigarette, had done so; of 1324 who were specifically queried about their lifetime cigarette use, 872 (65.8%) had become daily smokers for some length of time. Although all but four of those still smoking claim they want to quit, only 316 (36.2%) of all smokers (23.9% of respondents) had been able to do so by the time of the interview. Most who are still smoking have reduced their daily cigarette consumption; a majority relate temporary increases in their daily cigarette use to "stress." Thus the impact of daily cannabis use on cigarette consumption, although less impressive than is the case with alcohol, also seems significant and worthy of further exploration.

Table 8: Average initiation ages for entry level agents (N = 2498). This table is depicted by Figure 1 and emphasizes the rapid fall in age at initiation of cannabis after it first became available in high schools.

	Tobacco	Alcohol	Cannabis
1936–1940	16.07	16.43	26.39
1941–1945	15.86	15.89	21.12
1946–1950	14.98	16.18	18.64
1951–1955	14.88	15.79	16.58
1956–1960	14.8	15.25	15.87
1961–1965	14.74	14.71	15.66
1966–1970	15.28	14.84	14.92
1971–1975	15.08	15.04	15.68
1976–1980	14.99	15.22	15.15
1981–1985	14.29	14.66	14.32

Other drug initiations
When examined from the standpoint of both year of birth (YOB) cohorts and admitted initiations of other illegal agents (Table 9, Figure 2) noticeable and consistent differences are revealed: whites in every age cohort had consistently tried all other illegal agents more frequently than other racial groups (Table 10).

Further cohort analysis of this population's adolescent interest in other illegal drugs, plus its nearly universal initiation of alcohol and tobacco, suggest that while race (Table 10), and generation (Table 9) exert significant influences, gender merely parallels ethnicity (Table 11).

Despite such differences (Tables 9 &10), all cohorts and racial groups have shown steady downward trends in their initiation of all other illegal drugs, with the interesting exception of psychedelic mushrooms (psilocybin) and, perhaps, ecstasy (MDMA).

Discussion
It has long been recognized that users of illegal drugs may be difficult to identify, let alone recruit into a study [2]. That chronic users of cannabis would seek medical evaluations and be so willing to share sensitive personal information within the context of their required evaluations was the unanticipated benefit of Proposition 215 that made this study possible.

Birth cohort analysis of the average ages at which applicants reported first trying alcohol, tobacco and cannabis (Table 8, Figure 1) demonstrates that a surge in youthful marijuana use began in the US in the mid Sixties. How-

Table 9: Initiation rates for other illegal drugs by YOB cohorts (N = 2364). With the exception of "magic mushrooms," and ecstasy (a psychedelic made illegal in 1988), initiation rates for all Schedule One drugs have declined since 1975.

	1936–45	1946–55	1956–65	1966–75	1976–85
Psilocybin	61.36%	74.52%	71.06%	71.07%	74.58%
LSD	67.05%	79.56%	63.79%	61.68%	50.60%
P/M	60.92%	65.75%	40.89%	22.27%	15.09%
Cocaine	81.82%	87.60%	81.50%	63.59%	54.40%
Meth	44.83%	60.44%	57.21%	48.28%	31.56%
MDMA	16.28%	16.57%	20.79%	51.49%	55.89%
Heroin	25.29%	33.06%	16.67%	13.02%	7.69%

ever, that event was not documented until publication of the first Monitoring the Future (MTF) data in 1975 demonstrated that over half of American adolescents were trying marijuana while still in High School [3].

Close questioning of applicants suggests that the majority had been motivated by a mix of physical and emotional symptoms which had been experienced at varying times in their lives. Further, that a majority had become initiates, and later chronic users of cannabis under circumstances that suggest that it was for relief of emotional symptoms in most instances. Their discovery (usually later), that cannabis also relieved physical symptoms, was most frequently made within a context of established chronic use. That notion is further supported by recent literature indicating that phytocannabinoids, newly discovered endocannabinoids, and synthetic cannabinoid agonists all seem to manifest anxiolytic effects in both humans and animals [4-8].

More than 85% of applicants had tried other illegal drugs, principally lysergic acid diethylamide (LSD), psilocybin, cocaine, and/or MDMA. The majority of those doing so hadn't remained chronic users of any except cannabis. While a majority have continued to use alcohol occasionally, the volumes consumed and the occurrence of events related to alcohol excess have sharply diminished.

A "gateway" hypothesis had developed from observations [9] that most marijuana users studied in the early Seventies were adolescents and young adults who had first tried alcohol and tobacco; also that many had tried marijuana before later trying heroin. However, subsequent efforts to establish a definitive causal link between marijuana and "harder" drugs have been largely unsuccessful [10]. More recently, a theoretical alternative was shown to provide an explanation for accumulated MTF data that is at least as coherent [11].

A significant percentage of male applicants under 30 had been treated or evaluated for treatment with Ritalin or other stimulants for attention deficit hyperactivity disorder (ADHD) as children and their histories of a preference for morning use of minimal amounts strongly suggest that inhaled cannabis enhances their ability to concentrate. The statement of one, a construction company estimator, was revealing: "after two hits (of marijuana), and my morning coffee I'm the best estimator in the company." Another, a dental technician, stated that, when I first look at my workbench, I think I'll never finish, but after a couple of tokes (of marijuana), I'm through (with work) by two o'clock." Thus, reduction of work related anxiety seems a major factor in deciding to apply for legalized use of cannabis.

Conclusion

Analysis of the demographic and social characteristics of a large sample of applicants seeking approval to use marijuana medically in California supports an interpretation of long term non problematic use by many who had first

Table 10: Initiations of other illegal drugs by race (N=2400). Although race seems related to initiation rates throughout, this shows that drug initiations by all aces trying cannabis have been falling proportionately as the adolescent market matured.

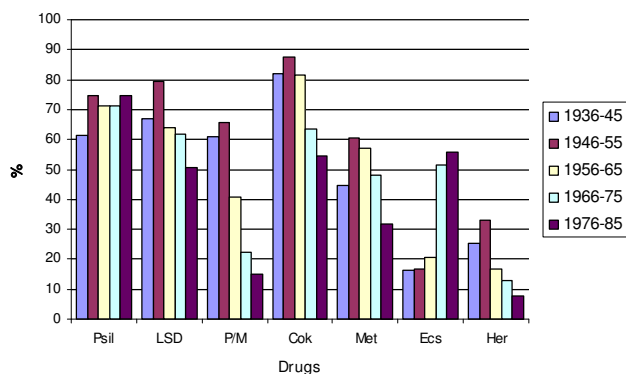|	Caucasian	African American	Hispanic	Asian
Psilocybin	82.33%	41.08%	53.50%	65.21%
LSD	69.56%	28.13%	43.71%	42.47%
P/M	35.19%	21.42%	15.34%	19.82%
Coke	74.21%	49.76%	55.55%	51.30%
Meth	52.59%	20.28%	34.67%	30.08%
MDMA	43.43%	28.88%	31.21%	64.65%
Heroin	17.54%	10.50%	7.10%	7.75%

Figure 2
Other illegal drugs tried by 10 year cohort analysis.
Interestingly, while all cohorts sampled other illegal drugs
aggressively during adolescence, the rates at which they've
done so have fallen progressively. Note also the striking gen-
erational differences in peyote/mescaline initiations by older
cohorts and ecstasy by younger ones.

tried it as adolescents, and then either continued to use it
or later resumed its use as adults. In general, they have
used it at modest levels and in consistent patterns which-
anecdotally- often assisted their educational achievement,
employment performance, and establishment of a more
stable life-style. These data suggest that rather than acting
as a gateway to other drugs, (which many had also tried),
cannabis has been exerting a beneficial influence on most.

Anecdotal evidence from repeated clinical contacts, and
other data gathered incidentally over five years of experi-
ence with this population suggests that, except for very
modest alcohol consumption and obligatory (addictive)
use of tobacco by those trying to quit, cannabis is the only
drug used past the age of twenty-five by most. Indeed,
their total drug use histories suggest that by competing
successfully with other, potentially more harmful agents,
cannabis may have actually been protective. Evidence
from federal agencies confirms that, since 1970, there has

been a gradual decrease in consumption of both tobacco
and alcohol (with correlated improvements in health out-
comes) even as cannabis initiation by adolescents has
remained at significant levels and overall chronic use by
adults has been rising steadily.

While this is a self-selected sample (which restricts the
generalizations that can be made from the observations
reported), its large size, the consistency of the patterns
uncovered, as well as their alcohol and tobacco outcomes,
seem significant. For the majority, cannabis can be seen as
an effective anxiolytic/antidepressant, performing as well
or better than many currently available pharmaceutical
agents prescribed for the same symptoms. This finding
lends important support to the concept of allowing can-
nabis to be used medically by all those who have been
chronic users and found it beneficial.

Abbreviations
Attention deficit hyperactivity disorder (ADHD)

Cannabis (Marijuana)

Cocaine (Coke)

Ecstasy (MDMA)

Lysergic acid diethylamide (LSD)

Monitoring the Future (MTF)

Peyote/mescaline (P/M)

Psychedelic mushrooms (Psilocybin)

Standardized clinical interview (SCI)

Tokes (Marijuana)

Year of birth (YOB)

Authors' contributions
TJO conceived the study, designed it, conducted all the
clinical interviews, and wrote the report.

CBB designed the relational data-base for data analysis
and later modified it to serve as medical record since
December 2005. Conducted statistical analysis of data
and contributed several other valuable suggestions and
helped write and edit the report.

Table 11: Initiations of Other Illegal Drugs by Gender (N=2464).
Similarly, although women consistently tried all agents
somewhat less often than men, the close parallels and internal
consistency suggests the data are reliable.

	Male	Female
Psilocybin	74.31%	62.41%
LSD	60.06%	57.54%
P/M	30.93%	28.17%
Coke	67.32%	65.85%
Meth	44.82%	44.01%
MDMA	41.61%	37.57%
Heroin	15.86%	12.32%

References

1. O'Connell TJ: **Cannabis use in adolescence: self-medication for anxiety.** *O'Shaughnessy's* 2005 [http://ccrmg.org/journal/05spr/anxiety.html]. Winter/Spring
2. Weibel WW: **Identifying and gaining access to hidden populations.** *The Collection and Interpretation of Data from HiddenPopulations NIDA Research Monograph. 98 1990 Lambert, EY Ed* [http://www.nida.nih.gov/pdf/monographs/98.pdf].
3. Johnston LD, O'Malley PM, Bachman JG, Schulenberg JE: **Monitoring the Future national survey results on drug use, 1975–2006. Volume I: Secondary school students.** :699 [http://www.monitoringthefuture.org/pubs/monographs/vol1_2006.pdf]. Bethesda, MD: National Institute on Drug Abuse (NIH Publication No. 07-6205)
4. Zuardi AW, Crippa JA, Hallak JE, Moreira FA, Guimarães FS: **Cannabidiol, a cannabis sativa constituent, as an antipsychotic drug.** *Braz J Med Biol Res* 2006, **4:**421?429.
5. Ashton CH, Moore PB, Gallagher P, Young AH: **Cannabinoids in bipolar affective disorder: a review and discussion of their therapeutic potential.** *J Psychopharmacol* 2005, **19:**293?300.
6. Müller-Vahl KR: **Cannabinoids reduce symptoms of Tourette's syndrome.** *Expert Opin Pharmacother* 2003, **4:**1717?1725.
7. Di Marzo V, Bifulco M, De Petrocellis L: **The endocannabinoid system and its therapeutic exploitation.** *Nat Rev Drug Discov* 2004, **9:**771?784.
8. Witkin JM, Tzavara ET, Nomikos GG: **A role for cannabinoid CB1 receptors in mood and anxiety disorders.** *Behav Pharmacol* 2005, **16:**315.
9. Kandel DB: **Stages and pathways of drug involvement.** In *Stages and pathways of drug involvement, Examining the gateway hypothesis* Edited by: Kandel DB. New York: Cambridge University Press; 2002:3?19.
10. Kandel DB, Jessor R: **The gateway hypothesis revisited.** In *Stages and Pathways of Drug Involvement, Examining the gateway hypothesis* Edited by: Kandel DB. New York: Cambridge University Press; 2002:365?392.
11. Morral AR, McCaffrey DF, Paddock SM: **Reassessing the marijuana gateway effect.** *Addiction* 2002, **12:**1493?1504.