

The Health and Psychological Effects of Cannabis Use

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1. Introduction

Appraisals of the health hazards of recreational drug use are unavoidably affected by the societal approval or disapproval of the drug in question. As Room¹ has observed, ethnographers studying the impact of alcohol on non-industrialised societies have often engaged in “problem deflation” in response to the “problem inflation” of missionaries and colonial authorities who used inflated estimates of alcohol’s health and social effects to justify paternalistic alcohol policies. A similar inflationary-deflationary dialectic has been at work in the debate about the health effects of recreational cannabis use.

The countercultural symbolism of cannabis use in the late 1960s has introduced a strong social and political dimension to the debate about the adverse health effects of cannabis which is strongly correlated with political radicalism and conservatism. Politically conservative opponents of cannabis use, for example, justified its continued prohibition by citing evidence of the personal and social harms of its use.² When the evidence is uncertain, as it is with many of the alleged effects of chronic cannabis use, they resolve the uncertainty by assuming that cannabis use is unsafe until proven safe.

Complementary behaviour has been shown by some proponents of cannabis decriminalisation and legalisation. Evidence of harm is discounted, and uncertainties about the ill-effects of chronic cannabis use are resolved by demanding more and better evidence, arguing that until this uncertainty is resolved individuals should be allowed to exercise their free choice about whether or not they use the drug. Such approaches to the appraisal of evidence have not always been consistently applied. Both sides of the debate, for example, would reject (for very different reasons) their own approaches to appraising the health hazards of alcohol, pesticides, herbicides, or chemical residues in food.

The standard legal mechanism for achieving a resolution of a dispute in the face of uncertainty is to place a *burden of proof* upon one or the other side of the argument. This is of little help in the debate about the legal status of cannabis because it is controversial who bears the responsibility for making a case, those who claim that cannabis adversely affects health, or those who doubt it. Proponents of continued prohibition of cannabis use appeal to established practice,³ arguing that since the drug is illegal the burden of proof of its safety falls upon those who want to legalise it. Some proponents of its legalisation respond that this begs the question since there was no evidence, they argue, that cannabis

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1 Room, R, “Alcohol and Ethnography: A Case of Problem Deflation?” (1984) 25 *Curr Anthr* at 169–91.

2 Nahas, G and Latour, C, “The Human Toxicity of Marijuana” (1992) 156 *Med J Aust* at 495–7.

3 Whately, R, *Elements of Rhetoric* (orig publ 1846) in Ethninger, D (ed), 1963.

was harmful when its use was first made a criminal offence. Others argue that the burden of proof falls upon those who wish to use the criminal law to prevent adults from using any drug.⁴

2. *Assessing the Health Risks of Cannabis: Some Modest Proposals*

I make a number of suggestions as to how we could achieve a more rational assessment of the health risks of cannabis.

- **Separate the legal and health issues**

We would improve our appraisals of the health effects of cannabis if this was more clearly distinguished from the debate about the legal status of cannabis use. The failure to separate the two issues means that the appraisers' views of the legal status of cannabis often prejudice their appraisals of its health effects, and vice versa.

- **Stop treating cannabis as a special case**

An assumption shared by both sides in the debates about the health and legal status of cannabis use is that cannabis is a "special" drug. According to its proponents, cannabis is a "mind-expanding", "consciousness-raising" drug, whereas to its opponents, cannabis is a "deceptively dangerous" drug which adversely affects the personalities of users and the fabric of society. I suggest that we should adopt the same approach to appraising the health effects of cannabis as we do to the health effects of other popular and licit recreational intoxicants and stimulants such as alcohol and tobacco.

One consequence of doing so is that an inquiry into the health effects of cannabis will begin with a presumption derived from pharmacology and toxicology that it is likely to harm health when used at some dose, at some frequency or duration of use, or by some methods of administration. This is a reasonable presumption for most drugs, and it is well borne out in the case of alcohol and tobacco. Indeed, given that cannabis is an intoxicant like alcohol, and a drug that is usually smoked like tobacco, there is good reason for expecting it to share at least some of the acute and chronic health effects of these two drugs.

Beginning with this presumption does not necessarily mean that one assumes that cannabis use is unsafe until proven safe. Rather it means that who bears the burden of proof will depend upon the state of the evidence and argument for different health effects. If a *prima facie* case of harm has been made, positive evidence of safety would be required rather than the simple absence of any evidence of ill effect. A *prima facie* case could be either direct evidence that the drug has ill effects in animals or humans (for example, from a case-control study), or some compelling argument that it could.

- **Use a reasonable standard of proof**

If we were to insist upon proof beyond reasonable doubt that there are adverse health effects of cannabis, very few conclusions could be drawn. Sensible, if fallible, health advice can be offered if the evidential criteria are relaxed to permit conclusions to be drawn about the *probable* adverse health effects of cannabis. This standard may be taken to be satisfied by the consensus of informed scientific opinion that sufficient evidence has been provided to infer a probable causal connection between cannabis use and a health outcome.⁵

4 Husak, D N, *Drugs and Rights* (1992).

5 For example see Fehr, K O and Kalant, H (eds), *Cannabis and Health Hazards* (1983); Institute of Medi-

- **Apply standards consistently**

There will always be disagreements about what should count as evidence of adverse health effects. Nonetheless, whatever standards are ultimately decided upon should be applied even-handedly. The best protection against the use of double evidential standards is for those conducting appraisals of the health effects of cannabis to be as explicit as possible about the evidential standards that they have used, and as even-handed as possible in their application.

3. *Adverse Health and Psychological Effects of Cannabis Use*

With these principles in mind I will summarise the major adverse health and psychological effects of acute and chronic cannabis use. The detailed justification for what must necessarily seem dogmatic assertions will be provided later in this year with the publication of a comprehensive review of the relevant literature.⁶

Acute health effects are taken to be those that occur shortly after a single dose or after a small number of occasions of use. Chronic health effects are those that occur after a period of regular use (eg daily) over a period of years or decades. Unless otherwise stated, the route of administration of cannabis is assumed to be primarily by smoking. In each case the adverse effects have been classified by the degree of confidence about the relationship between cannabis use and the adverse effect (probable and possible).

There is uncertainty surrounding many of these summary statements, especially those about the adverse health effects of chronic long-term cannabis use. They depend to varying degrees upon inferences from animal research, laboratory studies, and clinical observations about *probable* ill effects. In very few cases are there sufficient studies which provide the detailed epidemiological evidence necessary to make informed judgements about the magnitude and seriousness of the probable health effects of cannabis. The interpretation of the epidemiological evidence is complicated by difficulties in quantifying degree of exposure to cannabis, and in excluding alternative explanations (including other drug use) of associations observed between cannabis use and adverse health outcomes. Nevertheless, these statements provide the best available basis for making societal decisions about what policies ought to be adopted towards cannabis use.

A. *Acute Effects*

The major acute psychological and health effects of cannabis intoxication are:

- Anxiety, dysphoria, panic and paranoia, especially in naive users;⁷
- cognitive impairment, especially of attention and memory for the duration of intoxication;⁸

cine, *Marijuana and Health* (1982), National Academy Press, Washington DC.

6 Hall, W, Solowij, N and Lemon, J, *The Health and Psychological Effects of Cannabis*, (1994) Report to the National Task Force on Cannabis.

7 Smith, D E, "Acute and Chronic Toxicity of Marijuana" (1968) *J Psychedelic Drugs* 37-47; Thomas, H, "Psychiatric Symptoms in Cannabis Users" (1993) *Brit J Psychiat* 141-9.

8 Chait, L and Pierri, J, "Effects of Smoked Marijuana on Human Performance: A Critical Review" (1992) in Murphy, A and Bartke, J (eds), *Marijuana/Cannabinoids: Neurobiology and Neurophysiology*.

- psychomotor impairment, and probably an increased risk of accidental injury or death if an intoxicated person attempts to drive a motor vehicle or operate machinery;⁹
- an increased risk of experiencing psychotic symptoms among those who are vulnerable because of a personal or family history of psychosis;¹⁰
- an increased risk of low birthweight babies if used during pregnancy.¹¹

B. Chronic Effects

The major health and psychological effects of chronic cannabis use, especially daily use over many years, remain uncertain. On the available evidence, the major *probable* adverse effects appear to be:

- Respiratory diseases associated with smoking as the method of administration, such as chronic bronchitis, and the occurrence of histopathological changes that are precursors to the development of malignancy;¹²
- development of a cannabis dependence syndrome, characterised by a loss of control over cannabis use such as difficulty in abstaining from or controlling cannabis use;¹³
- subtle forms of cognitive impairment, most particularly of attention and memory, which persist while the user remains chronically intoxicated, and may or may not be reversible after prolonged abstinence from cannabis.¹⁴

The following are the major *possible* adverse effects of chronic, heavy cannabis use which remain to be confirmed by controlled research:

- An increased risk of developing cancers of the aerodigestive tract, ie. oral cavity, pharynx, and oesophagus;¹⁵

- 9 Gieringer, D H, "Marijuana, Driving and Accident Safety" (1988) 20 *J Psychoactive Drugs* 93-101; Terhune, K W, "Problems and Methods in Studying Drug Crash Effects" (1986) 2 *Alcohol, Drugs & Driving* 1-13.
- 10 Andreasson, S, Allebeck, P, Engstrom, A and Rydberg, U, "Cannabis and Schizophrenia: A Longitudinal Study of Swedish Conscripts" (1987) 2 *Lancet* 1483-6; Ghodse, A H, "Cannabis Psychosis" (1986) 81 *Brit J Addiction* 473-8.
- 11 Hatch, E E and Bracken, M B, "Effect of Marijuana Use in Pregnancy on Fetal Growth" (1986) 124 *Amer J Epidemiol* 986-93; Zuckerman, B, Frank, D, Hingson, R, Amaro, H, Levenson, S, Kayne, H, Parker, S, Vinci, R, Aboagye, K, Fried, L, Cabral, H, Timperi, R and Bauchner, H, "Effects of Maternal Marijuana and Cocaine Use on Fetal Growth" (1989) 320 *N Eng J Med* 762-8.
- 12 Bloom, J W, Kaltenborn, W T, Paoletti, P, Camilli, A and Lebowitz, M D, "Respiratory Effects of Non-Tobacco Cigarettes" (1987) 295 *Brit Med J* 1516-18; Tashkin, D P, "Is Frequent Marijuana Smoking Harmful to Health?" (1993) *Western J Med* 635-7.
- 13 Anthony, J C and Helzer, J E, "Syndromes of Drug Abuse and Dependence" (1991) in Robins, L N and Regier, D A (eds), *Psychiatric Disorders in America*; Stephens, R S and Roffman, R A, "Adult Marijuana Dependence" (1993) in Baer, J S, Marlatt, G A and MacMahon, R J (eds), *Addictive Behaviors Across the Lifespan: Prevention, Treatment and Policy Issues*.
- 14 Solowij, N, "Event-Related Potential Indices of Cognitive Functioning in Long Term Cannabis Users" (1994) unpublished Doctoral thesis, School of Community Medicine, University of New South Wales, Australia.
- 15 Donald, P J, "Advanced Malignancy in the Young Marijuana Smoker" (1991) in Freidman, H, Specter, S and Klein, T W (eds), *Drugs of Abuse, Immunity, and Immunodeficiency*; Taylor, F M, "Marijuana as a Potential Respiratory Tract Carcinogen: A Retrospective Analysis of a Community Hospital Population" (1988) 81 *Southern Med J* 1213-16.

- an increased risk of leukemia among offspring exposed in utero;¹⁶
- a decline in occupational performance marked by under-achievement in adults in occupations requiring high level cognitive skills, and impaired educational attainment in adolescents.¹⁷

4. High Risk Groups

A number of groups can be identified as being at increased risk of experiencing some of these adverse effects.

Adolescents

- Adolescents with a history of poor school performance whose educational achievement may be further limited by the cognitive impairments produced by chronic intoxication with cannabis;¹⁸
- Adolescents who initiate cannabis use in the early teens are at higher risk of progressing to heavy cannabis use and other illicit drug use, and to the development of dependence on cannabis.¹⁹

Women of Childbearing Age

- Pregnant women who continue to smoke cannabis are probably at increased risk of giving birth to low birthweight babies, and perhaps of shortening their period of gestation;²⁰
- Women of childbearing age who continue to smoke cannabis while trying to conceive or while pregnant possibly increase the risk of their children being born with birth defects.²¹

Persons with Pre-Existing Diseases

Persons with a number of pre-existing diseases who smoke cannabis are probably at an increased risk of precipitating or exacerbating symptoms of their diseases. These include:

- 16 Robinson, L I, Buckley, J D, Daigle, A E, Wells, R, Benjamin, D, Arthur, D C and Hammond, G D, "Maternal Drug Use and the Risk of Childhood Nonlymphoblastic Leukemia Among Offspring: An Epidemiologic Investigation Implicating Marijuana" (1989) 63 *Cancer* 1904–11.
- 17 Kandel, D B, Davies, M, Karus, D and Yamaguchi, K, "The Consequences in Young Adulthood of Adolescent Drug Involvement" (1986) 43 *Archives Gen Psychiat* 746–54; Newcombe, M D and Bentler, P, *Consequences of Adolescent Drug Use: Impact on the Lives of Young Adults* (1988).
- 18 Kandel et al, *ibid*; Newcombe and Bentler, *ibid*.
- 19 Kandel, D B, "Issues of Sequencing of Adolescent Drug Use and Other Problem Behaviors" (1988) 3 *Drugs & Soc* 55–76; Kandel, D B and Davies, M, "Progression to Regular Marijuana Involvement: Phenomenology and Risk Factors for Near Daily Use" (1992) in Glantz, M and Pickens, R (eds), *Vulnerability to Drug Abuse*; Yamaguchi, K and Kandel, D B, "Patterns of Drug Use from Adolescence to Adulthood. II: Sequences of Progression" (1984) 74 *Amer J Pub Health* 668–72; Yamaguchi, K and Kandel, D B, "Patterns of Drug Use from Adolescence to Adulthood. III: Predictors of Progression" (1984) *Amer J Pub Health* 673–81.
- 20 Hatch and Bracken, *above* n11; Zuckerman et al, *above* n11.
- 21 Hingson, R, Alpert, J, Day, N, Dooling, E, Kayne, H, Morelock, S, Oppenheimer, E and Zuckerman, B, "Effects of Maternal Drinking and Marijuana Use on Fetal Growth and Development" (1982) 70 *Pediatrics* 539–46; Linn, S, Schoenbaum, S, Monson, R, Rosner, R, Stubblefield, P C and Ryan, K J, "The Association of Marijuana Use with Outcome of Pregnancy" (1983) 73 *Amer J Pub Health* 1161–64.

- individuals with cardiovascular diseases, such as coronary artery disease, cerebrovascular disease and hypertension;²²
- individuals with respiratory diseases, such as asthma, bronchitis, and emphysema;²³
- individuals with schizophrenia who are probably at increased risk of precipitating or of exacerbating schizophrenic symptoms;²⁴
- individuals who are or have been dependent upon alcohol and other drugs are probably at an increased risk of developing dependence on cannabis.²⁵

5. *A Qualitative Comparison of the Health Risks of Alcohol, Tobacco and Cannabis Use*

The probable and possible adverse health effects of cannabis need to be placed in comparative perspective to be fully appreciated. A useful comparison is with what is known about the health effects of alcohol and tobacco. These are widely used psychoactive drugs with which cannabis shares a route of administration in the case of smoking, and which in the case of alcohol is also used for its intoxicating and euphoriant effects. This comparison is qualitative in the sense of simply indicating whether or not cannabis shares the adverse health effects of alcohol and tobacco. I have used the following authorities as the warrant for assertions made about the health risks of alcohol and tobacco: Anderson et al;²⁶ Holman et al's compendium of the health effects of alcohol and tobacco;²⁷ the Institute of Medicine;²⁸ the International Agency for Research into Cancer;²⁹ Roselle et al;³⁰ and the Royal College of Physicians.³¹

A. *Acute Effects*

Alcohol:

The major risks of acute cannabis use are similar to the acute risks of alcohol intoxication in a number of respects. First, both drugs produce psychomotor and cognitive impairment. The impairment produced by alcohol increases risks of various kinds of accident, and the likelihood of engaging in risky behaviour, such as dangerous driving, and unsafe sexual practices. It remains to be determined whether cannabis intoxication produces similar increases in

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- 22 Aronow, W S and Cassidy, J, "Effect of Smoking Marijuana and a High-Nicotine Cigarette on Angina Pectoris" (1975) 17 *Clin Pharmacol & Therapeutics* 549-54.
- 23 Tashkin, above n12.
- 24 Andreasson et al, above n10; Thomas, above n7.
- 25 Anthony and Helzer, above n13.
- 26 Anderson, P, Cremona, A, Paton, A, Turner, C and Wallace, P, "The Risk of Alcohol" (1993) 88 *Addiction* 1493-1508.
- 27 Holman, C D, Armstrong, B and D'Arcy, C, *The Quantification of Drug-Caused Morbidity and Mortality in Australia 1988* (1988) Commonwealth Department of Community Services and Health, Australia.
- 28 Institute of Medicine, *Causes and Consequences of Alcohol Problems: An Agenda for Research* (1987) National Academy Press, Washington.
- 29 Tomatis, L (ed), *Cancer: Causes, Occurrence and Control* (1990) International Agency on Cancer.
- 30 Roselle, G, Mendenhall, C L and Grossman, C J, "Effects of Alcohol on Immunity and Cancer" (1993) in Yirmiya, R and Taylor, A N (eds), *Alcohol, Immunity and Cancer*.
- 31 Royal College of Physicians, *A Great and Growing Evil: The Medical Consequences of Alcohol Abuse* (1987).

accidental injury and death, although on the balance of probability it does, especially when used in combination with alcohol.

Secondly, there is good evidence that substantial doses of alcohol taken during the first trimester of pregnancy can produce a foetal alcohol syndrome. There is suggestive evidence that cannabis used during pregnancy may have similar adverse effects. Thirdly, there is a major health risk of acute alcohol use that is *not* shared with cannabis. In large doses alcohol can cause death by asphyxiation, alcohol poisoning, cardiomyopathy and cardiac infarct whereas there are no recorded cases of human fatalities attributable to cannabis toxicity.

Tobacco:

The major acute health risks that cannabis share with tobacco are the irritant effects of smoke upon the respiratory system, and the stimulating effects of both THC and nicotine on the cardiovascular system. Both effects can be detrimental to persons with cardiovascular and respiratory diseases.

B. Chronic Effects

Alcohol:

There are a number of risks of heavy chronic alcohol use some of which *may* be shared by chronic cannabis use. Heavy use of either drug increases the risk of developing a dependence syndrome in which users experience difficulty in stopping or controlling their use. There is strong evidence of such a syndrome in the case of alcohol and reasonable evidence in the case of cannabis. A major difference between the two is that it is uncertain whether a withdrawal syndrome reliably occurs after dependent cannabis users abruptly stop their cannabis use whereas the abrupt cessation of alcohol use in severely dependent drinkers produces a well defined withdrawal syndrome which can be fatal.

There is reasonable clinical evidence that the chronic heavy use of alcohol can produce psychotic symptoms and psychoses in some individuals. There is suggestive evidence that chronic heavy cannabis use may produce a toxic psychosis, precipitate psychotic illnesses in predisposed individuals, and exacerbate psychotic symptoms in individuals with schizophrenia.

Chronic heavy alcohol use can, according to good evidence, indirectly cause brain injury — the Wernicke-Korsakov syndrome — with symptoms of severe memory defect and an impaired ability to plan and organise. With continued heavy drinking, and in the absence of vitamin supplementation, this injury may produce severe irreversible cognitive impairment. There is good reason for concluding that chronic cannabis use does not produce cognitive impairment of comparable severity. There is suggestive evidence that chronic cannabis use may produce subtle defects in cognitive functioning that may or may not be reversible after abstinence.

There is reasonable evidence that chronic heavy alcohol use impairs occupational performance in adults and educational achievement in adolescents. There is strongly suggestive evidence that chronic heavy cannabis use produces similar, albeit more subtle impairments in occupational and educational performance.

Chronic, heavy alcohol use, according to good evidence, increases the risk of premature mortality from accidents, suicide and violence. There is no comparable evidence for chronic cannabis use, although it is likely that dependent cannabis users who frequently drive while intoxicated with cannabis increase their risk of accidental injury or death.

Alcohol use also has been accepted as a contributory cause of cancer of the oropharyngeal organs in men and women. There is suggestive evidence that chronic cannabis smoking may also be a contributory cause of cancers of the aerodigestive tract.

Tobacco:

Apart from dependence, the major adverse health effects shared by chronic cannabis and tobacco smokers are respiratory diseases, such as chronic bronchitis, and possibly, cancers of the aerodigestive tract (ie the mouth, tongue, throat, oesophagus, lungs). The increased risk of cancer in the aerodigestive tract is a consequence of smoking as the shared route of administration of cannabis and tobacco. It is possible that chronic cannabis smoking also shares the cardiotoxic properties of tobacco smoking, although this possibility remains to be investigated.

6. *Public Health Significance of Cannabis Use*

The public health significance of cannabis use is measured in terms of the number of individuals whose health is likely to be adversely affected, and the severity of its health consequences for those individuals. It depends upon the magnitude of the risks associated with specific patterns of use (for example, occasional use over a period of months or daily cannabis smoking over decades) and on the prevalence of these different patterns of use.

The standard ways of measuring the magnitude of health risks are relative risk and population attributable risk. The relative risk of cannabis use, for example, is the increase in the odds of experiencing an adverse health outcome among those who use cannabis compared to those who do not. The population attributable risk represents the proportion of cases with an adverse outcome which is attributable to cannabis use. Relative risk is of most relevance to individuals attempting to estimate the increase in their risk of experiencing an adverse outcome if they use a drug. Attributable risk is of most relevance to a societal appraisal of the harms of drug use.

The personal and public health importance of the two measures of risk magnitude depends upon the prevalence of drug use and the base rate of the adverse outcome. An exposure with a low relative risk may have a low personal significance but a large public health impact if a large proportion of the population is exposed (for example, cigarette smoking and heart disease). Conversely, an exposure with a high relative risk may have little public health importance because very few people are exposed to it but major personal health implications exist for those who are exposed. Consequently, an appraisal of the personal and public health importance of cannabis and other illicit drug use must take account not only of the relative risk of harm but also the prevalence of use and the base rate of the adverse effect.

The most recent 1993 NCADA household survey indicates a number of things about the predominant pattern of cannabis use in Australia.³² First, males are more likely than females to have ever used cannabis, and to have used in the past year, and in the past week. Secondly, the highest prevalence of use is in the early 20s. Thirdly, the most common pattern of involvement with cannabis is experimentation in the late teens and discontinuation in the mid to late 20s. Fourthly, even among the younger age groups where rates

32 National Drug Strategy Committee, *1993 National Drug Household Survey* (1993) Australian Government Publishing Service, Canberra.

of cannabis use are highest, only one in four of those who have ever used have used in the past week. Fifthly, the pattern of use that poses the greatest risk of developing adverse health effects from chronic use, namely, at least weekly use, is a relatively rare pattern of cannabis use, and the proportion of users who maintain this pattern for a period of years is very small. All of this suggests that the adverse acute effects of cannabis use are much more likely to be experienced by cannabis users than the adverse effects of long-term use.

A. Acute Health Effects

Adverse Psychological Experiences:

In terms of the number of persons affected, the most common adverse effects of cannabis use are likely to be dysphoric and unpleasant psychological reactions in naive users. These may occur in as many as a third of those who ever use the drug, and their occurrence may be a major explanation for the high rates of discontinuation of its use.³³ Since the majority of these experiences are not life-threatening but are self-limited, easily managed by reassurance, and rarely lead to help-seeking, their public health significance is probably minor.

Motor Vehicle Accidents:

Given the high rates of cannabis use among young adults who are at highest risk of being involved in motor vehicle accidents, accidental injury and death are clearly a much more serious public health issue than transient dysphoria. However, it is difficult to assess the public health significance of motor vehicle accidents caused by cannabis because of the strong association between cannabis and alcohol use. The epidemiological studies suggest that in its own right, cannabis makes at most a very small contribution to motor vehicle accidents, and so on the whole it may seem to be a minor road safety problem by comparison with alcohol.³⁴ Its major public health significance for road safety may be in amplifying the adverse effects of alcohol on the performance of those drivers who combine alcohol and cannabis intoxication.

Low Birthweight Babies:

If we make a worst case assumption that cannabis and tobacco smoking are equivalent in their effects on foetal development, then cannabis smoking during pregnancy may double the risks of a woman giving birth to a low birthweight baby. The public health significance of cannabis use by pregnant women is likely to be much lower than that of tobacco smoking during pregnancy because the prevalence of cannabis use is much lower than that of tobacco. As with alcohol, however, although rates of foetal exposure to cannabis smoke may be relatively low, the risks of a low birthweight baby will be even higher among those cannabis users who also smoke tobacco and have other risk factors for a low birthweight baby.

B. Chronic Health Effects

Dependence:

Cannabis dependence is probably the chronic health effect of cannabis that presents the largest public health problem. On the estimates provided by the Epidemiologic Catchment

33 Goodstadt, M, Chan, G C, Sheppard, M A and Cleve, J C, "Factors Associated with Cannabis Nonuse and Cessation of Use: Between and Within Survey Replications of Findings" (1986) 11 *Addictive Beh's* 275-86; Smart, R G, "The Epidemiology of Cannabis Use and its Health Consequences in Western Countries" (1983) in Fehr, K O and Kalant, H (eds), *Cannabis and Health Hazards*.

34 Gieringer, above n9.

Area Study, approximately 3 per cent of the adult US population met diagnostic criteria for cannabis abuse or dependence as against 14 per cent who met diagnostic criteria for alcohol abuse and dependence.³⁵ Similar figures have been reported in Australian and New Zealand studies.³⁶ This is a substantial proportion of the population, although its consequences are somewhat ameliorated by the high rate of remission of symptoms of cannabis dependence in the absence of treatment, and the fact that there are probably fewer adverse personal and social consequences of cannabis than of alcohol dependence.

Respiratory Diseases:

If we make the worst case assumption that the risks of cancer are comparable among daily tobacco and cannabis smokers then cannabis smoking will make at most a small contribution to the occurrence of these cancers. This is because only a minority of those who ever use cannabis become daily users, and a much smaller proportion of these daily users persist in smoking cannabis beyond their mid-twenties by comparison with the proportions of tobacco smokers who do so. Among this minority, however, concurrent cannabis and tobacco use may amplify each other's adverse respiratory effects.

The public health significance of respiratory diseases such as chronic bronchitis is probably greater than that for respiratory cancers. This is so for two reasons. First, respiratory cancers require a greater length of exposure to cigarette smoke (15 to 20 years) than is required to develop chronic bronchitis. Secondly, there are very few cannabis users who use the drug for more than five years. The exposure period required to develop chronic bronchitis may be shorter still among those cannabis smokers who also smoke tobacco since there is good evidence that concurrent tobacco and cannabis smoking have additive adverse effects on the respiratory system.

Schizophrenia:

There is uncertainty about whether the association observed between cannabis use and schizophrenia is a token of a causal relationship.³⁷ However, even if it is, its public health significance in initiating cases of schizophrenia that would not otherwise occur is likely to be relatively small. Schizophrenia affects approximately 1 per cent of the adult population, and on the data of Andreasson et al,³⁸ cannabis use would be a contributory cause of less than 10 per cent of cases of schizophrenia. Even this figure seems high, however, since the incidence of schizophrenia has declined during the period when cannabis use among adolescents and young adults has increased.³⁹ The public health significance of cannabis use in schizophrenia may be more in precipitating cases earlier than otherwise and in making it harder to control symptoms in affected individuals who use cannabis.

Overall, most of the current public health risks of cannabis use are small to moderate in size. In aggregate, they are unlikely to be comparable to those currently produced by alcohol

35 Anthony and Helzer, above n13.

36 Clayer, J R, McFarlane, A C, Czechowicz, A S and Wright, G, *Mental Health in the Riverland* (1991) South Australian Health Commission, Adelaide; Wells, J E, Bushnell, J A, Joyce, P R, Oakley-Browne, M A and Hornblow, A R, "Problems with Alcohol, Drugs and Gambling in Christchurch, New Zealand" (1992) in Abbot, M A and Evans, K (eds), *Alcohol and Drug Dependence and Disorders of Impulse Control*.

37 Thornicroft, G, "Cannabis and Psychosis: Is There Epidemiological Evidence for Association?" (1990) *157 Brit J Psychiat* 25-33.

38 Above n10.

39 Der, G, Gupta, S and Murray, R M, "Is Schizophrenia Disappearing?" (1990) *1 Lancet* 513-16.

and tobacco. This is largely because on current patterns of use the proportion of the population that uses cannabis heavily over a period of years is much smaller than the proportions that use alcohol or tobacco in a comparable way. For example, the proportions of the Australian population who have ever used alcohol, tobacco and cannabis are: 95 per cent, 70 per cent, and 33 per cent, respectively;⁴⁰ while the proportions who are weekly users are: 66 per cent, 29 per cent, and 5 per cent.⁴¹

There are reasons for not becoming too complacent about this situation. The comparison based upon existing patterns of use cannot be used to predict what would happen if there was a major change in the prevalence of cannabis use, as some may argue would happen if existing criminal penalties were removed or replaced with civil penalties. In principle, it would seem a simple matter to estimate what the health risks of cannabis use would be if its prevalence was the same as that of alcohol and tobacco; for example, by multiplying the current health consequences of cannabis by the ratio of the new to old users. Such a calculation assumes, however, that the risks are the same regardless of the characteristics of the user, or the legal regime under which the drug is used.

The first assumption may be unreasonable. It may be that cannabis is used by a different population when its prevalence of use is low than when it was high. This phenomenon has been reported with alcohol with different patterns of alcohol consumption and problems in "dry" and "wet" cultures. Similarly, if the legal regime controlling adult use was liberalised, it may be easier to reduce some of these health risks. For example, with greater availability it may be possible to reduce the major respiratory risks of cannabis smoking, either by encouraging cannabis users to ingest rather than to smoke the drug, or by increasing the THC content and reducing the tar content of cannabis, for those who continue to smoke. It would also be easier if cannabis use were legal to give users advice on other ways of reducing their risks of using the drug.

For these reasons I have not provided estimates of the health risks of cannabis if its prevalence of use were to approach those of alcohol and tobacco. All that can be said with any confidence is that its public health impact would increase if its prevalence increased. It is impossible to say by how much with any precision beyond the statement that even on even the worst case scenario, it is unlikely that the public health effect of cannabis use would approach those of alcohol or tobacco use. Unlike alcohol, cannabis does not produce cirrhosis, and it appears to play little role in injuries caused by violence, as does alcohol. Unlike tobacco, the proportion of cannabis smokers who are likely to become daily smokers is substantially less than the proportion of tobacco smokers who currently do so. Moreover, some of the current respiratory hazards of cannabis smoking could be reduced in the same way that the adoption of filtered lower tar cigarettes has reduced the respiratory risks of tobacco smoking.

7. *Public Policy Implications*

Responses to comparisons of the adverse health effects of cannabis, alcohol and tobacco usually depend upon the person's prior views on the legal status of cannabis. Those who favour liberalisation tend to argue that if cannabis has health effects that are no worse than alcohol and tobacco then, on the grounds of consistency, cannabis should also be legally

40 Drug Abuse Statistics, 1992.

41 Ibid.

available for adults to use. Opponents of liberalisation typically argue, by contrast, that if cannabis has even half the adverse health effects of alcohol and tobacco then we should do all that we can to avoid making it as freely available in our community as these legal drugs are. Such responses demonstrate that the public policy implications of the adverse health effects of cannabis are not as immediate and obvious as is often assumed.

Is there reasonable cause for concern about the public health consequences of cannabis use? Is the use of criminal sanctions against cannabis use justified as a public health measure? There is a simple connection between the answers to these two questions in only one obvious case: if cannabis use were harmless there would clearly be no public health reason for its possession and use being a criminal offence. However, since few forms of drug use are ever harmless, this principle provides little guidance on public policy.

Even if clear connections were established between cannabis use and adverse health effects criminal penalties may not be the best method of decreasing the harms caused by its use. When there are both benefits and costs of recreational drug use, as there arguably are with cannabis and alcohol, societal choices have to be made between different combinations of policies for reducing drug-related harm. Such strategies do not necessarily include prohibition of use by adults; they may include a combination of measures such as: restricting availability to adults, using health education and price to discourage adolescent use, and teaching those adults who continue to use safer methods of using the drug.

In choosing between policies societal values other than public or personal health must be taken into account or else we would be morally obliged to make the use of alcohol and tobacco criminal offences. Foremost among these values are: the freedom of adults to make choices that pose a risk to their health but do not interfere with the choices of others; the social and economic costs of enforcing a widely broken criminal law (one that has been broken by over a third of adult Australians and the overwhelming majority of young adults); and the possibility of using equally effective and less coercive methods of discouraging adolescent cannabis use and reducing the harm caused by adult use of the drug.⁴² The balance between these competing values is best achieved by a full and intelligent public debate in which information on health effects can contribute.

8. Conclusions

There probably are adverse health and psychological effects of cannabis use. The clearest are the acute risks of adverse psychological experiences, the possibility of an increased risk of motor vehicle accidents if people drive while intoxicated, and low birthweight babies for women who smoke cannabis during their pregnancies. The adverse effects of chronic use are less certain but probably include in order of frequency: dependence, respiratory diseases (including perhaps cancers of the upper respiratory tract), and subtle forms of cognitive impairment. High risk groups include: adolescents with poor school performance; women of child-bearing age; individuals with cardiovascular and respiratory diseases; and individuals with a personal or family history of psychotic illness.

Given current patterns of cannabis use, the health effects of greatest public health significance are likely to be the acute effects, namely, increased risks of adverse psychologi-

42 Kleiman, M A R, *Marijuana: Costs of Abuse, Costs of Control* (1989); Kleiman, M A R, *Against Excess: Drug Policy for Results* (1992).

cal experiences and probably an increased risk of motor vehicle accidents. The major public health risks of regular cannabis use are in order of occurrence: dependence, respiratory disease, and precipitation or exacerbation of psychoses. Although difficult to estimate, the public health effects of increasing prevalence of cannabis use are likely to be much less than those currently caused by alcohol and tobacco, although they could represent a substantial fraction of these costs if daily cannabis use were to become as common as daily tobacco or even daily alcohol use is.

The public policy implications of the health effects of cannabis is nowhere as direct as often assumed in public debate about cannabis: it does not follow that because it has adverse health effects its use by adults should be a criminal offence; if it did then alcohol and tobacco use should also be criminal offences. Other important issues are at stake: including civil liberties; social and economic costs of law enforcement; and the possibility of using less coercive alternative methods of reducing the harms of cannabis use, including public health education and harm reduction advice to current users.⁴³ The balance between these competing values is best achieved by a political process informed by public debate.