

EMERGING PATTERNS OF CANNABIS AND OTHER SUBSTANCE
USE IN ABORIGINAL COMMUNITIES IN ARNHEM LAND,
NORTHERN TERRITORY: A STUDY OF TWO COMMUNITIES

Alan R Clough^{1,2}

Menzies School of Health Research and Charles Darwin University, Darwin, NT

Address for correspondence:

PO Box 1479, Nhulunbuy, NT, 0881

e--mail: Alan.Clough@nt.gov.au

Ph: 61 08 8987 0479

Fax: 61 08 8987 0499

Peter d'Abbs³

Sheree Cairney^{1,4}

Dennis Gray⁵

Paul Maruff⁴

Robert Parker⁶

Bridie O'Reilly²

1 Menzies School of Health Research, Darwin, Northern Territory

2 Charles Darwin University, Darwin, Northern Territory

3 School of Public Health and Tropical Medicine, James Cook University, Cairns,
Queensland

4 La Trobe University, Bundoora, Victoria

5 National Drug Research Institute, Curtin University, Perth, Western Australia

6 Flinders University Clinical School, Darwin, Northern Territory

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ABSTRACT

Objective:

A recent rise in cannabis use in Indigenous communities in northern Australia may have compounded existing patterns of other substance use. This paper describes these patterns in Arnhem Land in the 'Top End' of the Northern Territory (NT). Economic impacts of the cannabis trade are also described.

Methods:

In a descriptive cross-sectional study, random samples included 336 people (169 males, 167 females) aged 13-36 years. Consensus classification of life-time and current use of cannabis, alcohol, tobacco, kava, inhalants (petrol) and other drugs was derived based on health workers' proxy assessments. A sample (n=180, aged 13-36) was opportunistically recruited for interview. Life-time cannabis users among those interviewed (n=131, 81 males, 50 females) described their current cannabis use, usual quantities purchased and consumed, frequency and duration of cannabis use and other substance use.

Results:

In the random samples, 69% (63%-75%) of males and 26% (20%-31%) of females were life-time cannabis users (OR=7.4, 4.5-12.1, P<0.001). The proportion of males currently using cannabis was 67% (60%-73%) while the proportion of females currently using it was 22% (16%-27%) (OR=7.9, 4.8-13.1, P<0.001). Current cannabis users were more likely than non-users to be also using alcohol (OR=10.4, 4.7-23.3, P<0.001), tobacco (OR=19.0, 7.9-45.8, P<0.001) and to have sniffed petrol

(OR=9.1, 4.6-18.0, $P<0.001$) but were less likely to be using kava (OR=0.4, 0.2-0.9, $P<0.001$). Among those interviewed, higher tobacco consumption in current users and greater alcohol use in life-time users was associated with increased cannabis use.

Conclusions:

Action is required to reduce cannabis use especially in combination with other substances.

INTRODUCTION

Recent literature and anecdote suggest high rates of cannabis use among Indigenous people in remote communities in Australia's Northern Territory (NT) with rapid and widespread uptake occurring from the late 1990s.^{1,2} A survey in the mid-1980s did not detect cannabis use in the NT's 'Top End' communities.³ But by the late 1990s, unpublished data collected by one of us (ARC) suggested that 31% of males and 8% of females (aged over 15 years) were using cannabis in eastern Arnhem Land. By 1999, cannabis use increased to 55% of males and 13% of females in the same region.¹ In one locality, between 1999-2000, the proportion of males using cannabis doubled (21%-39%) and cannabis use emerged among women for the first time with up to 20% of them using it.¹ Further evidence in 2001-2002 suggested much higher rates of use with 62%-76% of males and 9%-35% of females aged 13-34 using cannabis regularly.²

While cannabis use probably added to existing patterns of other substance use,¹ there is a dearth of literature about cannabis in these populations. At the same time, NT policy makers struggle to respond to rapidly changing substance use patterns and associated harms.^{4,5} Information presented here describes patterns and levels of cannabis use to inform development of strategic responses to these important issues for Indigenous communities. In addition, associations with other substance use and the likely economic impacts of cannabis are estimated.

METHODS

Setting

Two contiguous communities in Arnhem Land, approximately 550km east of Darwin, were studied. They had a combined Indigenous population of 2649 (1180 aged 13-36 years).⁶ A variety of substances is used in these communities. Tobacco use is widespread.¹ Kava was introduced in 1982 from the Pacific islands,⁷ and was readily available in one of the communities sampled. Alcohol became available in the early 1970s from outlets in regional centres near the communities.¹ However, access to alcohol in the communities is restricted in accordance with decisions made by both communities and ratified under the NT Liquor Act.⁸ Petrol sniffing was common in the region during the late 1980s and early 1990s^{1,9} but is now greatly reduced.

Sampling

Individuals were selected from population rolls prepared for each community using a stratified random approach with similar numbers selected from each of six four-year age bands. The combined samples from both communities included 336 persons (169 males and 167 females), equivalent to 28% of the population aged 13-36. In addition, an opportunistic sample of 180 people (107 males and 73 females) in the same age range was recruited for interview. Of these people, 67 were also included in the random sample.

Exposure measures

For the random sample, consensus about each individual's past and present substance use was reached using a procedure that combined: proxy assessments made by up to

five health workers interviewed separately; documentary evidence (community health centre and hospital discharge records); and self-report recently validated in this same population (unpublished data). The procedures, described in detail elsewhere,¹⁰ rely on health workers' intimate knowledge of the communities where they live and work.

Lifetime and current substance use and information about selected health indicators was obtained in interviews with participants in the opportunistic sample. Interviews were conducted in plain English usually with health workers present to assist with translation, when required. Flip charts were used as in previous studies^{10, 11} to help quantify substance use and to overcome cross-cultural and language difficulties.

Participants interviewed in the opportunistic sample reported intermittent alcohol use equivalent to approximately 600g/month of pure alcohol. (The more common practice of estimating consumption on a weekly basis did not take account of the intermittent nature of drinking in this region). Health workers classified five of six participants who reported using >300g/month as 'heavy' alcohol users. In a nearby Arnhem Land community where alcohol is also restricted, participants reported using a maximum of 576g/month. A level of around 300g/month was also found to be a suitable threshold describing heavy alcohol use.¹² Three categories of alcohol consumption were used in this study (<100g/month, 100-300g/month, >300g/month).

Tobacco use was classified by numbers of cigarettes reported smoked each day. Health workers classified all 48 people who reported smoking the equivalent of a pack/day (25 cigarettes/day or more) as heavy users.

Kava use was described as ‘heavy’ (330-440g/week) and ‘very heavy’ (>440g/week) in previous studies.¹³ Regulatory authorities regard kava use at >400g/week as harmful.¹⁴ Seven of the eight kava users who reported using >400g/week of kava powder were classified by health workers as heavy users.

Cannabis is typically available in the local trade in manufactured, re-sealable plastic packets of a standard size (40mm x 50mm), containing small and varying quantities of plant material. Intact packets containing cannabis for weighing were not available. Instead, amounts were estimated by simulating the quantity of cannabis usually observed in these packets. When plant material was placed into forty empty packets and weighed, a wide range in the mass of material was found; from 20-160mg (median=70mg). In no case did the mass of plant material exceed the mass of an empty packet (20 empty packets had a mean mass of 254mg, sd=7mg). A packet typically costs \$A50 in the local trade, a price which, anecdote suggests, is standard in the NT’s ‘Top End’ communities. Price may increase if supply is short or if the material is perceived to be of high quality. Participants readily reported their cannabis use by numbers of packets purchased each week.

Cannabis is usually mixed with tobacco and smoked using ‘bucket bong’ fashioned from plastic soft-drink containers (usually 600ml for the receptacle and a 1-litre container for the bucket). ‘Cones’ are fashioned from strips of aluminium cans and seated with moistened playing cards or gum in a hole in the receptacle lid. Smoke from material burning in the cone is first drawn into the receptacle by the vacuum created when the receptacle is slowly raised in the water in the bucket. Then with the receptacle lid removed, the smoke is forced up and inhaled as the receptacle is pushed

down into the water. This gives the smoker a sudden dose with little smoke lost, rather than the varying amounts drawn from, say, a conventional 'joint'. Cones reported available from a packet of cannabis varied widely from 3-15. Cannabis was generally not cultivated in the communities.

Ethics

The joint ethics committee of Menzies School of Health Research and NT Department of Health and Community Services provided approval, subject to a risk management strategy to avoid legal compromise for participants and researchers. All key informants and participants gave written informed consent after ethical and legal risks were explained.

Statistical methods and data analysis

Odds ratios and significance levels for trends across groups were calculated using logistic regression and analyses of variance.¹⁵ Analyses were performed using Stata 7.0.¹⁶ Numbers of cannabis users in the population (aged 13-36) were estimated from prevalence proportions in the sample (weighted for differences between the sample and the region's age and sex structure¹⁷) combined with published population estimates.⁶ The frequency distribution of numbers of packets reported purchased each week, combined with the estimated numbers of users, permitted an estimate of quantity of cannabis used in these age groups.

RESULTS

Data from random samples: consensus classification using health worker proxy assessments.

Prevalence of life-time cannabis use in males was greater, 69% (63%-75%) than in females, 26% (20%-31%) (age-adjusted OR=7.4, 4.5-12.1, $P<0.001$). Most of those who had ever used cannabis were continuing users; 67% (60%-73%) of males and 22% (16%-27%) of females (age-adjusted OR=7.9, 4.8-13.1, $P<0.001$). Figures 1a and 1b also indicate that males were more likely to be current cannabis users than females. Half or more of the males and females aged >20 currently using cannabis also had a history of petrol sniffing (Figure 1a). Two males (aged 17 and 22) and two females (aged 19 and 25) were known by health workers to be currently sniffing petrol. Among males, a majority in each age group currently used both alcohol and cannabis, while only the older females used both (Figure 1b).

Figure 2 illustrates close associations and overlaps in the random sample between current cannabis use and other substance use (adjusted for age, sex and home community). Cannabis users were less likely to also be using kava. The small groups of continuing petrol sniffers and the group reporting the use of 'speed' (probably methamphetamine), confirmed in one individual by hospital discharge summary, were all current cannabis users. Twenty percent were life-time abstainers from all substance use with the majority (72%) female.

Patterns of cannabis use reported in interviews

The crude prevalence of life-time cannabis use was higher in those opportunistically interviewed than in the random samples; 76% (66%-83%) of males and 69% (57%-80%) of females. Current cannabis use in males was 68% (59%-77%), and similar to proxy assessments. However, among females, 68% (56%-79%) reported current cannabis use, three times the proportion in the random samples assessed by health workers. Current cannabis users reported a median of 4 years of use (Table 1). Most (94%) titrated cannabis with tobacco, the majority (81%) purchased one or two \$A50 packets of cannabis per week and three-quarters of those interviewed reported at least weekly use (Table 1).

Current cannabis users reported smoking tobacco more heavily but took up tobacco more recently than non-users (Table 2). There was no apparent association with increased alcohol use. Those not using cannabis reported using more kava (Table 2).

Three males (aged 16, 19 and 22) and four females (aged 16, 19, 25 and 27) were current cannabis users and also reported they were active petrol sniffers (data not shown). Eight males (six current cannabis users and two former users) reported past use of 'speed'.

Cannabis users were less likely to participate in education and training even when adjusted for age (likelihood ratio chi-square=13.2, P=0.001) and more often reported suffering weight loss (Table 3). In data not shown, ten of those interviewed reported having had a 'fit' associated with smoking cannabis. Eleven reported attending the local health centre for treatment for cannabis-related illnesses with one of these evacuated for admission to hospital with psychosis, confirmed by clinic records. Ten

reported that their cannabis use created family difficulties and seven had cannabis-related troubles with Police.

Table 4 suggests that people aged 13-36 used 2.4 to 4.1kg/week of cannabis and spent from \$19,000-\$32,000/week purchasing it. Previous studies reported 7%-20% of the region's population aged >36 years used cannabis,¹ indicating that this total quantity and value of cannabis should be adjusted upward when considering patterns in the total population.

DISCUSSION

Data limitations

Estimating total quantities of cannabis used by extrapolating from interviews to the general population is difficult because those interviewed were not part of a random sample. Bias in estimates is also possible if participants were reluctant to describe their illicit behaviour accurately, or if heavy episodic consumption was not well quantified by the methods used. Inaccurate estimates are likely given the considerable variation in amounts of cannabis material in the packets typically available. Further systematic study may reduce bias from these effects.

Notwithstanding these limitations, it seems unlikely that we have overestimated the high population prevalence of cannabis use. The crude prevalence among those interviewed was similar to (or greater than) estimates derived from the random samples. The much higher prevalence of cannabis use in women interviewed, on the other hand, implies that the random samples *underestimated* the prevalence of cannabis use in females. This is not supported, however, since health worker assessments of life-time cannabis use among the females interviewed agreed with their self-report on 79% of occasions ($\kappa=0.44$, $P<0.001$) in one community and on 74% of occasions in the other ($\kappa=0.45$, $P=0.003$) (data not shown) indicating that female cannabis users were more frequently recruited for interview than male users, and that we should therefore rely on prevalence estimates from the random samples.

We can have more confidence in the estimated total value of cannabis purchased than in the estimated total quantity used (Table 4) since the packet priced at \$A50 is

relatively fixed compared with the quantity of cannabis in a packet. A crude but realistic assessment of the economic impact of the cannabis trade is therefore possible. Most cannabis users (69%) purchased 1 packet/week (\$A50 worth) and 12% purchased 2 packets/week (\$A100 worth) (Table 1). The median income in these age groups is approximately \$160/week,⁶ so expenditure on cannabis, while extraordinarily high at 31% and up to 62% of median weekly income is nonetheless feasible within the communities' available resources. The communities' total weekly income was estimated from published data at approximately \$316,000/week.⁶ So, expenditure on cannabis per week (Table 4) may represent at least 6%-10% of the total monetary resources available in these communities. This does not, however, imply an immediate financial drain on the communities since, as described in a previous study,¹ part of cannabis profits may be concentrated in the hands of just a few locally-resident agents. It nonetheless creates pressure on the financial resources of cannabis users which, in turn, leads to pressure on family members, occasionally with violence and intimidation, to make good the shortfalls.¹

Main results

The proportion of Indigenous males currently using cannabis in this study, i.e. 67% (60%-73%) is almost double that in the general NT population in similar age groups who have used cannabis in the past year.¹⁸ The NT rate, in turn, is already ca. 1.7 times higher than in males of similar age in other Australian jurisdictions.¹⁸ The proportion of current female cannabis users, i.e. 22% (16%-27%), is lower than the rest of the NT but comparable to Australian rates.¹⁸ While this comparison suggests that rates of cannabis use are extremely high in the Indigenous male populations studied here, it is of interest that rates of life-time cannabis use are of similar

magnitude to rates of 59%¹⁹ and 45%²⁰ found in young people in recent studies elsewhere in Australia where rising cannabis use was also noted.

A more-or-less fixed price (\$A50) along with the variability in cannabis materials in each packet, provides dealers with considerable flexibility in manipulating their rates of profit and the opportunity to charge what the market is prepared to pay. Even the higher estimate of material in each packet (160mg) makes the price of cannabis a minimum of approximately \$300/g in the communities studied. This price is 12 times greater than reported in the cannabis trade elsewhere in the NT (\$25/g).²¹

The use of other substances in combination with cannabis found in this study is a cause for concern. No information is available about the combined effects of cannabis and petrol sniffing in this population. That the isolated occurrences of possible methamphetamine use were all cannabis users is also a concern. Heavy, episodic alcohol consumption is well known in Indigenous Australian populations.²²⁻²⁴ The highest levels of alcohol use reported in this study (600g/month) are around one-quarter of the average monthly amount reported consumed per capita in Indigenous communities across the NT's 'Top End',²⁵ probably reflecting the restricted access to alcohol in Arnhem Land. These levels appear similar to average daily levels considered to be harmful in Australia, i.e. 40g/day (males) or 20g/day (females)²⁶. While the methods used in the study were not adequate to describe hazardous alcohol use, there remains a concern in Arnhem Land that suicide and alcohol consumption are closely associated.^{27, 28} Added to this concern now is the possibility that cannabis use combined with alcohol use, perhaps in association with co-morbid mental disorders,²⁹ lowers the threshold of suicide risk in those already

disinhibited by alcohol use³⁰ even though average consumption levels appear moderate. Further study is required to more clearly describe hazardous alcohol use and cannabis use in combination in this population.

In the meantime, data reported here should alert policy makers in the NT to unusually high rates of cannabis use in Indigenous communities especially among males. The close association between cannabis use, alcohol use, petrol sniffing and the use of other illicit drugs needs to be closely monitored. The data also suggest that the impact of the cannabis trade on community economies is substantial. Urgent action in close consultation with communities is warranted in order to reduce cannabis use and to reduce the combined use of cannabis with other substances, especially alcohol.

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Figure 1a. Cannabis use and petrol sniffing in a random sample, 2001-2002, males (n=163)

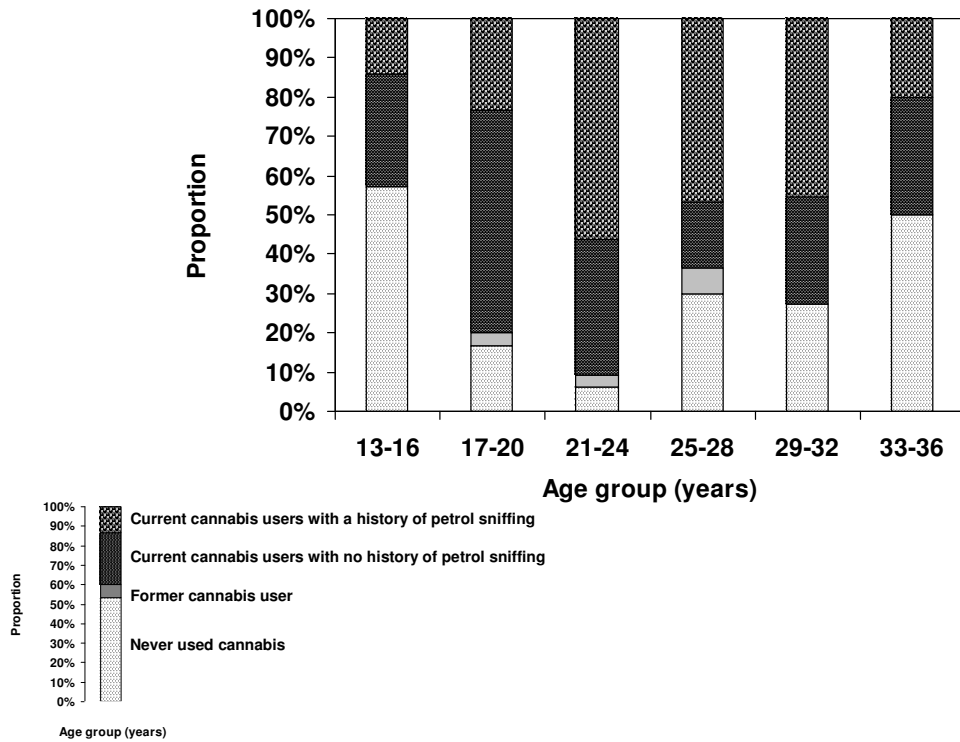


Figure 1a. Cannabis use and petrol sniffing in a random sample, 2001-2002, females (n=160)

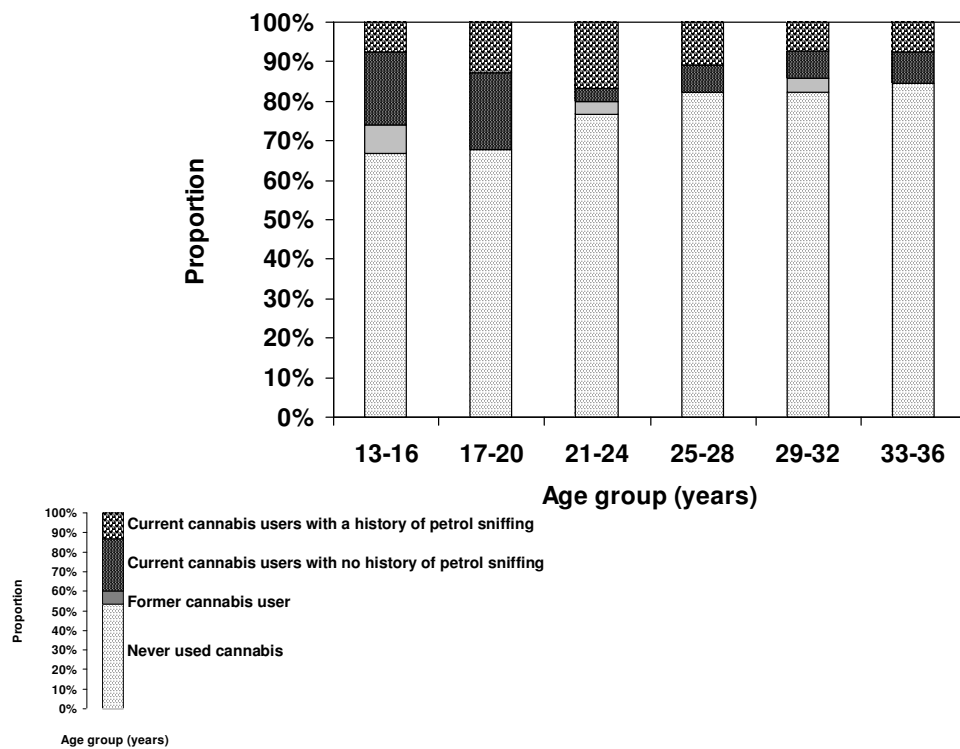


Figure 1b. Cannabis use and alcohol use in a random sample, 2001-2002, males (n=163)

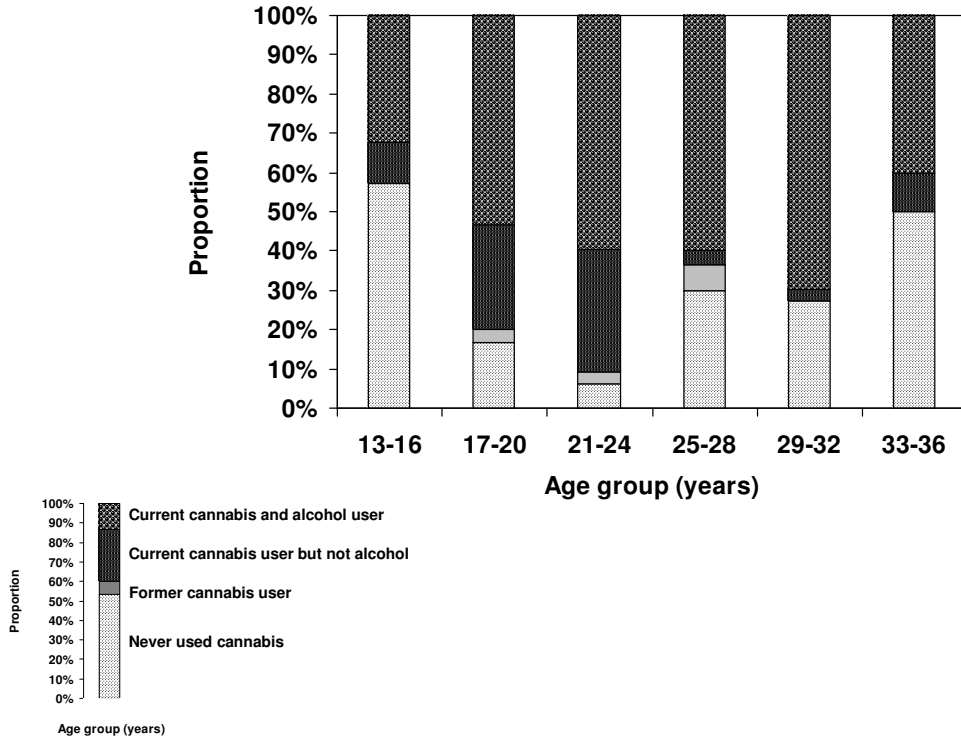


Figure 1b. Cannabis use and alcohol use in a random sample, 2001-2002, females (n=160)

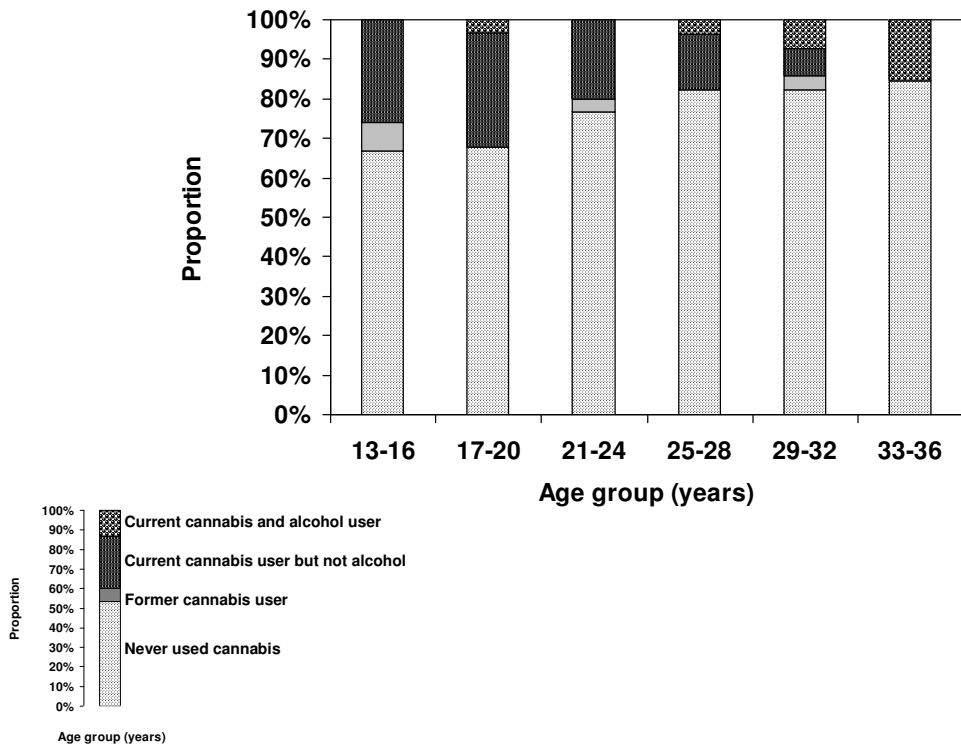
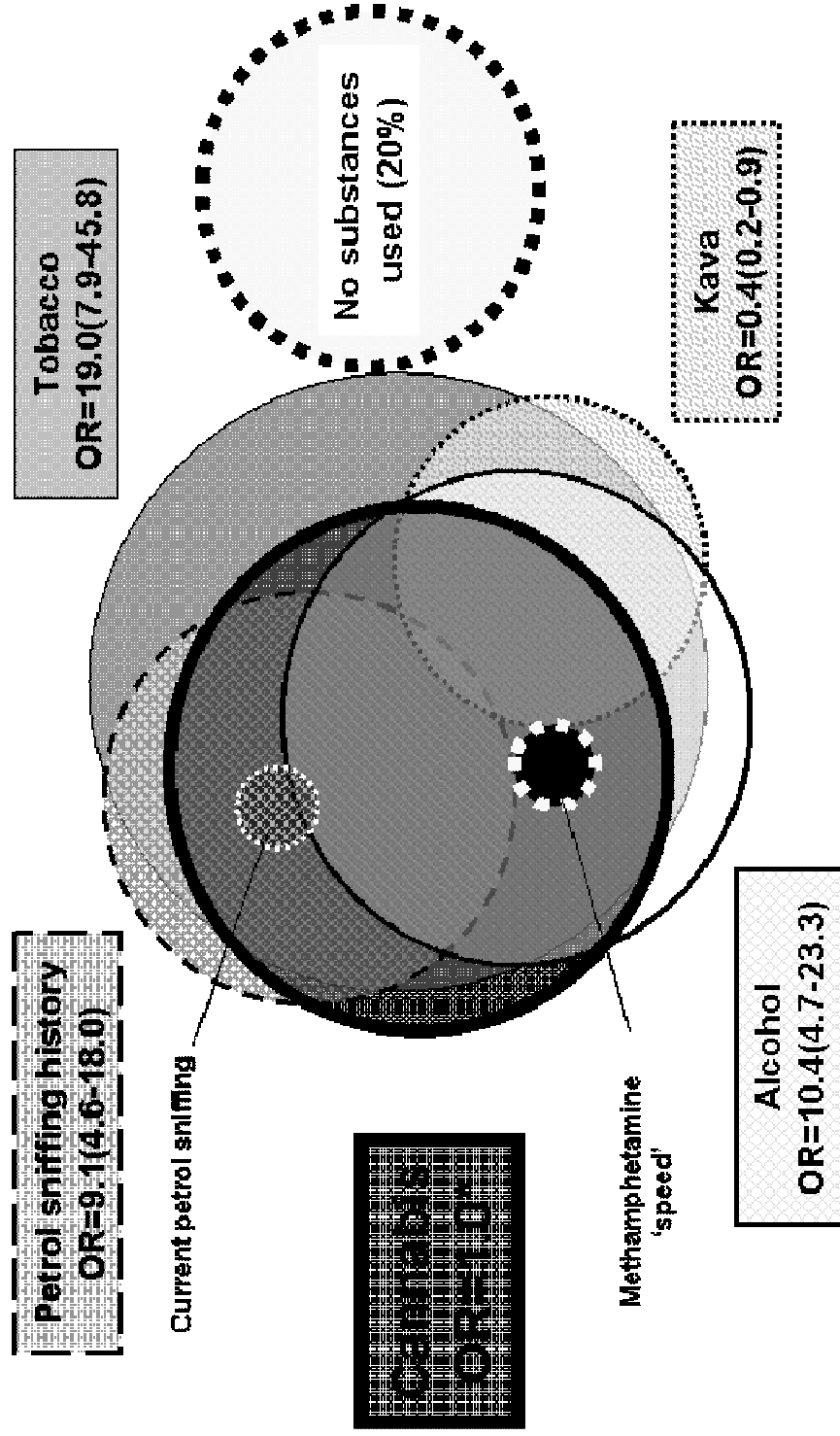


Figure 2. Current cannabis use and associations with other substance use in a random sample (n=321; 163 males, 158 females aged 13-36 years)



* With cannabis use the reference category the odds ratios (OR) represents the likelihood (with 95% confidence limits) that a cannabis user is also a user of each substance (adjusted for age, sex and home locality). All associations are significant (P<0.001). Circles shape and orientation represent the crude associations between substances since multivariate associations cannot be represented in this two-dimensional diagram.

Table 1: Characteristics of continuing cannabis users (n=109) interviewed in a sample (n=180) of Indigenous people aged 13-36 in Arnhem Land (NT, Australia)

Characteristics of current cannabis users	
n=109 (m=62, f=47)	
Male	62(57%)
Age mean(sd)	23(5.9)
Age at first use median (range)	17(12-32)
Smoking cannabis more or less than when first started	
Less now	69(68%)
About the same amount	14(14%)
More now	19(19%)
Years used median (range)	4.0(0.5-18)
Frequency of cannabis use.	
Regular - daily (or almost daily)	47(44%)
Regular - weekly	33(31%)
Irregular - monthly	28(26%)
Cones usually smoked/week median(range)	3(1-15)
Cannabis mixed with tobacco	
Half tobacco/half cannabis	90(88%)
More cannabis than tobacco	6(6%)
Cannabis only, no tobacco	6(6%)
Packets of cannabis usually purchased/week	
0.25 packets/week (reported as 1 packet/month)	7(7%)
0.5 packets/week (reported as 2 packets/month)	8(8%)
1 packets/week	70(69%)
1.5 packets/week (reported as 6 packets/month)	1(1%)
2 packets/week	12(12%)
3 packets/week	1(1%)
4 packets/week	2(2%)

Table 2: Cannabis use and other substance use reported in interviews with a sample (n=180) of Indigenous people aged 13-36 in Arnhem Land (NT, Australia)

Other substance use	Never used cannabis n=48 (m=26, f=22)	Cannabis user		P
		Past user (quit cannabis within the past year or earlier) n=15 (m=12, f=3)	Current user (used within the past month) n=109 (m=62, f=47)	
Tobacco-current user	21(44%)	12(80%)	90(83%)	<0.001
No tobacco	27	3	19	
<15 cigarettes/day	8	3	30	
15 up to 25 cigarettes/day	2	2	23	0.002
1 pack (25 cigarettes/day)	8	6	27	
> 1 pack (>25 cigarettes/day)	2	-	5	
Years used tobacco median (range)	12(0-22)	6(0-21)	7(0-20)	0.012
Alcohol-current user	13(27%)	4(27%)	45(42%)	0.150
No alcohol	35	11	63	
<100g pure alcohol/month	4	1	10	0.788
100g-300g pure alcohol/month	5	3	17	
>300g pure alcohol/month	1	-	5	
Years used alcohol median(range)	8(0-20)	3(0-13)	8(0-20)	0.363
Kava-current user	11(23%)	1(7%)	9(8%)	0.039
No kava	37	14	100	
<400g/week kava powder	6	-	3	0.017
400g/week or more kava powder	4	1	3	
Years used kava median(range)	14(0-20)	5	9(0-18)	0.116
Petrol sniffing history	7(15%)	9(60%)	53(49%)	<0.001
Currently sniffing petrol	1	1	6	0.554
Years ever used petrol median (range)	5(1-11)	2(0-7)	2(0-12)	0.228

Table 3: Cannabis use and social and demographic characteristics reported in interviews with a sample (n=180) of Indigenous people aged 13-36 in Arnhem Land (NT, Australia)

Social and demographic characteristics	Never used cannabis n=48 (m=26, f=22)	Cannabis user		P
		Past user (quit cannabis within the past year or earlier) n=15 (m=12, f=3)	Current user (used within the past month) n=109 (m=62, f=47)	
Male %	54%	80%	57%	0.165
Age mean(sd)	23(8.5)	23(6.8)	23(5.9)	0.567
Participation in workforce				
Not in workforce	24	5	52	0.527
CDEP*	7	3	25	
Employed	15	7	31	
Participation in education or training				
Not participating	16	8	74	<0.001
School	18	1	13	
Training (adult education)	12	6	21	
Active in sport or exercise				
No	14	7	42	0.388
Yes	33	8	65	
Recent weight change (self-report)				
Weight gain	22	5	51	0.026
No change	20	3	15	
Weight loss	5	7	41	

* CDEP=Community Development and Employment Program

Table 4: Calculating the size of the cannabis trade in an Indigenous community in Arnhem Land (NT, Australia)

Number of packets reported purchased /week	Number of cannabis users who purchase this number of packets/week	% frequency reported in interviews	Packets/week if users=346, the lower confidence limit in the population	Packets/week if users=584, the upper confidence limit in the population
a		b	$c=346*b*a$	$d=584*b*a$
0.25	7	7%	6	10
0.5	8	8%	14	23
1	70	69%	240	405
1.5	1	1%	5	9
2	12	12%	82	139
3	1	1%	10	17
4	2	2%	27	46
Total	101	100%	385	649
	Expenditure at \$A50/packet		\$19,227/week	\$32,452/week
	Quantity at 160mg/packet		2403g/week	4057g/week