

Cannabis and Crime: Treatment Programs for Adolescent Cannabis Use

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INTRODUCTION

A strong relationship has been found between frequent cannabis use by juveniles and their participation in crime (e.g. Dembo, Williams, Schmeidler, Wish, Getreu & Berry 1991; Salmelainen 1995; Baker 1998; Stevenson & Forsythe 1998; McGeary, Dennis, French & Titus in press). Surveys indicate that the reason for this relationship is that juveniles resort to income-generating property crime to fund their consumption of cannabis (Salmelainen 1995).

Research has also suggested that adolescents who begin using cannabis at an early age and who use cannabis frequently are at risk of subsequently using 'harder' drugs, such as cocaine or heroin (e.g. National Center on Addiction and Substance Abuse 1994; 1997). This progression to harder drugs is of concern not only because of the risk to the adolescents' health, but also because there is considerable evidence that heavy users of heroin resort to income-generating property crime to fund their heroin use (e.g. Dobinson & Ward 1985; Parker & Newcombe 1987; Dobinson & Poletti 1988; Jarvis & Parker 1989; Stevenson & Forsythe 1998).

These findings do not prove that all adolescents who are heavy cannabis users will inevitably become involved in crime or, if they are already involved in crime, that they will inevitably progress to committing crime more frequently or to committing more serious crimes. Nonetheless, investment in well-developed, high-quality treatment or cessation programs targeting adolescents who use cannabis frequently may be an effective method of decreasing the risk of

adolescents either becoming involved in crime or progressing to more frequent or more serious criminal activity.

The aim of this bulletin is to review the existing treatment programs for cannabis use. The first section of the bulletin examines the prevalence of cannabis use in Australia. The second section examines the relationship between cannabis use and criminal activity. The third section reviews the treatment programs available for individuals who use cannabis frequently. Finally, because only a small number of treatment programs for cannabis use have been evaluated, a few programs for the prevention of cannabis use are briefly described.

CANNABIS USE IN AUSTRALIA

Descriptions of the pattern of cannabis use in Australia have generally been based on household surveys of self-reported drug use among the general population and school-based surveys of self-reported drug use among school students.

A series of household surveys have been conducted by the National Drug Strategy in recent years.¹ The fifth of these surveys, conducted in 1995, found that, among people aged 14 years or more, cannabis is the most widely used drug after tobacco and alcohol (Commonwealth Department of Health and Family Services 1996). Almost one-third of those surveyed (31%) reported that they had tried cannabis and 13 per cent reported that they had used it in the previous 12 months.

The survey found that cannabis use was strongly related to the respondent's

gender, age, tobacco-smoking and alcohol-drinking behaviour. Eighteen per cent of the males surveyed reported that they had used cannabis in the previous 12 months compared with only eight per cent of the females. In a review of the literature, Hall, Solowij and Lemon (1994) also found that *daily* cannabis users tend to be male.

In the 1995 National Drug Strategy survey, cannabis use over the last 12 months was highest among the younger age groups. Twenty-eight per cent of survey respondents aged between 14 and 19 years, and 27 per cent of respondents aged between 20 and 34 years, reported that they had used cannabis within the previous 12 months. Only five per cent of respondents aged between 34 and 54 years, and less than one per cent of those aged 55 years or more, reported that they had used cannabis within the previous 12 months. Recent cannabis users were also more likely than non-users to be current smokers and regular alcohol drinkers. Hall, Solowij and Lemon (1994) also concluded that *daily* cannabis users tend to use alcohol regularly.

Most cannabis users tend to be 'experimental' users. The 1993 survey² found that, of those who had ever used cannabis, 64 per cent of females and 54 per cent of males had not used it for at least one year. Only seven per cent of females and 15 per cent of males who had ever used cannabis were using cannabis on a *weekly* basis at the time of the survey (Donnelly & Hall 1994).

Frequent cannabis use was most common among the younger age groups. The 1993 survey found that, of those aged between 14 and 19 years who had

ever used cannabis, eight per cent of females and 16 per cent of males were using cannabis on a weekly basis. Of those aged between 20 and 24 years who had ever used cannabis, 10 per cent of females and 26 per cent of males were using cannabis on a weekly basis (Donnelly & Hall 1994).

The initiation of cannabis tends to occur during adolescence for a sizable proportion of users. Of those who used cannabis *weekly* or more often, more than one-third had commenced use by 15 years of age (37% in the 1993 survey and 38% in the 1995 survey). The average age of initiation for all those who used cannabis weekly or more often was around 17 years of age for both the 1993 and 1995 survey respondents (Makkai & McAllister 1998).

Since 1971, the NSW Department of Health has regularly conducted a survey of drug and alcohol use among secondary school students. A random sample of students is used and is stratified by both location (metropolitan/rural) and school system (government/non-government). The survey conducted in 1992, the most recent for which detailed prevalence data on drug use have been published, involved a total of 3,828 students from 80 schools.³

These school-based surveys have found that the percentage of secondary school students in NSW who report using cannabis at least *weekly* increased between 1989 and 1992 from three to five per cent among females and from seven to 10 per cent among males (Cooney, Dobbins & Flaherty 1994). The 1996 survey found that, across all age groups, 39 per cent of male students and 31 per cent of female students had used cannabis at least once in their lifetime (NSW Health 1998).

Both household- and school-based surveys, therefore, show that cannabis use is fairly widespread in Australia. Furthermore, for a number of reasons, these surveys are likely to underestimate the prevalence of cannabis use in the population. Firstly, given that cannabis is an illegal drug, users may conceal their use, under-report frequency or quantity of use, or not agree to participate in surveys. Secondly, individuals who are not included in prevalence estimates because they are absent at the time a survey is conducted are more likely to be cannabis users than non-users. For example, there is evidence that cannabis users are more likely than non-users to have no fixed address, to truant from

school and to leave school early (Jessor 1979; Baker 1998).

The widespread use of cannabis is consistent with evidence that cannabis use is generally perceived as being socially acceptable (e.g. Commonwealth Department of Health and Family Services 1996). However, widespread cannabis use persists despite evidence that frequent, prolonged use can have negative health consequences. For example, based on their literature review, Hall, Solowij and Lemon (1994) conclude that daily use over a number of years probably increases the risk of experiencing long-term health and psychological consequences, such as respiratory diseases (e.g. chronic bronchitis), cognitive impairment (particularly of attention and memory), and a syndrome of cannabis dependence whereby individuals are unable to abstain from, or control, their cannabis use.

CANNABIS USE AND CRIME

Recent studies conducted by the NSW Bureau of Crime Statistics and Research have found statistically significant relationships between young people's use of cannabis and both their participation in crime and their criminal offending frequency (Salmelainen 1995; Baker 1998; Stevenson & Forsythe 1998).

Baker (1998) found a relationship between students' use of cannabis and their participation in crime. Baker's study was based on the most recent (1996) survey of drug use conducted among NSW secondary school students by NSW Health and the NSW Cancer Council. The survey involved a representative sample of 10,441 students enrolled in government and non-government secondary schools in NSW. The main purpose of the survey was to estimate the prevalence of students' self-reported use of drugs and sun-protection. Approximately half of the students surveyed (5,178) also answered questions regarding their participation in assault, malicious damage and acquisitive property crime during both their lifetime and the 12 months prior to the survey.⁴ Baker found that cannabis use was a significant predictor of students' participation in assault, malicious damage and acquisitive property crime, controlling for both developmental factors and the use of other drugs.⁵

The odds of participation in assault were more than two times greater for students

who used cannabis frequently (i.e. weekly) than for students who did not use cannabis. The odds of participation in malicious damage were about three times greater for frequent cannabis users than for non-users. The odds of participation in acquisitive property offences were almost five times greater for students who used cannabis frequently than for students who did not use cannabis.

Whereas Baker (1998) examined the relationship between student cannabis use and *participation* in crime, two other recent studies of offenders by the NSW Bureau of Crime Statistics and Research have found a relationship between adolescent cannabis use and *frequency* of offending. Salmelainen (1995) interviewed 247 juvenile theft offenders who were serving control orders in NSW detention centres.⁶ She found that cannabis use among these juvenile offenders was high. The average weekly use in the six months prior to arrest was at least 40 cones for 42 per cent of subjects, and between 10 and 39 cones for a further 20 per cent of subjects.⁷

More importantly, Salmelainen found a relationship between the offenders' self-reported use of cannabis and the frequency of their offending. Juveniles in detention for motor vehicle theft who smoked cannabis in larger quantities prior to being arrested were more likely to be high-rate offenders (i.e. had committed more than one offence per week) than were those who smoked no cannabis or who smoked cannabis infrequently. Similar results were obtained for juveniles in detention for break and enter offences. Approximately 45 per cent of break and enter offenders who smoked at least 40 cones of cannabis per week, and approximately 20 per cent who smoked between 10 and 39 cones per week, were high-rate offenders.

Furthermore, Salmelainen found a relationship between heavy cannabis use and reporting the need to acquire money to buy drugs as the main reason for committing crime. Approximately 45 per cent of the break and enter offenders and approximately 66 per cent of the motor vehicle theft offenders who cited the acquisition of money to buy drugs as their *main* reason for offending were high-rate offenders.

Stevenson and Forsythe (1998) conducted an interview study with 267 convicted burglars (147 adults and 120 juveniles) imprisoned in NSW adult prisons or juvenile detention centres. The aim of the study was to obtain

information primarily about the avenues through which burglars disposed of stolen goods.⁸ Subjects were also asked about their use of heroin or other opiates. In addition, they were asked which other illicit drugs they used if they reported spending 'money on illicit drugs, but not on heroin; or ... if the expenditure on heroin was considerably less than that claimed for all illicit drugs' (Stevenson & Forsythe 1998, pp. 25-26). Of the 172 subjects meeting these criteria, 144 (84%) stated that the expenditure was incurred for cannabis.

More importantly, cannabis use was more common among the juveniles in the sample than among the adults. Of the 144 who nominated cannabis use, 90 were juveniles and 54 were adults. These 90 juveniles represented approximately three-quarters of the entire juvenile sample whereas the 50 adults represented approximately one-third of the adult sample. Furthermore, Stevenson and Forsythe found a relationship between juvenile cannabis use and frequency of burglaries committed prior to arrest. For the 65 juveniles who used cannabis but did not use heroin, there was a significant correlation (0.5) between expenditure on cannabis and the number of burglaries committed per month.⁹

Therefore, there is good reason to believe that the cost of maintaining high levels of cannabis consumption increases the likelihood of a juvenile participating in crime and prompts juveniles who are already involved in crime to offend more frequently. As a result, effective treatment programs targeting adolescents who use cannabis heavily would be expected to be important crime control strategies, reducing both the participation of adolescents in crime and the frequency of their offending.

In addition to this evidence indicating a direct link between adolescent cannabis use and criminal offending, other evidence indicates a more indirect link. There is evidence that heavy cannabis use increases the likelihood of heroin use which, in turn, is associated with criminal offending.

Cannabis, together with tobacco and alcohol, are sometimes referred to as the 'gateway' drugs to other illicit drugs, including heroin. Research suggests that adolescents who use tobacco, alcohol and cannabis tend to progress through a sequence of drug use, adding new drugs as they progress through the sequence while, at the same time, increasing their

involvement with current drugs (e.g. Ellickson, Hays & Bell 1992; Kandel, Yamaguchi & Chen 1992; Yu & Williford 1992; Kandel & Yamaguchi 1993). Illicit, 'harder' drugs, such as heroin, are towards the end of this sequence. Furthermore, the earlier an adolescent starts using cannabis, tobacco and alcohol, and the more frequent the use, the greater the likelihood that the adolescent will use other illicit drugs (e.g. Kandel, Yamaguchi & Chen 1992; Kandel & Yamaguchi 1993; National Center on Addiction and Substance Abuse 1994; 1997). Hall, Solowij and Lemon (1994) also concluded that *daily* cannabis users tend to have experimented with a variety of other illicit drugs, including heroin.

There is also considerable evidence that heroin use is associated with income-generating crime (e.g. McGlothlin, Anglin & Wilson 1978; Ball, Shaffer & Nurco 1983; Dobinson & Ward 1985; Jarvis & Parker 1989; Hall 1996; Stevenson & Forsythe 1998). For example, in their interview study of convicted burglars, Stevenson and Forsythe (1998) found that burglars who used heroin reported a higher median rate of burglary (13 per month) than did burglars who did not use heroin (nine per month).

Thus, another reason why effective treatment programs for adolescent cannabis users would be expected to reduce criminal offending is because a reduction in the number of cannabis users is likely to lead to a reduction in the number of heroin users, and hence, to a reduction in the number of crimes committed to fund heroin habits.

The next section describes the treatment programs available for frequent cannabis users.

TREATMENT PROGRAMS FOR CANNABIS USE

A variety of drug treatment programs have been reported in the literature. These programs differ in a number of ways, including the drug which is the focus of treatment; the type, duration and intensity of treatment; the treatment objectives, admission criteria and provider; the characteristics of participants; and the methodology used, including the sampling technique and the evaluation criteria for successful outcome.

As Gerstein and Harwood (1990, p.132) aptly note:

Drug treatment is not a single entity but a variety of different approaches to different

populations and goals. Response to treatment is not a matter of all or nothing, complete success versus total failure, but of degrees of improvement. Moreover, the setting for evaluation is not the quiet purity of a controlled laboratory experiment but the tangled complexity of real lives and programs under pressure from many directions.

With respect to the drug focus of treatment programs, a review of the literature reveals a relative paucity of research on the effectiveness of *cannabis*-specific treatment programs. Indeed, there is no published research on the effectiveness of cannabis-specific treatment programs for *adolescents* (although one study is currently being conducted in the USA).¹⁰ In general, frequent cannabis use is not the central focus of the treatment programs reported in the literature. More commonly, if cannabis use is treated, it is treated along with other drugs that are the main focus of treatment. Furthermore, for some studies, it is not specified if cannabis was one of the drugs for which treatment was provided.

Given the lack of published evaluation research on cannabis-specific treatment programs targeting adolescents, the bulletin describes the small number of studies which have investigated the efficacy of treatment programs for adults using cannabis, regardless of whether cannabis was the drug which was the central focus of treatment.

With respect to methodology, few of the studies reported in the literature which evaluate the efficacy of treatment for cannabis use have sound methodology. The most stringent methodology for evaluating whether a treatment program is effective involves the random allocation of individuals to different groups. Ideally, these groups would include a group receiving the treatment of interest and a control group receiving no treatment (or only minimal treatment). Other groups receiving different treatments may also be included for comparison purposes. The purpose of random allocation is to ensure that the individuals in each group do not differ markedly in any systematic way apart from the treatment they receive. Without random allocation, one cannot discount the possibility that any obtained differences in outcomes between groups (e.g. differences in the reduction of cannabis use between groups) are due to pre-existing differences in the characteristics of the individuals in the different groups. Following random allocation, however, any difference in outcomes between groups can

confidently be attributed to the different treatments received.¹¹ Without a control group, one cannot discount the possibility that any positive outcome in the groups receiving treatment is due to factors other than the treatment itself. However, a random allocation study that includes two or more treatment groups but no control group can still be used to evaluate whether one treatment has superior outcomes to another treatment.

In addition to random allocation and the inclusion of a control group, a high-quality evaluation of drug treatment programs would include a number of other factors. The evaluation would include objective and reliable criteria for measuring treatment outcomes. Objective and reliable data on the behaviour of interest (e.g. cannabis use) would be collected at least twice: immediately before treatment and on at least one occasion after the completion of treatment. Without a pre-treatment measure of cannabis use, any reductions in cannabis use after treatment cannot be detected. Better studies would include not only an assessment of cannabis use immediately before and immediately after treatment, but also after a sufficient 'follow-up' period has elapsed so that the maintenance of any treatment effects over time can be evaluated. To ensure that there is sufficient power to detect any differences between groups due to treatment, the treatment program should also include adequate numbers of participants in each group at each phase of the study (pre-treatment, treatment completion and follow-up).

The following review of treatment programs for cannabis use first describes the studies that involved random allocation of subjects and then the studies that did not involve random allocation.

STUDIES INVOLVING RANDOM ALLOCATION

Only a few studies have been reported in the literature using random allocation to evaluate treatment programs for cannabis use. All of these studies targeted adult cannabis users. Two of these studies were conducted in the United States of America (USA) and one was conducted in Australia. Cognitive behaviour therapy was the primary focus of the overseas studies. This type of therapy uses both cognitive techniques to modify the thought processes

underlying drug use and behavioural techniques to develop behavioural skills and strategies for resisting drug use. The Australian study evaluated a counselling-based approach involving dynamic psychotherapy.

Roffman and associates conducted the first published randomised studies specifically targeting adults who used cannabis daily and who wanted help in discontinuing use. The studies were conducted in the USA and followed the identification of a demand for cannabis-specific treatment programs among daily users of cannabis in the USA (Roffman & Barnhart 1987; Stephens, Roffman & Simpson 1993).

The first study involved random allocation of subjects to one of two treatment conditions: Relapse Prevention (RP), a type of cognitive-behavioural intervention delivered in a group setting; or Social Support (SS), a group discussion intervention (Roffman, Stephens, Simpson & Whitaker 1988; Stephens & Roffman 1993; Stephens, Roffman & Simpson 1994). There was no control group. Cannabis use was assessed at pre-treatment, treatment completion and at a series of five follow-ups, the last of which occurred 12 months after treatment completion.

The subjects were 161 men and 51 women who responded to media announcements promoting a treatment program for adults who wanted assistance in stopping their cannabis use. The average age of subjects was 32 years. The majority of subjects were white (95%) and employed (85%). Forty-four per cent were married and 40 per cent had completed some college education. On average, subjects self-reported first using cannabis at age 16, becoming daily users by age 20, using cannabis for 15 years, and using cannabis on 81 of the previous 90 days.

The RP treatment was the more comprehensive of the two treatments. It involved active training both in cognitive and behavioural skills for coping with the circumstances that tend to lead to relapse and in soliciting social support. The aim of the RP treatment was to encourage life-style changes that decrease encounters with high-risk situations for cannabis use and increase the ability to cope with such situations (Stephens & Roffman 1993). Subjects were taught to identify the feelings, thoughts and situations that precipitate cannabis use, and to develop and master adaptive cognitive and behavioural responses to cope with these precipitators.

For example, role-playing was used to practise assertive responses to temptations presented by others, to negotiate support from others and to counter negative thoughts about oneself.

The SS treatment, on the other hand, was based on the premise that seeking and utilising support from others is critical in overcoming cannabis use. The SS therapists did not actively train subjects in cognitive or behavioural coping techniques, rather, they facilitated group discussion, primarily on the issue of social support. The SS treatment, therefore, had a narrower focus than the RP treatment. Subjects were assisted in identifying individuals within the treatment group and within their social network who could provide social support and in learning how to seek and utilise such support.

Both RP and SS treatment consisted of 10 two-hour sessions, with one session occurring weekly for the first eight weeks and each of the remaining two sessions occurring fortnightly. Each treatment condition was conducted in several groups of 12 to 15 subjects.

Cessation of cannabis use was the goal for subjects in both treatment conditions. Follow-up assessments were conducted one, three, six, nine and 12 months after treatment. At the three- and six-month follow-ups, subjects in both treatment groups received booster treatment, their urine was tested for cannabis and other drugs, and they completed questionnaires regarding their use of cannabis and other drugs. The remaining three follow-ups were conducted by mailed questionnaires in which subjects self-reported their cannabis use.

A total of 167 subjects (79% of the original sample) were involved in all follow-up assessments. Stephens, Roffman and Simpson (1994) hypothesised that the RP treatment, the more comprehensive of the two treatments, would produce and maintain superior reductions in cannabis use. In fact, the researchers found no statistically significant differences between the two types of treatment. Compared with pre-treatment, *both* interventions resulted in reductions in cannabis use at post-treatment and at follow-up, as indicated by measures such as cannabis abstinence rates and daily use rates. For example, at the 12-month follow-up, 15 per cent of the subjects in the RP treatment group and 18 per cent of the subjects in the SS treatment group

were cannabis-abstinent. A further 20 per cent in the RP group and 18 per cent in the SS group had reduced their frequency of cannabis use by at least 50 per cent compared with their pre-treatment levels. Furthermore, at the 12-month follow-up, subjects in each treatment group reported having used cannabis, on average, about 14 or 15 days per month compared with about 26 or 27 days per month at pre-treatment. Women were, however, less likely than men to remain abstinent.

While Stephens, Roffman and Simpson (1994) conclude that their results indicate that cannabis users can be effectively helped to reduce their use, they acknowledge that several factors limit the generalisability of their results, namely, 'the self-selected nature of the sample, the university research setting, and the failure to attract non-White racial groups' (p. 98). It should also be noted that attrition over the follow-up period resulted in the follow-up sub-sample consisting of more female, better educated, married subjects who had reported fewer cannabis-related problems at pre-treatment. Furthermore, given that there was no control group, it is not known whether the reductions in cannabis use obtained after the completion of treatment would have occurred even without treatment.

Using the same sample of subjects, Roffman, Klepsch, Wertz, Simpson and Stephens (1993) attempted to categorise the characteristics of the participants that predicted attrition from the treatment programs. They found that retention in treatment did not differ according to treatment type, education level or gender. However, differences were found between those who 'completed' the treatment program (i.e. attended at least seven of the 10 sessions) and those who dropped out 'early' (i.e. did not attend after the fourth session). The early dropouts were younger, earned less income, were more likely to rent rather than own their own home, were less able to pay bills and reported more psychological distress. Those who completed the program and those who left the program 'later' (i.e. attended five or six of the 10 sessions) were similar in terms of age, income, home ownership, ability to pay bills, psychological stress level and confidence in being cannabis-abstinent in the future. However, the rates of cannabis abstinence in the late dropouts resembled the rates for the early dropouts.

The encouraging results of the initial treatment study by Roffman and his

associates led Stephens, Roffman, Cleaveland, Curtin and Wertz (1994) to conduct another random allocation study in the USA, again targeting adult cannabis users who wanted assistance in ceasing their cannabis use. Given that the first study found that the two treatments were not sufficiently different to produce differences in outcome, the second study tested whether treatments that were more markedly different to one another would produce significant differences in outcome. As a result, an extensive cognitive-behavioural treatment, a minimal treatment and a control condition were evaluated.

Again, subjects were recruited via a media campaign. They were required to meet a number of eligibility criteria in order to participate in the study, including smoking cannabis at least 50 times during the previous 90 days, not abusing alcohol or a drug other than cannabis, not exhibiting psychosis and not currently participating in another drug treatment program. The majority of subjects were white (95%) and employed (88%). Forty-one per cent had college education. The mean age of first cannabis use was 16 years and of first daily use was 20 years.

Stephens, Roffman, Cleaveland, Curtin and Wertz (1994) randomly allocated 290 subjects (223 men and 67 women) to one of three conditions: the Relapse Prevention Support Group (RPSG) condition, an extended version of the RP treatment used in the first study; the Individual Assessment and Intervention (IAI) condition, a minimal treatment condition; and a waiting-list control condition. Assessments were made at pre-treatment and on five occasions after the start of treatment, the last occurring 16 months after the start of treatment.

The RPSG treatment, like the RP treatment in the first study, was a cognitive-behavioural treatment that aimed to prevent relapse and was delivered in a group setting. Compared with the RP treatment, the RPSG treatment included an increased number of group sessions (14 sessions over four months rather than 10 sessions), four concurrent but optional sessions with the subject's partner or support group, and a transition to self-help groups during the last two months of treatment.

The minimal IAI treatment did not involve active training in cognitive-behavioural skills. Rather, it involved providing feedback from assessment data and using motivational interviewing

techniques to bolster the subject's commitment to change and to engage the subject in a problem-solving approach to cannabis cessation. The IAI treatment was conducted in only two sessions that were scheduled one month apart. The subject's partner or supporter was encouraged to attend the second session.

The control condition was a delayed treatment condition in which the subjects waited four months before they received the treatment of their choice, either the RPSG or IAI treatment.

Subjects were assessed before treatment began and one, four, seven, 13 and 16 months after the start of treatment. Given that the treatment conditions had different durations, each assessment occurred at a different point in time relative to the completion of each treatment. For example, the four-month assessment occurred immediately after the completion of the four-month RPSG treatment, three months after the completion of the one-month IAI treatment and immediately before the waiting-list control group began treatment.¹² At each assessment, information was obtained regarding the subjects' cannabis use, cannabis-related problems and dependence symptoms using both self-reports and independent reports from the subjects' significant others.

At the four-month assessment, the researchers found that there were significant reductions in the number of days of cannabis use and significant increases in the rates of cannabis abstinence for subjects in all three conditions. Relative to the control group, both the RPSG and IAI groups produced significantly fewer days of cannabis use, significantly greater rates of cannabis abstinence, significantly fewer problems related to cannabis use and significantly fewer cannabis dependence symptoms. Furthermore, the improvements for the two treatment groups, while somewhat attenuated, were still generally evident at the 16-month assessment. However, as with the first study, there were no statistically significant differences between the two treatment conditions at any of the assessments. Nor were there significant differences between men and women. The authors concluded that minimal interventions are not only effective in terms of outcomes but also in terms of cost.

Recently, in a randomised study conducted in Australia, Grenyer, Solowij

and Peters (1998) compared an intensive treatment condition involving supportive-expressive dynamic psychotherapy with a minimal, self-help treatment condition. The minimal treatment group acted as a control for the intensive psychotherapy group. There was a pre-treatment assessment and an assessment four months after treatment admission.

Grenyer, Solowij and Peters (1998) used advertising to recruit 100 long-term adult cannabis users who wanted treatment to cease using cannabis. Subjects were randomly allocated to each group. The subjects had a median age of 32 years. The researchers reported that all subjects met the criteria for cannabis dependence as defined by the Diagnostic and Statistical Manual for Mental Disorders (DSM IV),¹³ had used cannabis on a near-daily basis for at least five years and had no history of other drug abuse. Most subjects had commenced using cannabis at 16 years of age and had become regular users within two and a half years.

The minimal, self-help treatment condition consisted of a single therapy session where the therapist provided the subject with motivational advice and a self-help manual.

The intensive supportive-expressive psychotherapy condition consisted of 16 therapy sessions conducted in an individual setting. Generally, one session was conducted weekly and each session lasted approximately 50 minutes (Grenyer, Luborsky & Solowij 1995). Supportive-expressive psychotherapy, as the name implies, uses a combination of 'supportive' and 'expressive' techniques to prepare the subject for cannabis abstinence. The supportive techniques aimed to foster a positive, empathic and supportive relationship between the therapist and the subject. The expressive techniques aimed to help the patient express, understand and change problems. The expressive techniques focused on the subject's Core Conflictual Relationship Theme (CCRT) patterns, that is, on the subject's recurring interpersonal conflicts with, for example, the therapist, partners, family and friends. The subject's CCRT patterns were identified by the therapist through an analysis of the subject's narratives about his or her interactions with others. The narratives generally included three elements: the subject's wishes, the responses of others to these wishes and how the subject was affected by these responses. Once the subject's CCRT pattern was identified, the therapist

helped the subject to understand and resolve his or her repetitive interpersonal conflicts, and to understand how these conflicts related to their drug use (Grenyer, Luborsky & Solowij 1995).

Although limited information is currently available, the researchers report that, at the assessment conducted four months after treatment admission, there were statistically significant differences between the two treatment groups. Nearly two-thirds of the subjects in the intensive psychotherapy treatment group had been successful in stopping their cannabis use, while only about 10 per cent of subjects in the minimal, self-help treatment group were successful. In addition, the intensive psychotherapy group performed better on measures of psychological health, depression and anxiety. Subjects in the intensive treatment group were also more satisfied with their treatment and more likely to recommend it to a friend.

In summary, the few studies reported in the literature that used random allocation to evaluate treatment programs for heavy cannabis use have found reductions in cannabis use compared with pre-treatment. Furthermore, in one instance, the group receiving intensive treatment had greater reductions in cannabis use than did the minimal treatment group. The treatments evaluated involved cognitive-behavioural and counselling techniques. These randomised studies suggest that heavy cannabis use can be effectively treated and that treatment effects can be maintained for a period of at least a year following treatment.

In addition to these published studies, three other randomised studies are currently underway specifically evaluating treatment programs for cannabis use. Two of these studies are being conducted in the USA, one targeting adult cannabis users and the other targeting adolescent users. The third is an Australian study which targets adults. The primary focus of all these studies is cognitive behaviour therapy. These studies are briefly described in the *Appendix*. The next section reviews studies that evaluated treatments for cannabis use, but did not use random allocation.

STUDIES INVOLVING NO RANDOM ALLOCATION

In the literature, there are only a handful of non-randomised studies that evaluate treatments for cannabis. Three of these studies were conducted overseas and

two were conducted in Australia. All the overseas studies and one of the Australian studies were observational in nature, evaluating a single treatment condition by comparing pre-treatment assessments with post-treatment and/or follow-up assessments in the absence of a control or comparison group. Aversion therapy was the primary form of treatment in the observational studies conducted overseas. Aversion therapy operates on the principle that a behaviour (such as cannabis use) can be reduced by repeatedly associating it with an unpleasant event (such as nausea or an electric pulse). The observational study conducted in Australia evaluates a brief treatment involving cognitive-behavioural and motivational counselling techniques. The other Australian study compares two treatment conditions: a multi-faceted treatment condition based on 'best practice' and a 'usual care' treatment condition.

Morakinyo's (1983) observational study, conducted in Nigeria, evaluated a single treatment condition involving three sessions of aversion therapy. Each session was separated by an interval of three or four days. Assessments of cannabis use were conducted at pre-treatment and over a period of at least six months after the completion of treatment.

The sample consisted of nine men, aged between 18 and 26 years, who had been admitted to hospital for a psychotic illness 'associated with a history of cannabis abuse' (p. 288). Morakinyo reports that, at pre-treatment, most of the patients had been smoking for at least two years and admitted to smoking at least two 'joints' daily.¹⁴

The aversion therapy involved inducing feelings of nausea and vomiting in the patient while he viewed photographs of himself preparing and smoking cannabis. During the first phase of treatment, the patient was photographed while re-enacting the process of preparing cannabis leaves for smoking and actually smoking cannabis. Half an hour prior to the second phase of treatment, the patient was given an injection designed to produce nausea and vomiting during the second phase. The second phase involved showing the patient a magnified version of each photograph taken during the first phase and asking him to recall, as vividly as possible, the actual event depicted. While looking at each photograph, the patient was asked to drink salty water which, in conjunction

with the earlier injection, made the patient nauseous. Following this treatment, the patient was given a sedative that stopped vomiting and he was allowed to rest.

The patients were monitored on an outpatient basis after completing their treatment. Based on self-reports and reports from relatives, all abstained from smoking cannabis for an average of nine months (ranging from six to 14 months).

In addition to the obvious limitation of the very small number of patients included in this study, the author also acknowledges that there was no control group and that the patients' medications for their psychotic illnesses may have contributed to their abstinence from cannabis.

In an observational study conducted by Smith, Schmeling and Knowles (1988) in the USA, the single treatment condition consisted of aversion therapy together with counselling. Cannabis use was assessed at pre-treatment, at treatment completion and at two follow-ups after treatment completion, the last follow-up occurring 12 months after completion. The follow-up assessments were conducted by telephone.

The sample consisted of 22 middle-class adults who were recruited via newspaper advertisements targeting cannabis users who wanted to stop their cannabis use. The 16 male and six female subjects had an average age of 30 years (ranging from 24 to 40 years). They had been smoking cannabis for an average of 14 years (ranging from seven to 22 years) and smoked an average of three cannabis cigarettes (joints) per day (ranging from one to eight joints).

Subjects received four weeks of treatment. In the first week, on each of five consecutive days, subjects received two periods of aversion therapy separated by a brief counselling session. In the last three weeks, subjects received one group counselling session each week but no aversion therapy.

During the first week of aversion therapy, three aversion therapy techniques were used. All three techniques involved randomly delivering an electric pulse of up to 10 milliamps to the subject's forearm while the subject prepared and 'smoked', in the instructed fashion, two THC-free cannabis cigarettes.¹⁵ The first technique involved delivering the electric pulse while the subject prepared and smoked the cannabis cigarettes essentially in the way he or she normally

would outside the treatment setting.¹⁶ The second technique involved delivering the pulse during 'rapid smoking' of the cannabis.¹⁷ 'Rapid smoking' consisted of inhaling smoke approximately every six seconds until the cannabis was finished or the subject felt too uncomfortable to continue. The third aversion therapy technique involved delivering the pulse while the subject engaged in 'quick puffing'. 'Quick puffing' consisted of the subject engaging in brief and shallow puffs (without inhaling) until the entire contents were smoked without placing the joint or pipe down.

On the first two days of aversion therapy, the first technique, involving normal smoking, was used. On the third day, the rapid smoking technique was used. On the fourth day, both the rapid smoking and quick puffing techniques were used. On the fifth day, all three techniques were used. On each of the five days, the brief counselling session which separated the two aversion therapy periods involved 'self-management' counselling that focused on a handout which varied each day. For example, the handout listed alternative behaviours to smoking cannabis, or required the subject to list the negative consequences of continued cannabis smoking and the positive results expected from cessation, or provided for the development of regimes of regular exercise and balanced diets.

The group counselling sessions delivered in the last three weeks of treatment (after the completion of the aversion therapy in the first week) were designed to maintain the aversion to cannabis smoking and to develop drug-free coping behaviours. Subjects were assigned to one of seven groups consisting of two to four individuals.

Smith, Schmeling and Knowles (1988) found that all 22 subjects self-reported that they had achieved cannabis abstinence by the end of the five days of aversion therapy. This abstinence rate was only slightly attenuated during the remaining treatment period and the follow-up period. At treatment completion, the abstinence rate was 90 per cent (19 out of 21 subjects). The abstinence rate dropped further to 75 per cent (15 out of the 20 subjects contacted) at the six-month follow-up, but rose to 84 per cent (16 out of the 19 subjects contacted) at the 12-month follow-up.

Also, for the subjects who reported smoking cannabis at the follow-up interviews, there was a decrease in the

average number of cannabis joints smoked daily. On average, subjects reported smoking three joints per day at pre-treatment, but only one-fifth of a joint per day at the 12-month follow-up.

The researchers concluded that their procedure is a promising cannabis-smoking cessation treatment program. However, two obvious weaknesses of this study are the small sample size and the lack of a control group. Its applicability to adolescents is also unknown.

In some treatment programs, cannabis use was not the focus of treatment but was treated along with the other drug(s) of primary concern. For example, in an observational study conducted by Smith and Frawley (1993) in the USA, the drug of primary concern was alcohol. However, of the 600 patients admitted to hospital for alcoholism, Smith and Frawley (1993) found that over half (53%) were using one or more other drugs at the time of admission. The two most common other drugs used were cannabis and cocaine, with 197 (33%) patients admitting to cannabis 'abuse' and 174 (29%) admitting to cocaine 'abuse'.¹⁸

All 600 patients received a multi-modal treatment program using aversion therapy for alcoholism. In addition to the treatment for alcoholism, the patients who also admitted to cannabis, cocaine or methamphetamine abuse were offered aversion therapy for each of these types of drug abuse. Forty-seven of the 197 patients who admitted to cannabis abuse agreed to receive aversion therapy for cannabis abuse. Twenty-eight of these 47 patients also received aversion therapy for cocaine abuse. One follow-up assessment was conducted at least 12 months after treatment was completed.

The treatment program was conducted on an in-patient basis and generally lasted between 10 and 16 days. The first 10 days involved receiving treatment for alcoholism while the subsequent days involved receiving treatment for the other addictions. The treatment program for alcoholism focused on daily sessions of either aversion therapy or narcotherapy, delivered on alternate days, but also included counselling, education, a family program and an after-care plan. The aversion therapy for alcohol involved pairing the sight, smell and taste of alcohol with either chemically-induced nausea or an electric stimulus. The narcotherapy for alcohol involved gathering psychological diagnostic

information and monitoring the development of aversion to alcohol by asking about the level of desire for alcohol.

Immediately following the 10-day treatment for alcoholism, the treatment for the other types of drug abuse was conducted. In the case of cannabis abuse, subjects received five sessions of aversion therapy in which a cannabis 'substitute' was paired with an aversive stimulus. Education and counselling specific to cannabis addiction were also provided. Smith and Frawley do not provide any further details of the treatment for cannabis abuse.¹⁹

Using a structured interview schedule, cannabis use was assessed at one telephone follow-up, between 12 and 20 months after treatment completion. Thirty of the 47 subjects treated for cannabis use were able to be contacted at follow-up. Twenty-one (70%) of these 30 subjects self-reported that they had abstained from using cannabis for at least 12 months after treatment completion. A further five subjects (17%) had remained abstinent for at least six months.

Smith and Frawley (1993) were also interested in the types of factors that determined relapse to cannabis use.²⁰ They found that important determinants of relapse were environmental or interpersonal factors, such as being around others who were using cannabis or pressuring the patient to use cannabis. Intrapersonal factors, such as stress from work or from family relationships were of less importance. The researchers note that this finding highlights the importance of carefully evaluating each patient's environment so that potential hazards can be anticipated and dealt with in the after-care plan.

One of the two non-randomised studies recently conducted in Australia targeted *adult cannabis* users whereas the other targeted *adolescent drug* users. Unlike the overseas studies that used aversion therapy as the primary form of treatment, the Australian studies used a combination of other therapies and included cognitive-behavioural and counselling techniques.

Turning Point Alcohol and Drug Centre, a non-government organisation based in Fitzroy, Victoria, conducted an observational treatment study between December 1997 and May 1998 (personal communication). The study targeted adult cannabis users. The treatment consisted of a brief, single session intervention involving a number of

different techniques, including cognitive behaviour therapy and motivational interviewing. There was no control group. Assessments of cannabis use were conducted at treatment admission and at one and three months following treatment.

The study included 30 adult cannabis users who were recruited via radio advertisements and a network of general practitioners. The treatment targeted subjects who self-defined that cannabis was a 'problem'. Subjects were excluded from treatment if they were dependent on drugs other than cannabis, psychiatrically ill or less than 16 years of age. Of the 30 subjects in the study, 19 were male and 11 were female. Their ages ranged from 20 to 40 years. The majority of subjects (73%) had been using cannabis for at least 10 years. The mean age of first cannabis use was 15 years and of 'regular' use (i.e. at least weekly) was 18 years. The mean length of self-defined problem use was five years.

When the subject first contacted the Centre, generally by telephone, a brief assessment of the subject's needs was conducted. A treatment session of approximately two hours duration was conducted at the Centre in seven to 10 days' time. In the meantime, the subject was sent an information package ('Pot Pack') which included a seven-day cannabis-use diary and a questionnaire regarding reasons for starting cannabis use, reasons for current cannabis use, plans for future use and strategies for ceasing use. The subject brought the completed diary and questionnaire to the treatment session. The diary and questionnaire formed the basis of discussion at this session. In addition, the clinician obtained further information regarding the subject's history of cannabis use and the impact of cannabis on the subject's lifestyle. The clinician used a variety of cognitive-behavioural and motivational techniques to help the subject identify his or her individual needs and to develop strategies tailored to meet these needs.

The one- and three-month follow-up interviews were conducted by telephone. Most of the 30 subjects were contacted at each follow-up: 29 (97%) at the first follow-up and 25 (83%) at the second. Subjects were asked questions regarding their use of cannabis (both quantity and frequency) during the previous month and during the previous week; the impact of their cannabis use on various aspects of their lives, such as health, work, relationships with family and friends,

hobbies and other leisure activities; and their opinion of the treatment.

Turning Point Alcohol and Drug Centre (personal communication) reports that, compared with the initial assessment, at both follow-ups, there were statistically significant reductions in both the quantity of cannabis used and the number of days of use. At initial assessment, 21 subjects (70%) reported that, at some point during the previous month, they had used at least 21 'bongs' daily.²¹ This number of subjects had dropped to seven (24%) at the one-month follow-up and five (20%) at the three-month follow-up. Furthermore, at initial assessment, only two subjects (7%) reported that they had used 10 bongs or less daily compared with 17 subjects (59%) at the one-month follow-up and 15 subjects (60%) at the three-month follow-up.

In addition, Turning Point reports that, at initial assessment, 22 subjects (73%) reported using cannabis every day during the previous week. After treatment, the number of subjects in this category decreased to 12 (41%) at the one-month follow-up and 11 (44%) at the three-month follow-up. Also, at the follow-up interviews, subjects reported improvements in various aspects of their lives, including relationships, health and social life.

This research became the foundation for a service that is currently being provided by three clinicians employed by Turning Point. Approximately 100 clients have been treated since December 1997 (including the 30 research subjects). Although one session of treatment is generally the norm, if necessary, further sessions are provided. Three or four clients are treated each week. Adolescent cannabis users are also treated if they contact the Centre.

Recently in Sydney, the National Drug and Alcohol Centre and the Ted Noffs Foundation jointly developed a drug treatment program which specifically targets adolescents (Spooner, Mattick & Howard 1996; Spooner, Mattick & Noffs 1998a; 1998b). The program, Program for Adolescent Life Management (PALM), is not cannabis-specific but aims to reduce all maladaptive patterns of drug use. Unlike the non-randomised studies described above which involved a single group of subjects, the PALM study compared the treatment group of interest with another group who received 'usual care'.²² The PALM treatment was a multi-faceted, holistic treatment based on 'best practice'. It included case

management, skills training, a family program and social support, and used a variety of cognitive-behavioural and counselling techniques. The type of 'usual care' that the comparison group received could include detention, residential detoxification, non-residential counselling, support from family and others, or no treatment. A pre-treatment assessment was conducted and follow-up assessments were conducted approximately six and 10 months after the pre-treatment assessment.

The study compared 60 adolescents who received PALM treatment with 61 adolescents who received usual care. During the month prior to treatment, of these 121 subjects, 61 per cent had used cannabis on a daily basis and 83 per cent had used some cannabis. For those who used cannabis, the average cannabis used on the last day of use was 16 cones (ranging from one to 73 cones).

All 121 subjects who participated in the study had applied to enter PALM and were eligible for the program. However, those who formed the usual care group did not take up a place in PALM when one became available.²³ To be eligible for PALM, subjects had to be between 14 and 18 years of age, have a maladaptive pattern of substance use which meets the criteria of 'abuse' or 'dependence' as defined by DSM IV and require assistance because of this maladaptive pattern of substance use.

PALM was designed following both an extensive review of the literature on treatment of adolescent substance users and consultations with such users and with service providers. PALM's holistic approach is based on the rationale that drug use is best treated along with the other problems in the adolescent's life which are associated with drug use. Examples of such problems are unemployment, mental health problems and criminal activity. According to this rationale, there are multiple risk factors for substance abuse by adolescents and programs need to reduce as many risk factors and enhance as many protective factors as possible. PALM's main goal, therefore, is to increase the ability of clients to manage their lives effectively (Spooner, Mattick & Howard 1996). PALM's three key objectives are to decrease harmful substance use by clients, to decrease their problem behaviours and to improve their intra- and inter-personal functioning.

The program includes 12 weeks of residential treatment followed by

scheduled, case-managed after-care. The residential component includes case management; education on harm-reduction practices; skills training using a variety of techniques such as cognitive restructuring, problem solving, anger management, assertiveness training and relapse prevention; counselling; a recreational program; a behaviour modification program which uses incentives to achieve behavioural change; and a family program including parenting skills training and parent support. Both group and individual settings are used for the residential treatment (Spooner, Mattick & Howard 1996).

At present, data for the follow-up conducted six months after pre-treatment are available for 104 of the 121 subjects (86%) and data for the follow-up conducted 10 months after pre-treatment are available for 84 subjects (69%).²⁴ Spooner, Mattick and Noffs (1998a) found no significant differences between the two groups in substance use over time. Both PALM and usual care produced significant reductions in frequency of cannabis use. Sixty-eight per cent of the subjects assessed at the first follow-up reported using cannabis compared with 83 per cent of the subjects assessed at pre-treatment. Furthermore, the average daily amount of cannabis used dropped from 16 cones at pre-treatment to eight cones at the first follow-up.

Spooner, Mattick and Noffs (1998a) provide a number of possible reasons for a lack of difference between the PALM and usual care groups. For example, the PALM after-care and family program were not fully implemented,²⁵ the average length of residential stay during the study period was seven rather than the intended 12 weeks and PALM subjects displayed greater social dysfunction than the comparison group at baseline. The researchers are also exploring the possibility that group differences did not emerge because more subjects dropped out of the usual care group compared with the PALM group. If those who dropped out had the poorer outcomes, the greater drop-out rate from the usual care group would artificially inflate the positive results achieved for this group (personal communication). Nonetheless, treatment of some type was effective in reducing cannabis use among the subjects.

In summary, the findings of the less methodologically rigorous, non-randomised studies support the findings

of the more rigorous, randomised studies in suggesting that treatment for cannabis use is effective. Generally speaking, however, the two types of studies evaluated different types of treatments. Most of the non-randomised but none of the randomised studies involved aversion therapy. The randomised studies generally evaluated treatments which used cognitive-behavioural and counselling techniques. Two of the non-randomised studies also evaluated these techniques. Given that most of the existing treatment programs for cannabis use have not been rigorously evaluated, further research is required to confirm the effectiveness of the various treatment programs which currently appear to be promising.

The main aim of the present bulletin was to review treatment programs for cannabis use. However, given the paucity of research into the *treatment* of cannabis use, it is valuable to examine briefly studies that attempt to *prevent or delay* cannabis use in adolescents. Prevention programs for cannabis use, like treatment programs for cannabis use, would be expected to reduce criminal offending among adolescents. Effective prevention programs should at least delay, if not prevent, a proportion of juveniles from participating in crime. The next section describes two such prevention programs.

PREVENTION PROGRAMS FOR CANNABIS USE

It is beyond the scope of this bulletin to thoroughly review prevention programs for cannabis use. Rather, the bulletin describes two large-scale prevention programs which have been rigorously tested. Both were school-based programs that aimed to prevent students' use of drugs, including use of cannabis. Both programs were conducted in the USA in the mid-1980s and involved the random allocation of schools to different treatment conditions, the inclusion of a control condition, large sample sizes, long-term follow-up assessments and the targeting of relatively young students, namely, students in Grade 7. Both programs included training in cognitive-behavioural coping strategies.

Project Adolescent Learning Experiences in Resistance Training (ALERT) was conducted in California and Oregon between 1984 and 1986. It specifically targeted the 'gateway' drugs, namely, tobacco, alcohol and cannabis (Ellickson

& Bell 1990; Ellickson, Bell & McGuigan 1993; Ellickson, Bell & Harrison 1993). The program was educational in nature and was based on the social influence approach to prevention. This approach involves helping young people to understand how drugs can affect their daily lives and to identify pro-drug pressures. The program also aimed to help adolescents acquire a repertoire of cognitive-behavioural skills for resisting pro-drug pressures. The evaluation of Project ALERT compared a control condition with two methods of delivering the program: delivery solely by adult educators and delivery by both adult and adolescent educators. The program was delivered to Grade 7 students who were given booster sessions in Grade 8 and were followed up through to their last year of secondary school in Grade 12.

The evaluation involved 3,874 students who were enrolled in 30 schools drawn from urban, suburban and rural communities. Ten schools were randomly allocated to each of three conditions. In the condition involving both adult and adolescent educators, the adolescent educators were older adolescents from neighbouring high schools. The adolescent educators assisted the adult educators in half of the lessons given to Grade 7 students. The main functions of the adolescent educators were to provide, based on personal experience, examples of effectively resisting pro-drug pressures, and to help develop a climate in which not using drugs is perceived as the norm. The control condition did not receive the Project ALERT program but were allowed to deliver existing drug and smoking prevention programs. Four of the 10 control schools did so.

The Grade 7 curriculum consisted of eight weekly 50-minute classroom lessons and the Grade 8 booster curriculum consisted of three 50-minute lessons. Each lesson had a specific focus, for example, reasons why people do or do not use drugs, the immediate personal and social consequences of use, identifying and countering pro-drug pressures, learning different ways to say 'no' to external and internal pressures to use drugs, reinforcing the skills learned and identifying the benefits of resisting drugs. The lessons involved a variety of techniques designed to develop both the motivation and the skills required by students to effectively resist pro-drug pressures. These techniques actively involved the students and included question-and-answer techniques, role

modelling, repetitive skills practice, small group discussions and writing exercises.

Using self-completion questionnaires, data were collected from each student on seven occasions, at baseline and at six follow-ups. The follow-up assessments occurred in Grade 7 (three months after the Grade 7 curriculum); in Grade 8, both before and after the booster curriculum (i.e. 12 and 15 months after baseline); and in Grades 9, 10 and 12. Thus, the last follow-up occurred about five years after the program was delivered. Students reported on their own drug use *behaviour* such as their use of alcohol, cigarettes and cannabis over the past month, the past year and in their lifetime, and their use of other drugs such as cocaine. In addition to being asked about their own drug use behaviour, students were asked about drug use in their family and peer group. Students were also evaluated on a number of *cognitive* measures assessing, for example, their beliefs, perceptions and future intentions concerning drug use, and their educational expectations.

Ellickson and Bell (1990) examined the outcomes from the first three follow-ups conducted in Grades 7 and 8. Comparisons between the experimental and control conditions were made for three groups of students: 1,976 'low-risk' students who had not used either tobacco or cannabis at baseline; 1,344 'moderate-risk' students who had used tobacco but not cannabis at baseline; and 554 'high-risk' students who had used cannabis at baseline.

They found that, while the lessons lasted (during Grades 7 and 8), the Project ALERT program was successful in curbing the use of cannabis and cigarettes, particularly among the low-risk students. The effects on cannabis use behaviour were smaller and less often statistically significant for the moderate- and high-risk students. Among the low-risk students, the rate of cannabis initiation at the 12-month follow-up was significantly higher in the control condition (8%) than in the two experimental conditions (5%). This difference was maintained at the 15-month follow-up, with 12 per cent of low-risk students in the control condition having started cannabis use compared with eight per cent in the two experimental conditions.

For the moderate-risk students, comparisons at the first three follow-ups did not reveal statistically significant differences between the three conditions on behavioural measures such as

cannabis initiation and cannabis use during the previous month. For these students, the only statistically significant difference between the three conditions on a behavioural measure occurred at the 12-month follow-up for 'monthly' use of cannabis.²⁶ Fewer students (3%) in the adult educator condition had used cannabis on a monthly basis compared with the adolescent-assisted educator or control conditions (6%).

The high-risk students were the most resistant to change. For these students, there were no statistically significant differences between the three conditions at any of the first three follow-ups on behavioural measures such as monthly use of cannabis or cannabis cessation. For example, at the 12-month and the 15-month follow-ups, about one-third of the high-risk students in each of the three conditions had not used cannabis during the previous year. In fact, for these students, the only statistically significant difference between the three conditions on a behavioural measure of cannabis use occurred at the three-month follow-up for 'weekly' use of cannabis, with six per cent of students in the adolescent-assisted educator condition using cannabis 'weekly' compared with 11 per cent in the other two conditions.²⁷

In addition to Project ALERT's positive effects on cannabis use behaviour at the first three follow-ups, positive effects were found on a number of the cognitive measures. For example, Ellickson, Bell and McGuigan (1993), and Ellickson, Bell and Harrison (1993) found that, at the 15-month follow-up, compared with the students in the control condition, those in the two experimental conditions modified their beliefs regarding the social and addictive consequences of cannabis use, their perceptions of the proportion of students who used cannabis and their expectations of personal future use of cannabis. Furthermore, these effects were statistically significant for students in each of the three risk levels, although they were strongest for the low-risk students.

Ellickson, Bell and McGuigan (1993) found that by Grade 9 (24 months after baseline), the positive effects of the program on cannabis use *behaviour* had disappeared completely, even for the low-risk students. Furthermore, these positive effects did not resurface at the later follow-ups in Grades 10 and 12. For example, of the 1,874 low-risk students who were followed up at Grade 12, approximately 10 per cent in each

condition reported that they had used cannabis in the past month. Of the 470 high-risk students followed up to Grade 12, approximately 40 per cent in each condition had used cannabis in the past month.

However, although the program's positive effects on cannabis use *behaviour* had disappeared by Grade 9, positive effects on some *cognitive* measures still remained. For example, Ellickson, Bell and McGuigan (1993) found that, at Grade 10, compared with students in the control condition, students in both experimental conditions were more likely to believe that drug use would have negative personal consequences and that friends would respect them for resisting cannabis use. Interestingly, this effect was stronger for the adolescent-assisted educator condition than for the adult educator condition. At Grade 12, a significant difference was found on the cognitive measure for the students' perceptions of drug use by peers.

The researchers conclude that 'drug prevention ... programs for junior high school students can make a difference in the short run ... [however, adolescents] need continued and strong reinforcement to resist drugs ... during the high school years ...' (Ellickson, Bell & McGuigan 1993, p. 860).

The Life Skills Training Program reported by Botvin and associates was a cognitive-behavioural skills training program designed to prevent tobacco, alcohol and cannabis use among school students (Botvin 1990; Botvin, Baker, Dusenbury, Tortu and Botvin 1990; Botvin, Baker, Dusenbury, Botvin & Diaz 1995). The program aimed to train both general life skills and skills specific to resisting drug use. The evaluation of the program was based on 4,466 students from 56 schools in New York State. Schools were randomly allocated to one of three conditions: two experimental conditions which received the program and one control condition. The two experimental conditions varied in the type of training received by the program providers. As with Project ALERT, the control condition was a 'treatment as usual' condition. The program began in 1985 and was conducted over a three-year period, with the main lessons conducted in Grade 7 and booster lessons conducted in Grades 8 and 9. Assessments were made on five occasions: at baseline, after the completion of lessons in Grades 7, 8 and 9, and in Grade 12.

Regular classroom teachers from the participating schools delivered the program after receiving training. In one experimental condition, teachers attended a formal, one-day training workshop and received feedback from project staff regarding the implementation of the program. In the other experimental condition, teacher training consisted of a two-hour training videotape and did not include feedback on program implementation. Both groups of teachers received curriculum materials.

The program was designed to facilitate the development of both students' general personal and social skills and students' skills for resisting social influences to use drugs. More specifically, the students were taught cognitive-behavioural skills for building self-esteem, resisting pressure from advertisements, managing anxiety, communicating effectively, developing personal relationships and developing assertiveness. Students were also taught to apply skills to specific situations. The skills were taught by a combination of techniques including demonstration, practice, homework assignments, feedback and reinforcement. In addition to skills training, students received information regarding drug use such as its decreasing social acceptability, its prevalence and its immediate negative consequences. However, students were given only minimal information about the long-term health consequences of drug use.

The program consisted of 12 curriculum units designed to be taught to Grade 7 students in 15 class lessons of 40 to 45 minutes duration. An average of two lessons was taught per week. In addition, 15 booster lessons were conducted, 10 in Grade 8 and five in Grade 9.

For the first four assessments, data were collected, using self-report questionnaires, for all students in classrooms. For the Grade 12 assessment, individuals who were not available for the classroom data collection were assessed either by telephone or by mail. Data were collected regarding the students' use of cigarettes, alcohol and cannabis. For cannabis, the frequency of use was assessed. Data were also collected on students' knowledge of drug use (e.g. about the immediate consequences, prevalence and social acceptability of drug use); their perceptions of drug use (e.g. about the social benefits of drug use); and their skills (e.g. in decision-making, coping with anxiety, being

assertive and maintaining high self-esteem).

Botvin et al. (1990) present results for the assessments conducted after the Grade 7, 8 and 9 lessons. Because only about two-thirds of the prevention program was implemented in each experimental condition, Botvin et al. (1990) only report results for students who were exposed to at least 60 per cent of the program. This sample comprised 3,684 students from 50 schools (14 schools in each experimental condition and 22 in the control condition). They found that, compared with the control condition, students in both experimental conditions had a significantly lower frequency of cannabis use, more knowledge about substance use and better interpersonal skills.

For the Grade 12 assessment, data were available for 3,597 students. Of these students, 2,752 (77%) received at least 60 per cent of the program. For the full Grade 12 sample, Botvin et al. (1995) found that there was no significant difference between the experimental conditions and the control condition on frequency of cannabis use. However, positive effects were found for the students who received at least 60 per cent of the program. For these students, compared with the control condition, both experimental conditions had lower rates of weekly cannabis use, and the condition delivered by formally trained teachers also had lower rates of monthly cannabis use. For some students, therefore, differences in cannabis use were still evident in Grade 12.

In summary, both Project ALERT and the Life Skills Training Program involved educating adolescents about drug use and training cognitive-behavioural skills. Both studies found, at least in the short-term, lower levels of cannabis use among students in experimental conditions compared with control conditions. Although the positive effects of these programs attenuated over time, some positive effects were maintained for about five years after the programs were implemented. These studies suggest that the initiation and heavy use of cannabis by adolescents can be delayed by school-based programs which develop both students' skills for resisting drug pressures and students' knowledge about drug use. Such delays in cannabis use would be expected to impact on juvenile crime rates in two ways: firstly, by delaying involvement in crime among juveniles who are not currently involved; and secondly, by

delaying an increase in offending frequency among juveniles who are already involved in crime.

CONCLUDING COMMENTS

There is increasing evidence that heavy cannabis use during adolescence is associated with both involvement in, and frequency of, criminal offending. This association is particularly evident for crimes such as break and enter, shoplifting and motor vehicle theft because the income generated from these crimes is used to fund cannabis use. There is also evidence that adolescent cannabis use increases the risk of heroin use, which, in turn, is also funded by income-generating property crimes.

It is, therefore, extremely important, in terms of crime prevention, to find ways of reducing cannabis use among adolescents. Programs which successfully treat, delay or prevent adolescent cannabis use should constitute effective juvenile crime control strategies, particularly for income-generating property crime. The bulletin examined two types of programs designed to reduce cannabis use: *treatment* programs which target individuals who use cannabis; and *prevention* programs which target adolescents in general, regardless of whether or not they use cannabis.

Unfortunately, little rigorous research has been conducted, either in Australia or overseas, evaluating *treatment* programs that target heavy cannabis users. As a result, at present, there is a dearth of sound evidence that specific types of treatment programs are effective in reducing heavy cannabis use among adolescents. The best evidence comes from a few random allocation studies which have evaluated treatment programs using *adult* rather than *adolescent* samples. It is not known whether treatment programs which have been designed for, and tested on, adults are appropriate for adolescents. Nonetheless, these studies suggest that, at least for adult users, cognitive-behavioural, social support and psychotherapeutic or counselling-based interventions are promising treatments. These treatments appear to increase cannabis abstinence rates and to decrease the frequency of cannabis use. Improvements in general health and in psychological and social functioning have also been reported for these treatments.

The effectiveness of treatments involving cognitive-behavioural and counselling techniques is also supported by two non-randomised studies. While aversion therapies may also be effective treatments for cannabis use, they have only been evaluated by less methodologically rigorous, non-randomised studies.

Evaluations of *prevention* programs which specifically target *adolescents* also suggest that the initiation of cannabis use and the progression to heavier cannabis use can be delayed, if not prevented. Two large-scale randomised studies which evaluated prevention programs in the USA, like many of the treatment studies, suggest that programs which include training in cognitive-behavioural skills are effective in reducing cannabis use.

Thus, there is growing evidence that both treatment and prevention programs for cannabis use may act as promising juvenile crime control strategies. Such strategies would be expected to delay both juvenile involvement in crime and progression to more frequent juvenile offending. The potential benefits of such strategies are considerable, both for the adolescents themselves and for the general community. Potential benefits for adolescents include not only avoiding criminal involvement but also avoiding possible health, psychological and social problems associated with heavy cannabis use. Potential benefits for the community include substantial long-term savings in the law enforcement and insurance costs associated with income-generating crimes.

However, given the paucity of methodologically rigorous research evaluating treatment programs for adolescent cannabis use, much greater effort needs to be placed on conducting such research. Also of benefit would be the evaluation of programs designed to prevent adolescent cannabis use in Australia.

APPENDIX

UNFINISHED STUDIES INVOLVING RANDOM ALLOCATION

Three relatively large-scale randomised studies evaluating treatment programs for cannabis use are currently underway, but results are not yet available. Two of these studies are being conducted in the

USA while the other is being conducted in Australia. One USA study, the Cannabis Youth Treatment study, targets *adolescent* cannabis users. The other USA study, the Marijuana Treatment Project, and the Australian study, by Rees, Copeland and Swift (1998), target *adult* cannabis users. All three studies evaluate some form of cognitive behaviour therapy and also include motivational enhancement therapy. One of the USA studies also evaluates family therapy.

Both USA studies are the result of a cooperative agreement between the Center for Substance Abuse Treatment (CSAT), which is part of the Substance Abuse and Mental Health Services Administration (SAMHSA), and the US Department of Health and Human Services (DHHS). Both studies are being conducted over three years at a number of sites in the USA (SAMHSA/CSAT and DHSS 1998a; 1998b). The final report for the Cannabis Youth Treatment study is expected in September 2000 while that for the Marijuana Treatment Project is expected in September 1999.

Cannabis Youth Treatment study

In the Cannabis Youth Treatment study, the main forms of treatment are cognitive behaviour therapy (CBT), motivational enhancement therapy (MET) and family therapy (SAMHSA/CSAT and DHSS 1998a). Eligible adolescents are randomly assigned to one of five treatment conditions: a brief MET/CBT condition; an extended MET/CBT condition; a condition combining extended MET/CBT and family therapy; a behavioural therapy condition comprising 'community reinforcement'; and a family therapy condition. There is no control group. Cannabis use is assessed before treatment and three, six and nine months after treatment admission.

The brief MET/CBT condition consists of five sessions, two individual sessions of MET and three weekly group sessions of CBT. The group sessions are conducted with peers, that is, other adolescents receiving treatment, but do not involve subjects' family members. MET is based on the principle of using an empathic, reflective therapeutic style to elicit self-motivation for change (SAMHSA/CSAT and DHSS 1998a). The MET sessions focus on enhancing the subject's motivation to cease cannabis use and identifying high-risk situations. The CBT group sessions focus on developing skills

for refusing offers to use cannabis, developing a social support network and coping with relapses.

The extended MET/CBT condition is a more extensive version of the first condition, consisting of 12 sessions: two individual sessions of MET and 10 weekly peer-group sessions of CBT. The additional seven weekly group CBT sessions aim to develop the subject's skills in problem solving, recognising antecedents of anger, managing anger, differentiating between destructive and constructive criticism regarding cannabis abuse, coping with cravings and urges to use cannabis, managing negative moods and depression, and managing thoughts about cannabis.

The third condition is a further extension of the extended MET/CBT condition. In addition to the 12 MET/CBT sessions, it includes 10 sessions of family therapy and 12 weeks of after-care and it also involves case management. Thus, this condition, unlike the first two conditions, involves the family in the treatment process. The 10 family therapy sessions comprise four (monthly) home visits to assess the family environment and engage the family in treatment, and six (bi-weekly) two-hour group meetings consisting of both parent education and family discussion in dealing with recovery issues. The after-care involves a parent/peer support network, a monthly newsletter and monthly phone calls from the case manager. This is the only condition that involves after-care.

The behavioural 'community reinforcement' condition consists of 10 individual sessions with the subject and four sessions with care-givers or 'concerned others'. Two of the sessions with caregivers also involve the subject and two do not. The treatment involves detailed behavioural assessment including identifying the antecedents and consequences of both cannabis use and prosocial behaviours. The treatment then involves re-arranging environmental contingencies so that cannabis use becomes less rewarding than abstinence. The subject also receives training in relapse prevention, problem solving and communication, and training in using community resources and family support to achieve abstinence.

The family therapy condition is a multi-dimensional, 12-week treatment consisting of 12 to 15 sessions involving the subject and the subject's family. The aim is to improve family and individual functioning by focusing on family roles,

problems and interactions. The treatment includes improving the subject's life skills (such as conflict resolution skills), increasing parental commitment and involvement with the subject, improving parenting skills and improving social support with peers, schools and service providers.

Recruitment of subjects began in June 1998 (M. Dennis, personal communication). A total of 600 subjects will be recruited from four sites, with approximately 150 recruited from each site. Only three of the five conditions are tested at each site, with the particular conditions tested varying from site to site. All conditions are tested at two or more sites. At each site, 50 subjects are allocated to each of the three conditions. To be eligible to participate in the study, subjects must be aged between 12 and 18 years, meet the DSM IV criteria for cannabis abuse or dependence, and have used cannabis in the previous 90 days. Subjects are excluded from the study if they have used alcohol on 45 or more of the previous 90 days, or have an acute medical or psychological condition that requires treatment, or have a history of violent behaviour, or lack sufficient English language skills.

At the four assessments, subjects are required to complete various interviews and questionnaires to assess their use of cannabis, alcohol and other drugs; their risk behaviours, physical health, mental health and substance use disorders; and their reasons for quitting. At admission and at the three- and six-month assessments, urine testing and collateral assessments (from a parent, guardian or other adult) will also be conducted to verify the subject's self-reports. The nine-month assessment will be conducted by telephone.

The Marijuana Treatment Project

Although the data from the Marijuana Treatment Project have been collected, results are not yet available. Similar to the Cannabis Youth Treatment study, the main forms of treatment in the Marijuana Treatment Project were MET and CBT (SAMHSA/CSAT and DHSS 1998b). Eligible adults were randomly assigned to either a control group or one of two treatment conditions: a brief MET condition and an extensive MET/CBT condition. Both conditions were delivered in an individual setting. Subjects were assessed on four occasions: at pre-treatment, at treatment completion and at two follow-ups, four and nine months after the beginning of treatment.

The MET condition was conducted in two sessions scheduled one month apart. As with the Cannabis Youth Treatment study, the MET involved an empathic, reflective therapeutic style designed to elicit self-motivation to change. The strategies used by the therapist included expressing empathy, identifying the discrepancy between the subject's present behaviour and important personal goals, avoiding argumentation, dealing with the subject's resistance to change and developing the subject's self-confidence in resisting pro-drug pressure.

The combined MET/CBT condition was conducted in nine sessions over a 12-week period, with the first two sessions being equivalent to those received by the MET condition, and the last seven sessions involving CBT and case management. The CBT and case management sessions were tailored to each individual's needs as identified by the initial assessment. The CBT component focused directly on the adolescent's use of cannabis and was designed to train cognitive-behavioural coping skills useful for becoming and remaining abstinent from cannabis. The subject was taught to recognise and cope with urges to use cannabis, to identify high-risk situations, to cope with thoughts about cannabis and to develop skills to refuse offers of cannabis. The case management component did not focus directly on cannabis. Rather, it was designed to assist the subject in recognising and developing strategies to reduce concurrent problems which present obstacles to reducing cannabis use. Such problems could include health, housing, legal, employment and family problems.

The final group was a control group in which treatment was deferred for four months, at which time subjects had the choice of receiving the two-session or the nine-session treatment.

The Marijuana Treatment Project was conducted at three different sites in the USA in an attempt to recruit subjects with different demographic characteristics. The aim was to recruit a total of 450 subjects: 150 from each site. At each site, 50 subjects were allocated to each group. To be eligible for study participation, subjects had to be at least 18 years of age, meet the DSM IV criteria for substance dependence, have used cannabis for at least 40 of the 90 days prior to the study and understand English. Subjects were excluded from the study if they met the DSM IV

diagnosis of dependence for alcohol or a drug other than cannabis, had acute medical or psychiatric problems, were being treated for a drug or alcohol problem, or had been court-mandated to attend treatment.

The main measure of treatment outcome was frequency of cannabis use. Face-to-face interviews and questionnaires were conducted at all assessments in order to measure frequency of cannabis use and a number of other characteristics, including use of other drugs, lifetime and recent problems associated with cannabis use, readiness to change, reasons for ceasing use, depression and family history. Furthermore, at pre-treatment and at the two follow-up assessments, subjects' urine was also tested to validate subjects' verbal reports. Given that the two treatment conditions were of different durations (one month and three months), the follow-up assessments occurred at different points in time relative to the completion of each treatment.

Australian study by Rees, Copeland and Swift

In Australia, Rees, Copeland and Swift (1998) have recently undertaken a study targeting adult cannabis users. Although the data for the study have been collected, results are not yet available. Similar to the overseas studies currently underway, CBT was of primary interest and MET techniques were also included. The study involved random allocation of 229 subjects to one of three conditions: a brief CBT condition, a more intensive CBT condition and a control condition. A follow-up assessment was conducted six months after the completion of treatment.

The brief CBT condition consisted of a single session of CBT and involved 81 subjects. The objective of the session was to assist the subject to develop strategies for ceasing cannabis use and for maintaining long-term abstinence from cannabis. The session used MET techniques to remove any barriers associated with ceasing use and to identify motives for ceasing use. In addition, subjects were instructed on a number of cognitive-behavioural techniques, including techniques for managing urges for cannabis use and for managing withdrawal and long-term abstinence.

The intensive CBT condition consisted of six one-hour sessions of CBT and involved 79 subjects. The first of the six sessions was similar to the single

session for the brief CBT condition, involving both MET and instruction in cognitive-behavioural techniques. Whereas the objective of the brief condition was to assist the subject in developing strategies for quitting and abstinence, the objective of the six-session CBT condition was to actually equip the subject with the necessary skills for doing so. Each of the five additional sessions in the intensive CBT condition had a specific focus, for example, coping with urges to smoke, reviewing high-risk situations and developing strategies for managing such urges and situations; 'cognitive restructuring' in which subjects were taught to manage negative thoughts and moods; exploring the subject's beliefs about the positive effects of cannabis, selecting alternative activities to using cannabis (e.g. recreational activities) and developing other skills (e.g. problem-solving, relaxation and stress management skills); consolidating the skills acquired and, if necessary, developing further skills; and learning to maintain the changes acquired and to prevent relapse.

The control condition was a waiting-list control. Sixty-nine subjects were placed on a six-month waiting list for treatment and then given the option of receiving either the one or six sessions of CBT.

In all treatment conditions, treatment was delivered on an individual basis, allowing the treatment components to be tailored to the needs of each individual.

The subjects were recruited principally by responding to radio and newspaper advertising. To be eligible to participate in the study, subjects were required to be at least 18 years of age, meet the DSM IV diagnosis for cannabis dependence in the previous 12 months, have smoked cannabis regularly for at least five years and be fluent in English. Exclusion criteria were problems with alcohol consumption, weekly use of substances other than cannabis, major psychological disorders or having received treatment for cannabis dependence during the previous three months.

Both self-reports and urine testing were used to assess the level of cannabis use (i.e. the number of cannabis-abstinent days). Self-reports were also used to assess the severity of cannabis dependence, cannabis-related problems and psychosocial functioning.

Results comparing the treatment conditions have not yet been published. However, data describing the

characteristics of 180 of the 229 subjects are available (Copeland 1998). For these subjects, the mean age was 34 years (ranging from 19 to 51 years). The majority of subjects were male (68%), had post-school qualifications (70%) and were employed (81%). The mean age of first using cannabis was 16 years (ranging from eight to 23 years of age). The mean number of cones smoked per day was 10 (ranging from one-tenth to 60 cones). The majority of subjects (72%) used bongs and 35 per cent smoked joints. More than one-quarter (29%) of the subjects' income was spent on cannabis. Most subjects (93%) smoked cannabis at home and 76 per cent reported that more than half of their friends also used cannabis. Most subjects (93%) had made previous attempts to cease use. Eighteen per cent had a previous conviction for a crime involving cannabis. Some subjects reported cannabis-related health or psychological problems, for example, 50 per cent reported respiratory problems, 21 per cent reported memory problems and 26 per cent reported depression and paranoia.

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NOTES

- Formerly the National Campaign Against Drug Abuse. The data for the 1995 survey were collected between May and June, 1995. The national sample of 3,850 people aged 14 years or more was randomly selected. Information was collected via both a face-to-face interview and a self-completion booklet. The latter was used to collect information on personal drug use questions.
- Although the 1995 survey respondents were asked about their frequency of use, this information is not presented in the final report. Furthermore, while Makkai & McAllister (1998, p. 37) report on frequency of cannabis use for the five national surveys conducted between 1988 and 1995, the data were pooled across surveys.
- Although a survey of secondary school students was conducted in 1996, a detailed report has not, as yet, been published by NSW Health. Only a very brief bulletin is currently available (NSW Health 1998).
- The relevant survey questions assessing assault and malicious damage were, respectively:
 - 'Have you ever attacked someone to hurt them, apart from when you were playing sport?' (Baker 1998, p. 70); and
 - 'Have you ever purposely damaged or destroyed something (including damaging by graffiti) that did not belong to you?' (p. 73).
 'Acquisitive property crime' included motor vehicle theft, break and enter, receiving or selling stolen goods, and shoplifting goods worth \$20 or more (p. 14).
- The 'developmental' factors that were controlled were supervision, family structure, school performance, truancy, Aboriginality and gender. The drug use factors that were controlled were use of alcohol, cannabis, opiates, stimulants and steroids.
- The juveniles interviewed were serving a control order for one of the following offences as their most serious offence: armed robbery, robbery, break and enter, motor vehicle theft or shoplifting. Subjects (238 males and nine females) were interviewed face-to-face between September 1993 and March 1994 (Salmelainen 1995, p. 6).
- A cone was estimated to contain approximately 0.35 grams of cannabis (Salmelainen 1995, p. 50, endnote 15).
- Adult burglars were persons serving a sentence in an adult prison for *break, enter and steal*. Juvenile burglars were persons serving a sentence in a juvenile detention centre for *break, enter and steal; take from motor vehicle; stealing; or armed robbery* (Stevenson & Forsythe 1998).
- This correlation is not included in the published report.
- See the study by SAMHSA/CSAT and DHSS (1998a) described in the Appendix.
- This is the case provided there is an adequate sample size.

- 12 The control group was only assessed at pre-treatment and at the four-month assessment.
- 13 The DSM IV criteria for substance dependence are listed below (American Psychiatric Association 1994).
- A maladaptive pattern of substance use, leading to clinically significant impairment or distress, as manifested by three (or more) of the following, occurring at any time in the same 12-month period:
- 1) tolerance, as defined by either of the following:
 - a) a need for markedly increased amounts of the substance to achieve intoxication or desired effect
 - b) markedly diminished effect with continued use of the same amount of the substance
 - 2) withdrawal, as manifested by either of the following:
 - a) the characteristic withdrawal syndrome for the substance
 - b) the same (or closely related) substance is taken to relieve or avoid withdrawal symptoms
 - 3) the substance is often taken in larger amounts or over a longer period than was intended
 - 4) there is a persistent desire or unsuccessful efforts to cut down or control substance use
 - 5) a great deal of time is spent in activities necessary to obtain the substance (e.g. visiting multiple doctors or driving long distances), use of the substance, or recover from its effects
- 6) important social, occupational, or recreational activities are given up or reduced because of substance use
- 7) the substance use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by the substance.
- 14 A 'joint' involves rolling cannabis into a cigarette.
- 15 THC is delta-9-tetrahydrocannabinol, the main psychoactive ingredient in cannabis. For all three techniques, the subject prepared the THC-free cannabis for smoking in his or her accustomed form, for example, rolled into joints or placed in a pipe. The two THC-free cigarettes yielded four rolled joints.
- 16 The subject was instructed to smoke as he or she would outside the treatment setting, except to place the cigarette in the ashtray provided between inhalations and to move his or her hand away. The electric pulse was not delivered as the cigarette was placed in the ashtray and the hand was withdrawn.
- 17 During rapid smoking, the subject was not allowed to put the cigarette down while the pulse was being delivered.
- 18 Smith and Frawley (1993) do not define cannabis 'abuse' or cocaine 'abuse'.
- 19 Similar treatments were received for cocaine and methamphetamine. That is, a cocaine or amphetamine 'substitute' was paired with an aversive stimulus, and drug-specific counselling and education were included.
- 20 The data pertaining to relapse factors are not presented separately for the subjects who used cannabis but not cocaine and the subjects who used both cannabis and cocaine.
- 21 A 'bong' is a type of water pipe used for smoking cannabis.
- 22 For several months, the researchers made attempts to randomly allocate subjects to either PALM or the comparison group. However, these attempts at randomisation were abandoned for various reasons, including adolescents not entering PALM when a place was available.
- 23 The researchers believe that some of the reasons why subjects did not take up a place in PALM included being in detention, changing one's mind, receiving alternative treatment while waiting for a place to become available and not being able to be contacted.
- 24 PALM was conducted between October 1996 and February 1998. Only preliminary results are currently available.
- 25 The after-care program was non-residential and travelling to the program was difficult for subjects who came from rural areas. PALM also lacked the necessary financial and human resources for full implementation.
- 26 Ellickson and Bell (1990, p. 54, Table C.3) defined 'monthly' use of cannabis as use on three or more days during the past month, or use 11 or more times during the past year.
- 27 Ellickson and Bell (1990, p. 54, Table C.3) defined 'weekly' use of cannabis as use on six days or more during the past month.

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