

**The nature and treatment of adolescent
substance abuse
Supplement to Monograph 26^a**

**Catherine Spooner, Richard Mattick
and Wesley Noffs**

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The nature and treatment of adolescent substance abuse

Supplement to Monograph 26^a

Final report of the adolescent treatment research project

**by
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Executive summary

An evaluation of a comprehensive, intensive intervention for adolescents with a substance use disorder was conducted during its first 3 years of implementation (1996-98). The evaluation included action research, process evaluation, impact evaluation, and a cost comparison; the main focus was the outcome evaluation. The outcome evaluation included pretest, posttest and follow-up of an intervention group and a comparison group. The intervention group comprised adolescents who began treatment at the intervention ($n=60$); the comparison group was adolescents who successfully applied for the intervention but did not enter the program when a place became available ($n=61$). The 6 domains assessed were substance use, criminal activity, social functioning, psychological functioning, HIV risk-taking behaviour and physical health.

Client profile

Data from the pretest assessments was used to describe the client profile. Study participants were aged 13-18 years and 64% were male. Most (88%) of the study participants had committed crime in the last month; 57% of the females and 25% of the males were identified as 'cases' requiring psychiatric assessment and treatment; and social functioning was poor, for example, most had been unemployed for the previous 3 months. The study participants were typically polysubstance users with high levels of substance dependence. The substances used most frequently on a daily basis were cannabis (61%), heroin (50%) and alcohol (12%). The data suggested that the client group were at the 'hard end' of adolescents seeking treatment for a substance use disorder, and that the prognosis for treatment was poor.

Outcome study

For both groups, there were significant improvements across all six domains between the pretest and the posttest and these improvements were maintained at follow-up. There were no significant differences between the intervention group and the comparison group in changes across time. Failure to detect group differences could have been the result of a combination of factors, particularly including problems with program implementation, and differential drop-out between the two groups over the course of the study.

Conclusion

Clients of the intervention did significantly improve on all domains: substance use, crime, social functioning, psychological distress, HIV risk-taking and physical health. Conservatively speaking, this improvement was at least as good as the improvement obtained by 'usual care'. However, given the factors outlined above, it appears likely that the intervention was successful in that it has enabled the 'harder end of the market' to achieve positive results. These results were attained while the intervention was under-funded and the program was still being developed. Increased funding and the development of program materials and practices since the evaluation was conducted are likely to produce even better outcomes.

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Preface

This report is a supplement to NDARC Monograph Number 26.¹ The two monographs are concerned with the nature and treatment of substance use disorders among adolescents. Monograph 26 (Chapters 1 to 11) contained background research for the development of an intervention to treat adolescents with substance use disorders and an intervention plan. This monograph (Chapters 12 to 14) contains the results of descriptive and evaluative research conducted with the intervention. Specifically, Chapters 1 to 3 were concerned with the epidemiology of substance abuse by adolescents: the prevalence of abuse, the types of substances used, the risk factors and the consequences. Chapter 4 explored the characteristics of the client group. Chapters 5 to 7 contained reviews of treatment program issues: screening and assessment, treatment-outcome and client retention. Consultations with service providers, adolescents with substance-use problems and other experts, plus a description of a range of interventions were summarised in Chapters 8 and 9. Chapter 10 contained recommendations for service planning and delivery, based upon the findings presented in the previous nine chapters. The final chapter of Monograph 26, Chapter 11, contained the plan for an intervention for adolescents in New South Wales with a substance use disorder, the Program for Adolescent Life Management (PALM). This Monograph supplements Monograph 26 with a description of the adolescents who applied for the intervention (Chapter 12), and the results of an evaluation of the intervention during its first 3 years of implementation: 1996-1998 (Chapter 13). A summary of the research and a discussion of the implications of the study are provided in Chapter 14.

Chapter 12. A study of the patterns and correlates of substance use among adolescents applying for treatment

Introduction

There has been growing concern about the need to provide appropriate services for adolescents with problems relating to substance abuse or dependence. Information about this client group is, therefore, necessary for both service planning and service provision. From a planning point of view, information about the extent and severity of problems among the client group indicates the type and level of service required. While there has been some debate about the issue of treatment matching,² it is likely that the intensity and duration of treatment needs to increase as problem severity increases.³⁻⁵ Relative to information about adults in PSUD-treatment interventions, information on the nature of substance use and associated problems among adolescents seeking treatment is scarce; comparisons with adults in treatment or adolescents in the general population are even rarer. However, without such comparisons it is difficult to interpret a group's pattern of behaviours and health symptoms. In particular, given the higher cost of intensive, residential treatment interventions relative to nonresidential programs,⁶ does the profile of adolescents attending a residential PSUD-treatment intervention suggest that such a program is warranted? It could be hypothesized that, as adolescents seeking treatment for a PSUD have not used substances for as long as adults in such treatment, the severity of the adolescents' problems would be less and their treatment needs would be less. Studies of adolescents compared with adults in residential communities in the USA have been reviewed elsewhere.⁷ Jainchill and colleagues reported that, relative to adults in therapeutic communities, adolescents have been more likely to have been referred by the criminal justice system, to have lower motivation for treatment, and to have problems with alcohol or cannabis use rather than heroin use. Adolescents have also reported levels and patterns of psychological disturbance that were similar to those of adults in therapeutic communities. For example, mild to moderate levels of depression, anxiety and poor self-esteem were evident and females were more psychologically disturbed than males. That is, it appears that the type of substances used and the route of entry to treatment differ, referrals from the justice system are more prevalent and psychological dysfunction is equivalent for adolescents and adults in therapeutic communities.

Service providers require information about the nature of the client group's problems to inform program planning. Reviews of the risk factors, correlates and consequences of substance abuse among adolescents have identified that adolescents presenting for treatment are likely to have high rates of the following characteristics: a lack of social bonding; feelings of alienation; a history of low quality and consistency of family management, family communication, family relationships and parental role-modelling; a history of traumatic experiences such as abuse or neglect; significant emotional or psychiatric problems; inadequate coping skills and social supports; inadequate social skills; a history of associating with substance using peers; a history of low commitment to education, failure at school, and unemployment; a history of antisocial behaviour and delinquency; poor physical health; and high risk of exposure to transmissible diseases.^{1 8} These reviews concluded that PSUD- treatment interventions need to be multimodal, to address as many of the risk factors, correlates and consequences of substance abuse as possible.

Some of the correlates of substance abuse have also been related to treatment

outcome. Client-related variables that have been found to be predictive of poorer treatment outcomes include criminal involvement, unemployment, more intense substance use, more severe psychiatric disorder or emotional problems, and less stable family background.⁹⁻¹¹

Information on the pattern of substance use by clients is also relevant for service provision. There were indications of a decrease in alcohol abuse and an increase in heroin dependence among New South Wales adolescents in PSUD-treatment.¹² This trend reflected an increase in heroin use among the broader population of young people in New South Wales.^{13 14} Given increasing concerns about heroin-related overdoses,^{15 16} disease transmission from unsafe injecting practices,¹⁷⁻²⁰ this increase in heroin use is an important issue. Benzodiazepine use among the client group is also of interest because of previous research by Ross and Darke suggesting that benzodiazepine use is associated with higher levels of problems.²¹

This chapter presents data on the substance use patterns, HIV risk-taking behaviours, criminal behaviour, social functioning, physical health and psychological distress of adolescents who applied for an intensive, residential PSUD-treatment intervention. The data are compared with data from studies using the same instruments with adults,²²⁻²⁶ and with adolescents from the general population.^{27 28} Questions addressed by the analyses were: a) what is the pattern of substance use by the sample, b) how does the adolescent sample compare with adults in treatment in terms of HIV risk-taking behaviours, criminal behaviour, social functioning, and physical health and c) how do adolescents applying for treatment compare with adolescent samples from the general population treatment in terms of psychological distress? On the basis of previous research on risk factors, correlates and consequences of substance abuse by adolescents (outlined above) it was hypothesized that the patterns and correlates of substance abuse by the sample would a) be equivalent to that found among samples of adults with a PSUD and b) adolescents seeking treatment would be characterised by more psychopathology than adolescents in the general population.

Method

Participants

The study sample comprised all adolescents who applied for an intensive, residential PSUD-treatment intervention in Sydney and who were screened as suitable for the intervention between October, 1996 and February, 1998 ($N=121$). Screening was conducted over-the-telephone, using a short screening instrument that had been specially designed for the intervention. The screening form checked for the criteria of a) being 14-18 years old, b) residing in New South Wales or the Australian Capital Territory, c) experiencing substance-use-related problems consistent with the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV) criteria for substance abuse or dependence,²⁹ d) being physically and mentally capable of participating in the intervention and e) being able to speak English.

About half (53%) of the adolescents in the sample were male and males ($M=16.4$, $SD=1.0$) were significantly older than females ($M=15.9$, $SD=1.3$) ($t=118$, $df=118$, $p=0.02$). When asked which ethnic group they identified with, 61% stated 'Australian'. The remainder identified with Aboriginal (11%), Indo-Chinese (8%), Pacific Islander or Maori (8%), East European (3%), Middle Eastern (3%) or other (5%) ethnic cultures. Not all study participants who identified as 'Australian' had Anglo-Saxon backgrounds or Australian-born parents. The most common source of referral to the intervention was the juvenile justice system (38%), followed by specific PSUD-treatment or referral services

(19%), family (14%), self (14%), health services (8%) and welfare agencies (7%). Most clients had involvement with more than one referral source.

Instruments

The research instrument included a modified form of the Opiate Treatment Index (OTI),²² a modified frequency of substance use item from the Adolescent Drug Abuse Diagnosis (ADAD),³⁰ the Severity of Dependence Scale (SDS),³¹ and the Symptom Checklist-90-Revised (SCL-90-R)²⁷ (Appendix B). Each of the instruments were chosen because a) they had demonstrated good psychometric properties,^{25 27 32 33} b) pilot-testing indicated that they were easily understood by the study population, and c) they covered the main domains of interest to the study. The OTI assesses substance use, HIV risk behaviours, social functioning, criminal behaviour and physical health. The SDS is a five-item scale that assesses non-substance-specific dependence symptoms. It focuses on the amount of psychological dependence as indicated by concern about impaired control. The SDS has been demonstrated to have high sensitivity and specificity for identifying substance dependence among a range of substance users.^{21 25 34 35} The SCL-90-R is a psychiatric screening instrument that assesses psychological symptom status on nine dimensions: somatisation, obsessive-compulsive traits, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, psychoticism. The mean score across the dimensions of the SCL-90-R is the Global Severity Index (GSI). Items on the SCL-90-R were rated by the study participants from 0 (indicating no distress) to 4 (indicating extreme distress). Further details on the instrument are presented in Chapter 13.

Recruitment

Recruitment of study participants was embedded within the procedures for intake at the intervention. All of the applicants to the intervention who were screened as suitable for the intervention were sent an application pack and asked to telephone the intervention for a baseline assessment. During the data collection period 266 people called to inquire about entry to the intervention, of whom 220 were screened as suitable for the intervention. Out of the 220 screened as suitable, 122 proceeded with the application and did the assessment interview. Telephone enquiries made to those who did not proceed with the application indicated that most tended to change their mind about wanting treatment. Data was lost for 1 study participant, so the final sample size was 121.

Data collection

Nearly all of the interviews were conducted by telephone. Face-to-face interviews were rare because, being a state-wide program, applicants usually lived 1 to 12 (or more) hours travel from the study centre. Study participants were sent a copy of the instrument form so that they could read the questions and multiple-choice answers during the interview. Responses were recorded by the interviewer. The interviewee was provided sufficient information to give informed consent to participate in the study and confidentiality was stressed.

Data analysis

Data were entered into an SPSS database, verified, then analysed using SPSS for Windows. Descriptive statistics including frequencies, means (*M*), and standard deviations (*SD*) were calculated. Some simple tests for group differences, mainly between males and females, were conducted: Chi-square (χ^2) for categorical data and *t* test (*t*) for continuous data.

When linear trends of two groups were compared, the Mantel-Haenzel χ^2 statistic for linear trend was used, with 1 degree of freedom (*df*). Multivariate logistic regression tested the associations between multiple independent variables and dichotomous dependent variables.³⁶ Multivariate logistic regression was performed with backward elimination of variables that had a Wald statistic that was not significant at the 0.1 significance level. Details of the models are described below. Odds ratios (*OR*) and their 95% confidence intervals (*CI*) are reported for independent variables from the models. Scoring of the OTI, the SCL-90-R and the SDS, described below, was based upon procedures outlined by the authors of each instrument.^{22 25 27}

Three models were tested by multivariate logistic regression. The first model aimed to identify patterns of substance use: the use of benzodiazepines, alcohol and cannabis (independent variables) were used to predict heroin use (dependent variable). The second and third models aimed to identify whether heroin use or benzodiazepine use (dependent variables) were associated with a different pattern of problems relative to non-use. Independent variables in these models were HIV risk-taking behaviour, social functioning, criminal behaviour, physical health and psychological distress (GSI). To adjust for the significant correlation between benzodiazepine use and heroin use (identified in the first model), benzodiazepine use was an independent variable when heroin use was a dependent variable, and vice versa.

The methods for calculating scores are described below:

Substance use: Statistics on substance use frequency, the number of substances used, amount of use and patterns of use were calculated. The OTI manual suggests that the daily average use of each substance be calculated by dividing the amount of each substance used during the last two occasions of use by the number of days between the last and the third last occasions of use. However, this method was not feasible for the data collected. Some substances within a category could be used in different ways (for example, injected, swallowed, 'snorted' or smoked) and there were different substances within substance categories (for example, 'hallucinogens' included LSD and ecstasy; 'inhalants' included amyl nitrite, soda bulbs and petrol). Each specific substance tended to be used in different amounts so that summary statistics were not useful. Given these problems, it was only valid to calculate amounts of use for three substances: cannabis ('cones'), alcohol (standard drinks) and benzodiazepines (pills). Following the precedent of other cannabis research, 1 'joint' of cannabis was converted to 3 cones.³⁷ To obtain summary statistics on frequency of use of each substance, the ADAD frequency of use item was used. Patterns of substance use were investigated via multivariate logistic regression with heroin use as the dichotomous dependent variable and the amount of alcohol use, cannabis use and benzodiazepine use in the previous month as dependent variables.

HIV Risk-Behaviour Scale (HRBS): Scores on the Drug Use Section of the HRBS were added to obtain the Drug Use Subtotal: a score out of 30 for HIV risk due to unsafe injecting. Scores on the Sexual Behaviour Section of the HIV Risk Section were added to obtain the Sexual Behaviour Subtotal: a score out of 25 for HIV risk due to unsafe sex. The Drug Use Subtotal and the Sexual Behaviour Subtotal were added to obtain a score out of 55 for total HIV Risk Behaviour. Higher scores were indicative of more risk-taking behaviours.

Social Functioning: Scores on the Social Functioning section were added to obtain a total score out of 48 for social functioning. Higher scores were indicative of poorer social functioning.

Criminal behaviour: Study participants reported levels of involvement (no

involvement to daily involvement) in four types of crime: property crime, fraud, dealing illicit substances and violent crime. These scores were added to obtain a total Crime Scale score ranging from 0 for no criminal behaviour to 16 for daily involvement in all four crime types. Scores greater than 1 for each of the four crime types were used to identify any involvement in each of those types of crime.

Physical health: The numbers of physical health symptoms reported for each subsection (for example, general health, neurological health) were added to obtain Physical Health Sub-total Scores. The Physical Health Scale score was calculated by adding each of the Physical Health Sub-totals. The maximum possible score on the Physical Health Scale was 47.

Substance dependence: Each of the five items of the Severity of Dependence Scale (SDS) has a four-point scale from 0 to 3. The items were added to give a total score with a range of 0 to 15. The recommended cut-off score for identification of dependence has varied between studies from 4 for identifying heroin, cocaine and amphetamine dependence^{25 35} to 3 for cannabis³⁴ and benzodiazepine dependence.²¹ The more conservative cut-off of 4 was used to indicate dependence among this sample. As the SDS was a late addition to the study, data was only available on the last 35 study participants recruited.

Psychological distress: Raw scores for each domain of the Symptom Checklist-90-Revised (SCL-90-R) were calculated by summing the items from each domain. The sample's mean raw scores on each domain of the SCL-90-R were converted to standard (normalised) area T-scores using norms from non-patient adolescents in the USA. The T scores were then used to calculate percentile ranks for the sample on each domain. For each domain, study participants whose scores were two standard deviations (*SD*) above the general population means were also identified. Caseness was calculated using the operational rule that if a study participant had a GSI T-score greater than 62 (using non-patient adolescent norms) or two dimension T-scores greater than 62, then that study participant was defined as a positive risk or 'case'.²⁷

Results

Frequency of substance use

The substances most likely to have been used on a daily basis were tobacco, cannabis and heroin. Daily use of other substances, including alcohol, was not common (Table 1).

Table 1: Use of each substance in the last month (*N*=121)

Substance type	No use %	Non-daily use %	Daily use %	Total %
Tobacco	1	1	98	100
Cannabis	17	22	61	100
Heroin	35	15	50	100
Alcohol	37	51	12	100
Amphetamine	61	34	5	100
Benzodiazepines	62	31	7	100

Hallucinogens	78	22	0	100
Cocaine	88	7	5	100
Inhalants	88	10	2	100
Methadone	88	10	2	100
‘Designer’ drugs	88	12	0	100
Steroids	99	0	1	100

Differences in frequency of use between males and females were tested. Categories included ‘daily use’, ‘less than daily use’ or ‘no use in the previous month’. For substances that were used by less than 20% of the sample, ‘any use’ was compared with ‘no use in the previous month’. There were no significant differences between males and females in the frequency of use of cannabis, heroin, alcohol, amphetamines, or benzodiazepines nor in the use of hallucinogens/ designer drugs, cocaine, inhalants or methadone ($p>0.05$).

Number of substances used

The average number of substances used by the sample in the previous month was 4.5 ($SD=1.6$, range=2-9). There was no significant gender difference in the number of substances used ($t=0.28$, $df=119$, $p=0.8$).

Amount of substances used

Statistics on the amounts of use on the last days of use for cannabis (cones), alcohol (standard drinks) and benzodiazepines (pills) were calculated. The summary statistics for cannabis and alcohol were skewed by a small number of outliers. The methods for identifying and dealing with outliers suggested by Tabachnick and Fidell were used.³⁶ Outliers were defined as values greater than 3.29 standard deviations above the mean. Outlying cases were assigned new scores on the ‘offending’ variables that were 1 unit larger than the next most extreme score on the distribution. The summary statistics for amount of substances used after making these transformations for alcohol and cannabis use are presented in Table 2. T-tests for independent means identified no significant difference in the amount of use of alcohol, cannabis nor benzodiazepines by gender after the outliers were adjusted ($p>0.05$).

Table 2: Amount of substance used on the last occasion of use - outliers adjusted

Substance type	<i>N</i>	Unit	<i>M</i>	<i>SD</i>	Range	Outliers [*]
Alcohol	76	Standard drinks	18	11	1-43	75, 92
Cannabis	101	Cones	16	17	1-73	84, 85, 100
Benzodiazepine	46	Pills	9	9	1-36	None

^{*}**Note.** Values greater than 3.29 standard deviations above the mean were defined as outliers. To reduce their influence on summary statistics, outliers were recoded to 1 unit more than the less most extreme score.

Patterns of substance use

Multivariate logistic regression identified that heroin use was positively associated with benzodiazepine use ($\chi^2=3.9$, $df=1$, $p=.049$, $OR=1.79$, 95% CI 1.33-2.40), negatively associated with alcohol use ($\chi^2=16.3$, $df=1$, $p=.0001$, $OR=.89$, 95% CI .87-.92) and not significantly associated with cannabis use ($\chi^2=0.13$, $df=1$, $p=.7$). With or without cannabis use in the model, the substance use model accurately predicted 74% of cases. That is, the sample appeared to be split between adolescents who used heroin and adolescents who drank alcohol and both groups were equally likely to use cannabis. Benzodiazepines were primarily used by heroin users.

Substance dependence

For the 35 study participants who answered the SDS questions, the mean score was 9.3 ($SD=2.9$, range 4-14). There was no significant difference between males and females in SDS scores ($t=0.38$, $df=33$, $p=.7$). Only 1 of the 35 study participants had a score below 5, with a score of 4. Therefore using the criteria described previously, all the participants were likely to be substance dependent.

HIV risk-taking behaviour

Half of the sample (53%, $n=64$) had injected a substance in the previous month and were administered the Drug Use Section of the HRBS. Males and females were equally likely to have injected in the previous month ($\chi^2=1.1$, $df=1$, $p=0.3$). Drug Use Risk Behaviour Subtotal scores ranged from 1 to 21 ($M=7.5$, $SD=4.0$). Female injectors ($M=8.6$, $SD=4.3$) had a significantly higher score on the Drug Use Risk Behaviour Subtotal than males ($M=6.4$, $SD=3.4$) ($t=2.2$, $df=62$, $p=0.03$). Among the injectors, 14% reported that they had used a needle after somebody else in the previous month, and 31% reported that somebody had used a needle after them. Injecting 'risk' was mainly associated with not using bleach to clean a needle after reusing it: 74% of injectors who reused rarely or never cleaned with bleach. Most of these injectors were reusing their own needles so they felt that bleach was not necessary.

Significantly more females (86%) than males (63%) ($\chi^2=8.5$, $df=1$, $p=0.004$) had engaged in sexual behaviour in the previous month. Those who had been sexually active were administered the Sexual Behaviour Section of HRBS ($n=89$). Scores for the Sexual Behaviour Risk Subtotal ranged from 0 to 15 ($M=5.5$, $SD=2.9$) and were significantly higher among females ($M=6.1$, $SD=3.0$) than males ($M=4.6$, $SD=2.5$) ($t=2.6$, $df=86$, $p=0.01$). Not using a condom during paid sex (1%) and engaging in anal sex (3%) were rarely reported. However, among those who had sex with a casual partner ($n=35$), 54% did not use a condom every time they did so.

The mean score on the total HIV Risk Behaviour Scale (HRBS) for the whole sample ($N=121$) was 8.0 ($SD=6.5$, range:0-27, mode=0, Figure 1). Females ($M=10.3$, $SD=6.6$) had a significantly higher HRBS score than males ($M=6.0$, $SD=5.6$) ($t=3.8$, $df=118$, $p<0.0001$).

Social functioning

Out of a possible total of 48, where high scores indicated poorer social functioning, the sample mean on the OTI Social Functioning Scale was 22.2 ($SD=5.5$, range 10-34, Figure

1).

Study participants' scores for individual items on the Social Functioning Scale indicated poor functioning in terms of employment (76% unemployed for most or all of the previous 3 months), conflict with the family (64% had conflict with their family often or very often in the previous 3 months) and association with substance using peers (66% of the sample reported that most or all of their friends were substance users). It appeared that friends played a major role in the lives of the sample: 84% saw their friends often or very often, 78% of the sample reported that they seldom had conflict with their friends, and 59% reported that they were satisfied or very satisfied with the support they received from their friends.

Females ($M=23.7$, $SD=5.7$) had a significantly higher mean score on the Social Functioning Scale than males ($M=20.1$, $SD=5.3$) ($t=2.8$, $df=118$, $p=0.006$). This gender difference was accounted for by higher rates of residential mobility, conflict with partner and living with people who use substances among females than males.

Criminal behaviour

Most of the clients (88%) reported some form of criminal behaviour in the month prior to the interview. Most were involved in property crime (74%). Less common were dealing (49%), crimes involving violence (42%) and fraud (21%). There were no significant differences between males and females in involvement in each of these crime categories ($p>0.05$). However, males (72%) were significantly more likely than females (50%) to be facing charges at the time of the assessment ($\chi^2= 5.6$, $df=1$, $p=0.02$). With a maximum possible score of 16 indicating daily involvement in all four types of crime, the mean score on the Crime Scale (Figure 1) was 4.8 ($SD=3.1$, range 0-12). There was no gender

difference in scores on the Crime Scale ($t=0.6$, $df=116$, $p=0.5$).

Physical health

Study participants reported a mean of 17 health symptoms on the OTI Health Scale ($SD=8.7$, range=2-38). The study participants were most symptomatic in general health - particularly poor appetite (74%), trouble sleeping (74%) and fatigue or energy loss (69%) - followed by neurological health - particularly forgetting things (80%) and headaches (67%) - cardio/respiratory health - particularly coughing up phlegm (65%) and gastro-intestinal health - stomach pains (65%).

Females reported significantly more physical health symptoms than males ($t=2.7$, $df=119$, $p=0.007$). In particular, females reported significantly more symptoms relating to general health, genito-urinary health, gastro-intestinal health, and injecting than males ($p<.05$).

Psychological distress

The majority of the females (56%) and one quarter of the males (25%) were classified as 'cases' or at risk ($\chi^2= 12.1$, $df=1$, $p=0.0005$). Looking at the raw mean scores, females reported significantly more mental distress than males ($p<0.05$ for all dimensions, Table 3). The highest raw mean scores for males and females were on the dimensions of hostility, depression and obsessive-compulsive disorder.

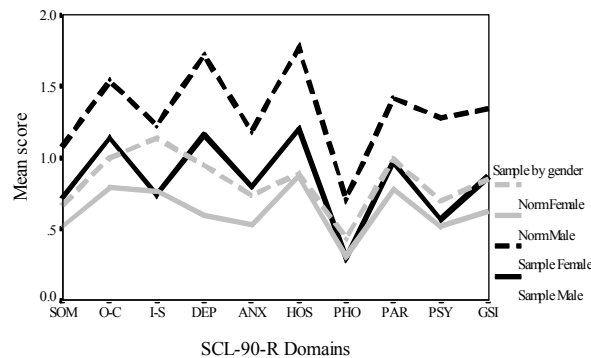
Table 3: SCL-90-R dimension scores by gender ($N=120$, missing=1)

SCL-90-R dimension	Gender		<i>p</i>
	Female	Male	

	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Somatisation	1.08	0.86	0.72	0.65	0.01
Obsessive-Compulsive	1.54	0.92	1.14	0.77	0.01
Interpersonal Sensitivity	1.23	0.93	0.74	0.66	0.001
Depression	1.73	0.96	1.16	0.55	0.001
Anxiety	1.19	0.91	0.8	0.67	0.009
Hostility	1.77	1.10	1.2	0.97	0.003
Phobic Anxiety	0.72	0.78	0.3	0.49	<.0001
Paranoid Ideation	1.42	0.86	0.97	0.81	0.004
Psychoticism	1.28	0.86	0.57	0.45	<.0001
Global Severity Index	1.35	0.77	0.89	0.56	<.0001

Note. Means (*M*), standard deviations (*SD*) and significance of gender differences (*p*)

Females from this study had consistently higher raw scores on the SCL-90-R than a sample of adolescent females in the general population (Figure 1).²⁷ Males in the study also tended to have higher scores than their counterparts in the general population, but the difference was less pronounced and consistent.



Note. SOM=Somatisation, O-C=Obsessive-Compulsive, I-S=Interpersonal Sensitivity, DEP=Depression, ANX=Anxiety, HOS=Hostility, PHO=Phobic Anxiety, PAR=Paranoid Ideation, PSY=Psychoticism, GSI=Global Severity Index

The sample was compared with non-patient adolescents by identifying the individuals with scores on particular domains and the GSI that were 2 *SD* above the norm for non-patient adolescents (Table 4). These individuals' scores, by definition, were in the upper 2.3% of the normative sample for that domain. From Table 4, it can be seen that:

- significantly more females (40%) than males (14%) had a GSI 2 *SD* above the population norm;
- for seven out of nine domains, at least one fifth of the females' scores were in the top 2.28% of the population. Females were most likely to have scores 2 *SD* above the population norm for the domains of hostility (32%) and depression (26%);
- generally, less than 10% of the males had domain scores that were 2 *SD* above the

population norm. Males were most likely to be in the top 2.28% on hostility (14%).

Table 4: Percentage of study participants 2 *SD* above SCL-90-R domain means by gender (*N*=121)

Domain	Gender		<i>p</i>
	Females (%)	Males (%)	
Hostility	32	14	0.02
Depression	26	6	0.002
Obsessive-compulsive	21	8	0.04
Somatisation	21	8	0.04
Anxiety	20	6	0.03
Phobic anxiety	19	5	0.01
Psychoticism	19	0	0.001
Paranoid ideation	12	9	0.6
Interpersonal sensitivity	7	2	0.1
Global Severity Index (GSI)	40	14	0.001

Predictors of heroin use

Predictors of heroin use were investigated because of the increase in heroin use since the early 1990s¹³ and increasing overdose deaths related to heroin use.¹⁵ A multivariate logistic regression model, with heroin use as the dependent variable, was tested. The independent variables were five substance-use-related problems: HIV risk-taking behaviour, social dysfunction, criminal behaviour, physical health and psychological distress. Benzodiazepine use was added to the model because of its significant correlation with heroin use, so that the model would identify predictors of heroin use after accounting for benzodiazepine use. The model was significantly superior to a constant only model ($\chi^2=45.8$, $df=5$, $p<0.00001$) and correctly predicted 81% of the cases. None of the variables were removed from the model because of non-significance. After adjusting for benzodiazepine use, heroin use was positively associated with criminal behaviour, HIV risk-taking, and the number of physical health symptoms. Heroin use was negatively associated with social dysfunction and psychological distress (Table 5). The odds ratios of 0.9 for social dysfunction suggested that there was little change in the likelihood of using heroin on the basis of a 1 unit change on the Social Functioning Scale. After adjusting for all other variables in the model, the likelihood of being a heroin user was reduced by one third for each unit increase on the GSI (the measure of psychological distress), increased by about one half for each unit increase on the Crime Scale, increased by about one fifth for each additional physical health symptom and increased by about one tenth for each additional point on the HIV Risk-Taking Scale. Chi-square analyses identified that the types of crime that were significantly more likely to be committed by heroin users relative

to non-heroin users were dealing (63% compared with 26%, $p=.0001$) and fraud (27% compared with 9%, $p=.03$). There were no significant differences in the rates of property crime nor crimes involving violence between the two groups ($p>.05$).

Table 5: Predictors of heroin use, adjusting for benzodiazepine use

Variable	Wald Statistic	df	p	Odds ratio	95% CI
Benzodiazepine use	0.8	1	.4	0.6	0.3 - 1.1
Criminal behaviour*	11.0	1	.0009	1.4	1.2 - 1.5
Physical health*	12.2	1	.0005	1.2	1.1 - 1.2
HIV risk-taking*	5.1	1	.02	1.1	1.1 - 1.2
Psychological distress*	6.2	1	.01	0.3	0.2 - 0.5
Social dysfunction*	8.0	1	.005	0.9	0.8 - 0.9

*Notes. 1. Higher scores indicate poorer functioning i.e. more involvement in criminal behaviour, more physical health symptoms, more HIV risk-taking, more psychological distress, poorer social functioning. 2. Some odds ratios equal the extreme of the confidence interval due to rounding.

Some of these multivariate findings appeared to contradict relationships identified by univariate methods. For example, chi-square analysis identified that heroin users (47%) were significantly more likely to be using benzodiazepines than non-heroin users (21%) ($\chi^2=7.4$, $df=1$, $p=.006$). It appears that the concurrent use of heroin and benzodiazepines was related to other factors in the model such as psychological distress (see below). A univariate t test for independent means had identified no significant difference between heroin users and the rest of the sample in the GSI ($p=.9$). Figure 1 illustrates the nature of the unadjusted differences in the psychological distress between heroin users and study participants who did not use heroin. Figure 1 contains the percentage of heroin users and non-heroin users whose scores for each domain were high enough to be classified as a likely 'case' for that psychological disorder. It appears that the main source of psychological distress for heroin users was somatisation. The multivariate model accounted for physical health symptoms so heroin users appeared less psychologically distressed.

In sum, the analyses suggested that, after adjusting for benzodiazepine use, heroin users were a) more involved in crime and HIV risk-taking and had more physical health symptoms than non-heroin users; and b) more socially functional and less psychologically distressed than non-heroin users. However, the difference in social dysfunction was small. Furthermore, the difference in psychological functioning seems to have been the result of the multivariate model accounting for physical health symptoms, which would have been contributing to the high rates of somatisation among heroin users.

Note. SOM=Somatisation, O-C=Obsessive-Compulsive, I-S=Interpersonal Sensitivity, DEP=Depression, ANX=Anxiety, HOS=Hostility, PHO=Phobic Anxiety, PAR=Paranoid Ideation, PSY=Psychoticism, GSI=any psychological disorder

Predictors of benzodiazepine use

A similar multivariate logistic regression was used to identify predictors of benzodiazepine use. Predictors of benzodiazepine use were investigated because it had been found to be a ‘marker’ for problems among adults in PSUD-treatment interventions, so it was hypothesized that it could also be a marker for problems among adolescents seeking treatment. Independent variables were the five substance-use-related problems (as above) plus heroin use so that the model was not affected by the significant correlation between benzodiazepine use and heroin use. The full model was significantly better than a constant only model ($\chi^2=22.0$, $df=5$, $p<0.0005$). Three variables were removed from the predictors of use model due to non-significance after adjusting for heroin use: social dysfunction, criminal behaviour, and physical health symptoms. Removal of non-significant variables from the full model reduced the prediction rate of the model from 77% to 74% but did not significantly change the goodness of fit of the model ($\chi^2=2.9$, $df=3$, $p>0.1$). After adjusting for all other variables in the model, the likelihood of being a benzodiazepine user was nearly doubled for each unit increase on the GSI (the measure of psychological distress). The odds ratio of 1.1 for HIV risk-taking suggested that there was little change in the likelihood of using benzodiazepines on the basis of a 1 unit change on the HRBS (Table 6).

Table 6: Predictors of benzodiazepine use after adjusting for heroin use

Variable	Wald statistic	df	p	Odds ratio ^b	95% CI
Heroin use	2.50	1	.1	0.4	0.3 - 0.8
Psychological distress ^a	6.10	1	.01	1.9	1.4 - 2.6
HIV risk-taking behaviour ^a	9.30	1	.002	1.1	1.1 - 1.2

Notes. a. Higher scores indicate poorer functioning, that is, more psychological distress, more HIV risk-taking behaviour. b. Some odds ratios equal the extreme of the confidence interval due to rounding.

Discussion

Substance use patterns

The patterns of substance use by the sample were indicative of significant abuse and dependence. About half of the sample had been using heroin on a daily basis, paralleling reports of increased heroin use among young people in Sydney.¹³ The majority of the sample was smoking an average 16 cones of cannabis a day. Alcohol use could be characterised as ‘binge drinking’: large amounts consumed, but not on a daily basis. Scores on the SDS reflected the high levels of use and suggested that most if not all of the study participants could be described as substance dependent. These patterns of use were the same for males and females. The lack of gender differences in the patterns of use raises particular concerns. From equivalent amounts of substance use, females are more susceptible to adverse consequences than males.³⁸ From the substance use patterns alone, it would be expected that the sample would have experienced considerable substance-related harm, and would be at high risk of further harm if the use continued.³⁹⁻⁴¹

Comparisons with other samples

Opiate Treatment Index: It is difficult to appreciate the meaning of the scores on the OTI sub-scales without comparisons with other samples. Such comparisons were made with Australian studies using the OTI with samples of opioid users in and out of treatment,²² clients of methadone treatment services,²³ and heroin users and amphetamine users.²⁴ All of these comparative studies had adult samples, so the comparisons address the question: how do adolescents entering PSUD-treatment interventions compare with adults entering treatment and other adult samples of illicit substance users? The main differences between the adolescent sample and the adult samples were that the adolescents had:

- lower HRBS scores indicating lower HIV risk ($M=8.0$, $SD=6.5$ compared with $M=9.0$, $SD=7.1$)
 - higher Social Functioning Scale scores indicating poorer social functioning ($M=22.3$, $SD=5.5$ compared with $M=20.5$, $SD=7.2$)
 - higher Crime Scale scores indicating more involvement in crime ($M=4.8$, $SD=3.1$ compared with $M=1.0$, $SD=1.7$)
 - more physical health symptoms ($M=17.0$, $SD=8.7$ compared with $M=12.6$, $SD=7.6$).
- Within the adolescent sample, females had a higher risk of transmission of HIV, poorer social functioning and poorer physical health than the males.

The lower mean score on the HRBS was probably due to the lower proportion of injectors in the adolescent sample relative to the adult samples. Looking at the injectors, the proportion of injectors who had lent needles to others (14%) was similar to rates found in adult samples and the proportion who admitted to lending needles to others (31%) was substantially higher than found in adult samples. HIV risk was also significant among the sexually active, with more than half not using a condom every time they had sex with a casual partner. In sum, while the overall HRBS score suggested low risk for HIV, a closer observation of the behaviours of injectors and the sexually active indicated that the risk of transmission of HIV, and other transmissible diseases such as hepatitis, was significant within the adolescent sample.

SDS: SDS scores from this study sample were compared with scores from samples of heroin users in methadone maintenance,^{21 25} amphetamine users,²⁵ and long-term cannabis users.^{34 42} The adolescent sample's mean score on the SDS ($M=9.3$, $SD=2.9$) was substantially higher than the mean scores of the other samples, which ranged from 4.1 to 5.2. This finding suggested that the adolescent treatment-based sample had higher levels of substance dependence relative to adult substance users in and out of treatment. The experience of withdrawal symptoms could provide a substantial disincentive to these young people to enter and stay in treatment as well as negatively affecting treatment outcome and relapse.

Psychological distress: The GSI mean scores from the SCL-90-R of the sample from this study were compared with scores from samples of adolescents in the general population,²⁷ adults in methadone maintenance,²⁶ and adolescents in school and in treatment.²⁸ The adolescents in this study had a higher GSI mean score ($M=0.87$, $SD=.56$ for males, $M=1.35$, $SD=.77$ for females) than samples of school students ($M=0.63$, $SD=.52$ for males, $M=0.85$, $SD=.54$ for females), clients in methadone maintenance ($M=0.72$, $SD=.52$ for males, $M=1.13$, $SD=.75$ for females) and adolescent students and treatment referrals (separate means were provided for six categories from abstainers to very high substance users: $M=0.35$ - 0.61 for males, $M=0.46$ - 1.18 for females). This study's adolescent

treatment-based sample had very high levels of psychological distress, suggesting that counselling and/or psychiatric treatment would often be a necessary part of treatment. The higher GSI scores among benzodiazepine users suggested that this group were in particular need of such services. The females in the current study were significantly more psychologically distressed than the males, even after taking into account expected gender differences. The reason for this difference is unclear. Social and/or biological factors could make males less likely to be distressed, or to express distress, about problems relating to substance abuse/dependence than young females. Alternately, young females might experience worse consequences of substance abuse/dependence than young males. While prostitution was rare among the study participants, females could have been more likely to have been sexually exploited than the males. The higher rates of impending charges against males than females could be a factor: the juvenile justice system could be getting young people into treatment earlier than if they had not been charged with an offence. Females could have been more supported by family or partners males and the problem might need to be significantly worse for females before these supports will resort to professional help. This is an area for further investigation.

In the context of previous research on the poor mental health of methadone patients,⁴³ the finding that heroin users reported less psychological distress than the rest of the sample was not expected. The profile of distress reported by the study participants suggested that heroin users were particularly prone to distress relating to somatisation and that non-heroin users were particularly experiencing distress related to hostility. This pattern was consistent with other data. The high levels of somatisation among heroin users was consistent with the larger number of physical health symptoms reported by heroin users relative to non-heroin users. The higher prevalence of hostility among the non-heroin users was consistent with the negative association between heroin use and alcohol use, and the association between alcohol and violence reported by previous research.⁴⁴ In sum, psychological distress was high for the whole sample, however the extent and nature of this distress appeared to be related to the type of substance used such that non-heroin users (typically binge-drinkers) would be expected to exhibit more hostility and heroin users would be expected to exhibit more distress relating to physical health problems.

Treatment prognosis

The adolescents in this sample had high scores on all of the risk factors for poor prognosis in treatment. Those who used heroin, a substantial proportion of the sample, appeared to be at even greater risk of concurrent involvement in crime. Those who used benzodiazepines appeared to have poorer psychological functioning. Higher levels of involvement in crime, psychological dysfunction and substance use have been identified as markers for treatment failure.¹⁹¹⁰ It is important in terms of responsibility to funding bodies, the morale of staff, and the self-efficacy of clients that realistic objectives are set. Overly ambitious objectives could set up programs and their clients for failure. No program is likely to provide a 'miracle cure' such as abstinence for all clients.

Some would argue that adolescents with such poor prognosis should be excluded from treatment and that treatment resources are better spent on adolescents who are more likely to benefit. However, we have a duty to care for all adolescents.⁴⁵ Furthermore, treatment is likely to be beneficial: Outcome studies have suggested that PSUD-treatment interventions are associated with positive outcomes.⁴⁶ As expressed by Catalano and colleagues: 'some treatment is better than no treatment', even though the occurrence of relapse is high.⁴⁷ It is likely that adolescents such as those involved in this research study

could benefit if appropriate treatment was provided.

Treatment needs

The adolescents from this study appeared to need a comprehensive, intensive and long-term intervention to assist with the number and severity of signs and symptoms of distress. While there has been some debate about the issue of treatment matching, it is commonly accepted that the intensity and duration of treatment needs to increase as problem severity increases.³⁻⁵ While residential treatment is more expensive per client per day than nonresidential treatment,⁶ intensive residential treatment has been advocated when intrapersonal, interpersonal and environmental factors are particularly dysfunctional.⁴ The significance of substance-using peers in the lives of the sample, identified by the Social Functioning Scale, suggested that time-out from such influences and development of new non-substance-using peer networks, could be an important part of treatment. Residential treatment might not be essential, but could assist this need for time-out.

Conclusions

The adolescents in this study tended to be poly-substance users with cannabis, heroin and alcohol the main substances used. Heavy use in terms of frequency and amounts of use were reported. The profile of the group was highly problematic in the areas of HIV risk, social functioning, criminal behaviour, psychological distress, physical health and substance dependence. This profile suggested that improvements would be likely to be difficult to achieve and to maintain. It was argued that a comprehensive, intensive, longer-term PSUD-treatment intervention is needed to address the variety and severity of problem areas evident in the sample.

Chapter 13. Controlled trial of a comprehensive treatment program for adolescents with a substance-use disorder

Introduction

As identified in Chapter 6, there have been few rigorous evaluations of treatment programs for adolescents with a PSUD. Reviews of the research on treatment outcome for adolescents with a PSUD have identified that exposure to treatment is generally associated with improved outcome. However, while there has been some support for family therapy and cognitive-behavioural skills training (Chapter 6), no treatment method has been demonstrated to be superior to other treatments for adolescents.^{46 48} However, there is support for multimodal programs that include family-based interventions, case management, skills training and after-care.^{8 46} The intervention described in Chapter 11 was designed on the basis of research and expert opinion. It was not a replication of an intervention of proven efficacy, so it was important to evaluate its effectiveness.

Research questions

The central question addressed by the evaluation was: was participation in an intensive, comprehensive PSUD treatment program associated with more positive outcomes than usual care? The intervention was designed to be a ‘best practice’ program for adolescents with a substance-use disorder. The key features of the intervention were that it was a) intensive (3-month residential program followed by after-care) and b) comprehensive, including assessment and case management, skills training, individual and family counselling, a recreation program, and a therapeutic community environment.

The alternative, usual care, included other residential or nonresidential interventions or no intervention at all. The other interventions included combinations of detention, non-medicated detoxification, case management, and counselling. While there were some elements of overlap between the study intervention and usual care, usual care did not have a systematic, intensive, comprehensive program. The option of comparison with usual care was chosen for several reasons: a) there was no added cost or problems associated with creating or working with particular alternative interventions, b) it would not force applicants into an alternative intervention that might not be appropriate, c) adolescents would not be denied treatment because of the study, d) it allowed an investigation of what actually happened to study participants who were not able to get into the intervention, and e) it allowed an assessment of whether the intervention was superior to the existing management options.

Hypotheses

The hypotheses were based upon the three outcome domains suggested by McLellan and colleagues for evaluating the effectiveness of treatment for substance abuse.⁴⁹ The hypotheses are set out below.

- H1: Attendance at the intervention was associated with a greater reduction in the domain of substance use in the short and medium term (defined below), relative to usual care.
- H2: Attendance at the intervention was associated with a greater improvement in the domain of personal and social functioning in the short and medium term, relative to

usual care.

- H3: Attendance at the intervention was associated with a greater reduction in the domain of public health and public safety threats in the short and medium term, relative to usual care.

Short term was defined as at least 1 month after leaving the residential phase of the intervention, not less than 3 months after entry to the intervention. Medium term was defined as at least 4 months after leaving the residential phase of the intervention, not less than 6 months after entry to the intervention.

Research design

The randomised controlled trial (RCT) is usually regarded as the gold standard in evaluation studies.⁵⁰ Nonetheless, many evaluation research studies use quasi-experimental designs or observational methods.⁵¹ Such studies are generally easier and less costly to implement than RCTs because they allow for more naturalistic methods of allocation of study participants and data collection. However, inferences based on their results are more subject to validity problems than RCTs.⁵¹ Issues pertinent to ensuring the validity of results obtained by an RCT include the selection of the study population, how study participants are allocated to groups, the maintenance and assessment of compliance and the achievement of high and uniform rates of follow-up.⁵⁰ If these issues are satisfactorily dealt with and the study has a sufficient sample size for the detection of an effect, RCTs provide valid data on program efficacy. In consideration of these issues, an RCT was designed and initiated for the evaluation of the intervention. However, the attempt to implement an RCT was not successful so a quasi-experimental design was adopted. An account of the development and trial of an RCT, the problems encountered and the adaptations used to deal with those problems is provided below.

Randomised Controlled Trial

The procedures for recruitment and randomisation were embedded within the intervention's intake process. When an applicant or a referrer called the intervention, a short screening instrument (Appendix A) was administered over the telephone. If the applicant appeared suitable for the intervention, an application 'pack' was posted to the applicant. The application pack included a cover letter explaining the purpose of the study, consent forms, a form for providing the applicant's contact details, and a copy of the interview format (Appendix B). The applicant then participated in an assessment interview (generally by telephone) and sent in completed consent forms and contact details. Finally, the applicant was randomly allocated to the intervention waitlist or to the comparison group. For ethical reasons, if a vacancy existed within the intervention, applicants were able to enter straight away, they were not randomised to the comparison group.

The randomised controlled trial was conducted between October 25, 1996 and February 13, 1997. During this time 53 inquiries about entry to the intervention were received. This number does not include those who were told that the intervention was not accepting applications because the waitlist was full. Forty-four applicants were screened as suitable for the intervention and were sent an application pack, from which 24 baseline assessments were completed. A telephone survey of 20 applicants who did not proceed with the application after the application pack was sent, indicated that most of these applicants changed their minds about wanting or needing to come. Discussion with the clinical coordinator of the intervention suggested that this was typical of adolescent applications to PSUD-treatment programs. Of the 24 applications completed by February

13, 1997, 1 applicant dropped out prior to randomisation, 4 (all females) were immediately offered the intervention because of vacancies within the intervention for females, and 7 were randomised to the comparison group.

Of the 7 applicants randomised to the comparison group, one entered the intervention after a lengthy period of dispute between juvenile justice officers (some argued he needed the intervention, another argued that it was not what he needed) and lobbying of intervention staff by the juvenile justice officers. During this process, the applicant was given contradictory messages by juvenile justice officers about whether or not he could go to the intervention. In the end, the intervention's clinical coordinator was concerned that the process was detrimental to the wellbeing of the applicant so the applicant was offered a place in the intervention, which he subsequently accepted. The other 6 study participants remained in the comparison group. Verbal and written complaints were made to the NSW Department of Juvenile Justice and to management at the intervention about applicants being allocated to the comparison group. One parent rang the intervention staff 3 months after her son had been randomised to the comparison group, in tears and begging for her son to be able to come to the intervention. The parent argued that there were no other options for her son as his substance use and violent behaviour had worsened since his initial application and he was, at the time of her call, in a detention centre as a result of his behaviour. Despite the repeated efforts of the applicant's juvenile justice officer, no other services in their (rural) area could accommodate him. Those service providers who had attempted to intervene with this adolescent said there was nothing they could do and refused to provide further services.

Twelve applicants were randomised to the intervention group. From this group, 1 died before entry to the intervention, 1 changed his mind about coming to the intervention, 1 could not enter the intervention because he received a 6 to 9 month jail sentence. On February 13, 1997, 3 of the 12 applicants allocated to the intervention were on the waitlist and 6 had attended the intervention for periods from a few days to 3 months. Thus only 50% of those randomised to the intervention had entered the intervention by the date that the trial was reviewed, 25% might have entered when a place became available.

By the end of nearly 4 months of implementing the randomisation procedures, randomisation was not working well. The intervention was experiencing significant public relations problems with referring agencies, on whom it depended for clients. One referrer reported that she had stopped referring adolescents to the intervention because the task of telling parents their children could not get treatment because of a research study was so difficult and unpleasant. The experience of dealing with referrers and parents of applicants allocated to the comparison group had also been very stressful, particularly as the applicants often had no other option besides the intervention and their needs for treatment were high. Furthermore, randomisation was not achieving its goal of randomly allocating study participants to groups. Only 6 of the 23 study participants had been placed in the comparison group; 6 of the 12 applicants allocated to the intervention group had entered the intervention (3 were on the waitlist). Given the difficulties experienced with implementing the RCT, it was decided that the process of randomisation should cease and that the study should proceed with a quasi-experimental design.

Quasi-experimental design

The design was changed by using a natural process of self-selection of participants into the intervention or comparison groups, with statistical adjustment for group differences to be conducted if necessary. Consequently, the design was a pretest, posttest and follow-up study of a treatment group and a comparison group. This design was feasible because

approximately half of the adolescents who inquired about the intervention and proceeded with the baseline interview did not come to the intervention when a place was available. On average, posttests were conducted 23 weeks (6 months) after the pretests ($SD=11$, range 10-69 weeks) and follow-ups were conducted 17 weeks after the posttests ($SD=5$, range 11-40 weeks), that is 39 weeks (10 months) after the pretests ($SD=11$, range 28-84 weeks). It was anticipated that this period of follow-up would be long enough to encompass most relapses and close enough to the intervention period to avoid contamination from subsequent interventions.⁴⁹

Participants

Sample definition

The study sample comprised all adolescents who applied for the intervention and who were screened as suitable for the intervention between October 1996 and February 1998. The intervention accepted 14- to 18-year-old adolescents residing in New South Wales or the Australian Capital Territory who appeared to suffer a PSUD consistent with the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV) criteria for a substance abuse or dependence disorder²⁹ and who could physically and mentally participate in the intervention. A copy of the intervention's screening form is in Appendix A.

Sample size and power calculations

A meta-analysis of seven controlled trials of intrapersonal/interpersonal skills-training programs (similar to the skills-training program in the intervention) found an averaged effect size difference (ESD) at 1 to 5 months after program completion of +0.87 between treatment and comparison conditions.⁵² An effect size of 0.5 indicates a medium difference between groups and an effect size of 0.8 indicates a large difference.⁵³ Therefore, a large effect size was anticipated as a result of the intervention. The results of this meta-analysis were used as a bench-mark for power analyses and sensitivity analyses for determining sample size for this study, using the Design-Power computer package.⁵⁴

Power analysis - assuming a significance level of 0.05, an ESD of 0.87, and 40 study participants per group, statistical power would be 0.97. That is very high power to detect a difference between groups.

Sensitivity analysis - given that a power of 0.97 is very high (0.8 is regarded as high and generally sufficient) and that an ability to detect an ESD of less than 0.87 would be useful, a sensitivity analysis was conducted to establish the sample size required if power is set at 0.8 and the ESD were less than 0.87, but still moderate to large. With significance level at 0.05, power at 0.8 and an ESD of 0.7, 33 study participants per group would be required; with an ESD of 0.6, 45 study participants would be required.

On balance, a sample size of 40 study participants per group ($N=80$) was considered sufficient for testing the study hypotheses. Based upon previous clinical and research experience at NDARC with similar samples, it was anticipated that about 40% of the study participants referred to other services might not be able to be located for follow-up or might refuse to participate in the research project; and that 40% of study participants might not complete the intervention or might be lost at follow-up. Consequently, to obtain 40 study participants per group at the follow-up assessment, it was anticipated that an additional 27 study participants per group would need to be recruited (that is, $n = 67$ per group or $N = 134$, in total).

Recruitment

Recruitment of study participants was embedded within the procedures for intake at the intervention as described above (p. 20). However, instead of randomising study participants after conducting the baseline assessment, all applicants who participated in the baseline assessment were placed on the intervention's waitlist. During the data collection period 272 people called to inquire about entry to the intervention. From these 266 enquiries, 70 were turned away because the waitlist was full^a; 11 were turned away because they were not appropriate for the intervention (for example, too old); 13 were simply making enquiries; 57 were sent an application pack but did not proceed with the application, usually because they had changed their minds about wanting treatment or the crises passed; 60 were assessed and admitted into the intervention; and 61 were assessed and placed on the waitlist but did not enter the intervention. Apart from randomisation, non-entry to the intervention was usually due to a change of circumstance (for example, sentenced to detention) or a change of mind by the applicant. These participants formed the comparison group.

Strategies for maximising follow-up

Follow-up of study participants was important for two reasons. First, the more study participants that were followed-up, the more power the study had to detect changes over time between groups. Second, previous research has demonstrated that study participants who are easier to follow up are different to those who are difficult to follow up, so loss due to follow-up can be a source of bias.⁵⁵⁻⁵⁷ In particular, study participants who are more difficult to find have tended to have worse treatment outcomes than other study participants.^{58 59} It was anticipated that follow-up interviews would be difficult to achieve because the study participants would have little motivation to assist a research study and would be difficult to locate as they moved between detention centres, refuges, homes of friends and family. Some study participants were unable to be traced because they had warrants for their arrest so they did not want anybody to find them. An enormous amount of effort was made to follow up study participants. The following strategies for maximising follow-up were planned and implemented:

- Contact details of each participant and of others who would know the whereabouts of the participant (for example, parents and juvenile justice officers) were obtained from each participant. Also the optimal and least good times for telephoning were obtained.
- Participants were called 1 month prior to the second and third interviews to update contact details, remind the study participants about the follow-up assessments and maintain rapport.
- All communications were aimed to develop rapport. Guidelines were to a) be pleasant, b) give study participants a sense of participating in something that is valuable by explaining enough about the study for them to understand and appreciate what they are involved in and why the questions are asked, c) keep the data collection session as short as possible, and d) address any complaints expressed by the study participant.
- Follow-up times (and places when applicable) were made at the study participant's convenience, day or night, 7 days a week.

^a More than this number were turned away, however records were only completed for 70 of the 'turn-aways'.

- Reimbursement to compensate for time and effort without compromising the study outcome was provided. This was a \$20 gift voucher from a shop of the study participant's choice.
- When attempts to speak to study participants were repeatedly unsuccessful, a letter was sent to the study participant offering a payment of \$10 for the subject to call the study.
- A national toll-free telephone number was set up so that study participants could call for an interview from anywhere in Australia without paying the cost of the call. Unanswered calls were diverted to a mobile telephone so that they could be answered at any time on any day. If the mobile telephone was not answered, the caller was diverted to a message service so that the call could be promptly returned.

A substantial amount of effort was made to follow up study participants. The average number of telephone calls, letters, facsimiles or email messages required to obtain a Test 2 was 13 ($SD=10$, range 2-57) and to obtain a Test 3 was 12 ($SD=6$, range 2-54). Less than half of the sample was able to be interviewed for Test 2 within 10 contact attempts. This effort was important for reducing sample bias. For example, a repeated measures ANOVA was used to test the relationship between two levels of effort to obtain Test 2 interviews on heroin use at Test 1 and Test 2. The two levels of effort were: a) 1-6 attempts (23% of the sample), and b) 7 or more attempts (77% of the sample). Study participants for whom more than six attempts were required to obtain an interview used significantly more heroin, on average, than study participants for whom less effort was required ($F=23.9$, $df=1$, $p<.0001$).

Follow-ups and drop-outs

Of the 121 study participants in the baseline sample, 106 (88%) were tested at Test 2 and 88 (73%) were tested at Test 3. Loss to follow-up was significantly greater among the comparison group than the intervention group at Test 2 ($\chi^2=12.5$, $df=1$, $p=.0004$) and at Test 3 ($\chi^2=9.0$, $df=1$, $p=.003$) (Table 7).

Table 7: Follow-up rates

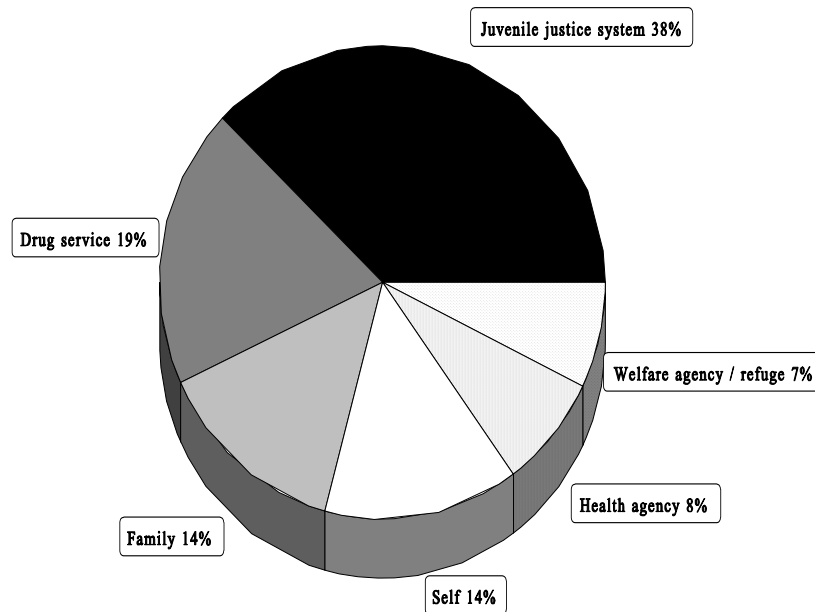
Group	Test 1	Test 2		Test 3	
	<i>n</i>	<i>n</i>	% of Test 1	<i>n</i>	% of Test 1
Intervention	60	59	98	51	85
Comparison	61	47	77	37	61
Total	121	106	88	88	73

Twenty-seven percent of the study participants were not followed-up to Test 3. Twelve study participants (10% of the Test 1 sample) were not followed-up because the data collection period finished before their next interview was due or before efforts had ceased to contact them for the interview. Four of the 12 were in detention, 1 was in a psychiatric unit and 1 was in a long-term residential program so they were unable to be tested until they left these facilities. Other reasons for loss to follow-up were refusals to continue to participate (7%), unable to be contacted (5%), 'on the run' or missing (4%), overseas (1%) or deceased (1%).

Multivariate logistic regression with backward elimination was used to test for differences at baseline between participants who were followed-up to Test 3 ('follow-ups') and participants who were not followed-up to Test 3 ('drop-outs'). Variables in the model were group (intervention or comparison), gender, Crime Scale score at Test 1, Social Functioning Scale score at Test 1, and Substance-Use Scale scores for heroin, alcohol, cannabis, benzodiazepines (see Appendix C for description of the Substance-Use Scale). The final model was significantly better than chance at predicting cases ($\chi^2=14.2$, $df=2$, $p=.0008$) and correctly predicted 73% of cases. Only group ($\chi^2=8.6$, $df=1$, $p=.003$) and heroin use at Test 1 ($\chi^2=4.3$, $df=1$, $p=.04$) were significantly associated with drop-out by Test 3. Drop-outs were significantly more likely to be from the comparison group (73%) than the intervention group (27%). From the perspective of drop-out by group: 39% of the comparison group dropped out, 15% of the intervention group dropped out. Study participants who dropped out were significantly more likely than those who were followed-up to use heroin (79% compared with 60%) and to use heroin on a daily basis at baseline (68% compared with 44%). In sum, there was differential drop-out between the two study groups.

Description of the study sample

About half (53%) the participants were male and males (mean age=16.4, $SD=1.0$) tended to be significantly older than females (mean age=15.9, $SD=1.3$) ($t=2.7$, $df=119$, $p=0.009$). As can be seen in Figure 1, the modal age of males was 17 years and the modal age of females was 16 years.



The most common source of referral was the juvenile justice system (Figure 1). The high proportion of study participants referred to treatment by the criminal justice system was consistent with adolescent referral patterns in to residential programs in the US.⁷ Most study participants had involvement with more than one referral source. For example, referrals from health, welfare and PSUD-specific agencies were typically involved with the Juvenile Justice system as well. The main PSUD-specific agencies were short-term residential programs for adolescents based in Sydney and a referral agency based in Canberra.

Research instruments

A review of relevant assessment instruments was conducted (Chapter 5) and the following instruments were short-listed for possible use in the study:

- Problem-Oriented Screening Instrument for Teenagers (POSIT)⁶⁰
- Drug Use Screening Inventory (DUSI)⁶¹
- Adolescent Drug Abuse Diagnosis (ADAD)⁶²
- Opiate Treatment Index (OTI)²²
- Personal Experience Inventory (PEI)⁶³
- Adolescent Diagnostic Interview (ADI)⁶⁴
- Prevention Intervention Management and Evaluation System (PMES).⁶⁵

These instruments were reviewed with the case manager at the intervention and assessed for appropriateness, comprehensiveness, legibility and face validity. Problems identified by this process were that most instruments were too long for the outcome study and some of the language and items seemed inappropriate for Australian adolescents.

Three instruments were short-listed by this review process and pilot tested. The ADAD was piloted with 1 adolescent as a face-to-face interview. The interview length of 2 hours was too long to be practical for the study, given that data collection for the study was

separate to the case management process.^a The PEI was piloted with 5 clients of the intervention as a self-completion questionnaire. The clients described it as too long. They reported that some items were repetitive, seemed irrelevant and lacked face validity. There was frustration that some items did not permit for 'not applicable', for example, in the case of questions relating to schooling if the respondent did not attend school. Questions about incest and domestic violence were seen as too personal. Finally, the language and tone of the instrument were described as 'American', not Australian. The Opiate Treatment Index (OTI) was pilot tested with 7 clients of the intervention as a self-completion questionnaire. From this pilot, it was determined that the OTI was not too long, had face validity, and was easily understood by the study's target group. Consequently, the decision was made to use the OTI, with some modifications and additions (described below) as the study instrument. A copy of the data collection instrument used for the outcome study is in Appendix B.

Opiate Treatment Index (OTI)

The OTI assesses substance use, HIV risk-behaviours, social dysfunction, criminal behaviour, physical health and psychological adjustment. It was designed to be administered by interview to measure the effectiveness of treatment for opioid-dependent adults. The OTI has demonstrated high test-retest reliability on all of its scales and validity has been demonstrated by comparison of the scales with other types of measurement such as the Addiction Severity Index and physical examination.³² The OTI has been used in a number of epidemiological and treatment-outcome studies in Australia and overseas, allowing for comparisons between this study and others.^{22 24 66-69} The following modifications were made to the OTI:

- The last section of the OTI, the General Health Questionnaire, was replaced with the Symptom Checklist-90-Revised (SCL-90-R).²⁷ Mattick and colleagues demonstrated that the SCL-90-R was significantly superior to the General Health Questionnaire in detecting depression, anxiety and 'any disorder'.⁴³ A description of the SCL-90-R is provided below.
- A modified Severity of Dependence Scale (SDS)²⁵ was added to measure substance dependence after preliminary analyses of the first 80 baseline interviews suggested that substance dependence was likely to be prevalent among the sample.⁷⁰ The SDS was added to verify the presence and severity of dependence. A description of the SDS is provided below.
- An item to measure frequency of substance use from the ADAD was modified and added to give a quick, summary score of frequency of substance use.
- Some minor wording changes were made to the instrument to make it more appropriate for adolescents. In particular, the question 'How many full time jobs have you had in the last 6 months' was changed to 'How much of the last 3 months have you been unemployed and not in education or training?'.
- The reference point of the past 6 months in the Social Functioning Scale was changed to the past 3 months to allow for the measurement of change at 3-monthly intervals.

^a To avoid duplication of assessments, information from the study assessments of intervention group participants were given to the intervention's case managers if the participant consented.

Symptom Checklist-90-Revised (SCL-90-R)

The SCL-90-R assesses psychological symptom status on nine dimensions: somatisation, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, psychoticism (Table 8). The mean score across these dimensions is the Global Severity Index (GSI).

Scores on the SCL-90-R indicate the amount of distress experienced as being none at all (0), a little bit (1), moderate (2), quite a bit (3), or extreme (4). Mean GSI scores for adolescents from a general population sample in the US were 0.25 ($SD=0.24$) for males and 0.36 ($SD=0.35$) for females.²⁷ A sample of adolescents from the general population in Australia would be expected to report similarly low levels of distress on the SCL-90-R.

Severity of Dependence Scale (SDS)

The Severity of Dependence Scale (SDS) is a five-item questionnaire designed to measure dependence. Rather than focussing on the specific withdrawal symptoms of particular substances, the SDS includes questions relating to control over substance use, anxiety about substance use and difficulty in stopping substance use. Consequently, it was an ideal scale for measuring non-substance-specific dependence. Psychometric testing of the SDS has suggested that it provides a reliable and valid indicator of dependence.²⁵

Table 8: Dimensions of SCL-90-R

Dimension	Explanation
Somatisation	Distress from perceptions of bodily dysfunction
Obsessive-Compulsive	Unremitting, irresistible and unwanted thoughts, impulses and actions
Interpersonal Sensitivity	Feelings of inadequacy and inferiority, particularly in comparison with others
Depression	Symptoms of dysphoric mood (for example, withdrawal, low energy, suicidality)
Anxiety	Signs of anxiety (for example, nervousness, tension)
Hostility	Anger: aggression, irritability, resentment
Phobic Anxiety	Persistent and irrational fear
Paranoid Ideation	Disordered thinking (for example, hostility, delusions, fear of loss of autonomy)
Psychoticism	A continuum from mild interpersonal alienation to dramatic psychosis (for example, hallucinations, thought control)
Global Severity Index (GSI)	A single, mean score of distress

Additional measures

Some extra items were added to these instruments. Two self-assessment questions asked

study participants whether they felt their substance use and their lives in general had improved, worsened or stayed the same and the reasons for change or lack of change. Open-ended questions were added to ascertain the problems caused by substance use from the study participant's perspective and the improvement in substance use and life in general (Test 3 only).

Data collection

Most interviews were conducted by telephone. Face-to-face interviews were rarely done because, being a state-wide program, applicants were usually 1 to 12 (or more) hours travel from the study centre. General guidelines for assessment (for example, not leading answers, repeating questions without changing their meaning), as well as guidelines within the instrument manuals,^{22 27} were followed.

Prior to beginning the interview, the interviewee was given sufficient information to give informed consent to participate in the study. At Test 1, participants usually had a copy of the interview format in front of them so that they could a) see exactly what the interview contained before consenting to be interviewed, b) read the questions as they heard them and c) see the multiple choice answers. Responses were recorded on a data collection form by the interviewer, not the interviewee. The quality and consistency of data collection was facilitated by a detailed procedures manual for data collection. procedures.

As reviewed elsewhere, and discussed in Chapter 5, self-report data on substance use from young people has generally been found to be reliable if there is no motivation to falsify answers.^{71 72} Study participants were assured of the confidentiality of their answers, although the baseline interviews were generally made available to the intervention's clinical staff as part of the intake and case management processes. Consequently, it is possible that study participants could have altered their responses to increase or decrease their chances of being accepted to the intervention. Data from Test 1, Test 2 and Test 3 were only made available to the intervention's clinical staff if the study participant and the clinical staff so desired. With respect to information relating to illegal activities, the instrument had been reviewed by the NSW Department of Juvenile Justice and assurances were given that, apart from questions relating to manslaughter and murder, the information being provided was too nonspecific to be incriminating. Study participants were given this information and told that their answers would not be given to anybody without their permission, unless they reported that they had committed murder or manslaughter.

Data collectors

Most of the data collection was conducted by me (CS). During the latter part of the data collection period, two students worked as research assistants on the project as part of their placement for qualifications in Psychology (see Acknowledgements). Each student was trained over a period of at least 2 months before being able to work independently on data collection. Training included observing data being collected and records being maintained, role-plays of the interview process, collecting data and maintaining records under close supervision, and reading instruction manuals and other relevant materials. Data collection by the students was supervised on a daily basis. Data collection procedures were documented to assist adherence to the procedures.

The intervention

The intervention plan

The intervention was based upon research into best practice in the treatment of PSUDs

among adolescents (Chapters 1-10). The main underlying assumption of the intervention was that it needed to address the multiple risk factors, protective factors and consequences of substance abuse by adolescents, and that it needed to do so in a manner that was attractive, appropriate and effective for each individual in the target population. To do this, the treatment program needed to be comprehensive, intensive and longer-term. Reviews of PSUD-treatment programs for adolescents published since the intervention plan was developed have confirmed the need for intensive, multimodal programs.^{73 74} The plan was to implement the intervention on a residential as well as nonresidential basis, but due to limited resources only the residential program was implemented. Program components included case management (assessment, case planning, support), individual counselling, a family program, cognitive-behavioural skills training, education, a substance-free recreation program, training in living skills, incentives for behaviour modification and an after-care program. Details of the intervention plan are presented in Chapter 11.

Exposure to the intervention

Study participants who attended the intervention attended for periods from less than 1 day

to 18 weeks ($M=7$ weeks, $SD=5$ weeks) (Figure 1).

Adequacy of implementation

It is generally recommended that an outcome evaluation does not commence until an evaluability assessment has been conducted, that is, it has been established that the 'management basics' are in place⁷⁵ and the intervention is being satisfactorily implemented.^{76 77} Research has identified that a number of facets of program implementation can affect treatment outcome. For example, a study of methadone maintenance programs found that treatment outcome was affected by the adequacy of staffing levels, management efforts in quality assurance, the extent of client follow-up by staff and client selection practices.⁷⁸

During the first year of program implementation, action research methods were used to increase program fidelity prior to the outcome evaluation.⁷⁹ Details of the action research are presented in Appendix D. At the time that baseline interviews were due to commence (October, 1996), the action research study had identified that the intervention was not being fully and optimally implemented. For example, the after-care and family skills training programs were not being adequately implemented and the adolescent skills training manual had not been finalised. While concerned about the intervention fidelity, it

was decided that implementation was sufficient to warrant commencement of the evaluation study. The view was taken that the study was an evaluation of an attempt to implement a 'best practice' program in the 'real world' and that it was not realistic to delay the evaluation until program implementation was 'perfect'.

At the end of the data collection period, an assessment of program fidelity was conducted retrospectively, to measure the degree to which the intervention was implemented as planned during the study period. A data collection form was designed to allow key informants to rate the level and quality of implementation of each of the intervention elements and to give comments on the implementation. Key informants were asked to rate the **level** and **quality** of implementation of each program element using the following scales:

Level of implementation:

Fully or nearly completely implemented.....	4
Mostly implemented	3
Partly implemented.....	2
Not implemented	1
Don't know.....	0

Quality of implementation:

High standard of implementation	4
Reasonable standard of implementation.....	3
Variable standard of implementation	2
Low standard of implementation.....	1
Don't know / Not applicable	0

Key informants were also asked to give comments about the implementation of each component, for example, what was done, how implementation could have been improved, and what factors interfered with full implementation to a high standard. The intervention elements were directly taken from the intervention plan (Chapter 11). Key informants were chosen on the basis of their having closely observed the intervention during the whole study period, the skills and knowledge to assess the intervention and to answer the questions above and a unique perspective on the intervention. It is acknowledged that none of the participants could be completely objective. To address this issue, key informants from a range of perspectives were chosen: clinical, management and research. Data were entered into an Excel database and means were calculated for each question and each section. The mean ratings for each operational principle, program component and service delivery detail are presented in Tables 9, 10 and 11.

Table 9: Mean ratings for implementation of operational principles

No	Operational principle	Level	Quality	Comment
1.	Appropriate interventions by assessment and case management	3.0	2.7	Psychometrically proven assessment instruments rarely used, case plans might not have been realistic, no protocol for case management.
2.	Interventions appropriate to adolescents	3.3	2.7	At times, staff expected more compliant behaviour than can be

No	Operational principle	Level	Quality	Comment
				expected from the study participant group.
3.	Emotionally and physically safe environment	3.3	2.7	
4.	Staff members will be recruited, professionally supported and trained to ensure that they have the competencies to implement the intervention in an appropriate and effective manner	3.0	2.7	Professional, experienced staff were difficult to find. Support and training were variable. Staff shortages meant that staff were often stressed and over-worked.
5.	Cultural appropriateness	3.3	3.3	Involvement of cultural groups that could assist re-integration was lacking.
6.	Program planning and modification based upon best practice and ongoing evaluation	3.0	2.7	Research project ensured this to some degree, although staff sometimes 'ran their own race'. Program monitoring and evaluation almost non-existent, apart from the outcome study.
7.	Client participation in evaluation, planning, and implementation	2.7	2.3	
8.	Comprehensive approach	3.0	3.0	Some elements overlooked, particularly vocation.
9.	Principle of harm-minimisation	3.7	3.7	
10.	Clear ethical standards, including guides on staff responsibilities, client rights, and behavioural boundaries	3.3	3.3	Varied.
Mean		3.2	2.9	

Note. Scores ranged from 1 for 'not implemented' or 'low standard of implementation' to 4 for 'fully or nearly completely implemented' or 'high standard of implementation.' 'Don't know' or 'not applicable' were scored 0.

Table 10: Mean ratings for implementation of program components

No	Program component	Level	Quality	Comment
1	Case management	3.0	2.7	No protocol, variable implementation.
2	Group education and skills training	3.7	3.0	Group manual not developed, staff not adequately trained and supervised to run groups effectively. Skills-trainer position dropped from program.

No	Program component	Level	Quality	Comment
3	Family program	2.5	2.2	Variable implementation, depending upon staff. Never fully implemented. Thwarted somewhat by the distance of families from the intervention site.
4	Counselling and support	3.3	3.3	Varied, depending upon staff.
5	Recreation program	3.0	2.3	Varied, depending upon staff. Focus tended to be on filling time rather than broadening repertoire of ideas and experiences for substance-free activities.
6	Incentives for behaviour modification	2.7	2.3	Highly variable, depending upon staff. Tendency to punish rather than to reward.
7	After-care	2.1	1.4	Almost non-existent - largely due to lack of staff and the distance of clients homes from the intervention site.
Mean		2.9	2.5	

Note. Scores ranged from 1 for 'not implemented' or 'low standard of implementation' to 4 for 'fully or nearly completely implemented' or 'high standard of implementation.' 'Don't know' or 'not applicable' were scored 0.

Table 11: Mean ratings for implementation of service delivery details

No	Service delivery detail	Level	Quality	Comment
1	Service delivery model	1.7	1.7	Nonresidential program never fully implemented due to lack of resources.
2	Residential setting	3.3	2.7	Not a consistently supportive environment.
3	Adaptations to the adult TC model for adolescents	2.3	2.0	Positive group culture rarely developed.
4	Physical environment	3.7	3.7	Required more attention to cleanliness and maintenance. Larger backyard with gardens and recreation area required.
5	Entry criteria	3.3	3.3	Screening was minimal.
6	Exclusion criteria	2.7	4.0	
7	Program length	3.3	2.7	Few stayed the full 12 weeks.
8	Program cycles	3.7	3.3	Repeated groups sometimes made the group work repetitive. Variable - staff more likely to use

No	Service delivery detail	Level	Quality	Comment
9	Positive reinforcements	3.3	2.8	punishment.
10	Structure and rules	3.5	2.8	Sometimes too tight so everyone was being punished, sometimes too loose so problems arose. Depended upon staff.
11	Group activities	3.3	3.0	
	Mean	3.2	2.8	

Note. Scores ranged from 1 for 'not implemented' or 'low standard of implementation' to 4 for 'fully or nearly completely implemented' or 'high standard of implementation.' 'Don't know' or 'not applicable' were scored 0.

The level of implementation was generally around the value of 3, suggesting a reasonable level of implementation. Lower scores were evident for after-care, the family program, adaptations to the therapeutic model for adolescents and provision of the intervention on a nonresidential basis. Scores for the quality of implementation were lower, indicating a low or variable standard of implementation. Comments suggested that the main factors in the quality of implementation related to lack of resources (particularly staff), lack of consistency among staff and a lack of program protocols.

In sum, the assessment of program implementation indicated that the intervention was not implemented completely to plan, nor was it implemented at a consistently high standard. However, most of the intervention components were implemented to a reasonable degree.

Clinical assessments of the intervention group participants

Treatment outcome was dependent upon the achievement of multiple program objectives, including improvements in social behaviour, motivation to change, intrapersonal skills, interpersonal skills, psychological functioning, external supports, family issues, participation in substance-free activities, societal connectedness, feeling of hope for the future, living skills and relapse prevention skills. As impact evaluation had not been conducted during the study period, retrospective, clinical assessments of the impact of the intervention on clients were obtained from clinical staff of the intervention. Intervention group participants were rated by their respective case managers on each of the above areas and on overall improvement on a scale from 1 ('a lot worse') to 5 ('a lot better') with 3 as the midpoint ('no change'). Details of the method and instrument for the collection of clinical assessments are provided in Appendix E.

On average, case managers described modest improvement across all of the domains of interest. Motivation to change was rated as improving the most ($M=3.8$), developing external supports was rated as improving the least ($M=3.3$). However, the differences in mean ratings were minimal.

From the content analysis of the comments made by the case managers, factors that impinged upon the success of the intervention included the geographic distance from the home of some study participants, making participation in the family program and after-care difficult, and the intellectual inability of a small number of study participants to deal with the cognitive aspects of the intervention. The case managers reported that the intervention helped study participants in numerous ways, including providing time away from substance

use; providing opportunities to interact with others in a positive manner; exposing study participants to divergent experiences, people and views; providing a stable environment; facilitating access to other services; and exposing study participants to a supportive and caring environment.

The case managers identified a range of positive changes for study participants as a result of participation in the intervention. Some of the positive changes were improved living skills, self-esteem, family relations, mood management, decision-making skills, insight, acceptance and tolerance of difference, communication skills, motivation to change, understanding of harm minimisation, relapse prevention skills and awareness of consequences of actions. Even for those study participants in the intervention for a short period of time some positive changes were reported. For example, for 1 study participant, it was noted that the opportunity to take time out from substance use and substance-using friends was seen as a very positive consequence of the intervention:

This person benefited from a short period of 'time out' during which she changed her address away from drug-using friends and made a short-term plan to stay drug free.

In sum, the case managers' ratings of the impact of the intervention on study participants were generally positive. The degree to which this pattern reflected reality or a response bias is not known. It is likely that both reality and bias have influenced the results. The tendency to rate societal reintegration and the development of external supports as least likely to improve was consistent with the evaluation of program implementation (above), which suggested that these areas were particularly deficient. Geographic isolation from family was identified as a barrier to family involvement and the provision of after-care. The ways in which the intervention helped study participants and in which study participants improved, as expressed by the case managers in response to the open-ended questions, were consistent with the intervention plan, suggesting that there was a reasonable level of intervention implementation and impact.

Exposure to other interventions

Study participants from both the intervention group and the comparison group were exposed to other interventions likely to affect the outcome variables. Study participants were given a score of 1 for reporting a) detention in the 12 weeks prior to the interview^a; b) counselling or other treatment in relation to their substance use from the Department of Juvenile Justice while in the community since the previous interview ; or c) counselling or other treatment in relation to their substance use from any other source in the community since the previous interview. Chi-square tests were performed to test for group differences in experience of any of the three categories of intervention prior to Test 2 and prior to Test 3. Exposure to other interventions and the significance of group differences are presented in Table 12. In the period prior to Test 2, the comparison group was significantly more likely than the intervention group to receive a treatment other than the intervention ($p=.002$). In particular, the comparison group was significantly more likely to have been in detention than the intervention group ($p=.0004$). There were no group differences in the receipt of interventions other than the study intervention between Test 2 and Test 3 ($p=.6$).

^a Note that the mean time between Test 1 and Test 2 was 6 months; the mean time between Test 2 and Test 3 was 4 months. Consequently, attendance in detention during the follow-up period is likely to be an underestimate because it includes only the 12 weeks prior to Test 2 and Test 3.

Table 12: Group differences in interventions other than the intervention

	Source of intervention	Comparison group (%)	Intervention group (%)	$p (\chi^2)$
Prior to Test 2 $n=106$	Detention	34	7	.0004
	Juvenile justice community	17	15	.8
	Other community	47	32	.1
	Any of the above	77	48	.002
Prior to Test 3 $n=88$	Detention	8	8	.96
	Juvenile justice community	14	6	.2
	Other community	27	41	.2
	Any of the above	43	49	.6

Comparative cost of the intervention

The relative cost of intervention options is an important consideration for treatment planning. As detention was the main other intervention to which the comparison group participants were exposed, the daily cost per client in the intervention was compared with that cost in detention. However, information about costs is only useful in relation to what those resources provide. Higher staff:client ratios have been associated with greater effectiveness⁷⁸ so the ratio of staff to clients was also investigated.

The cost and staffing comparison was very simple, based upon available information. It is acknowledged that economic analyses require much more sophisticated methods than used for this study.⁸⁰ Furthermore, details of the items included in the costings from the Department of Juvenile Justice were not available so the validity of the cost comparison is not known. However, as asserted by Sindelar and Manning, there is little point in conducting detailed cost-benefit and cost-effectiveness analyses if effectiveness has not yet been demonstrated.⁸¹ It was hypothesised that:

- H1: the daily cost per client in the intervention would be less than in detention because the intervention had low costs relating to security and
- H2: the staff:client ratio would be higher in the intervention than detention because of the emphasis on individual and small group activities in the intervention. It was assumed from consultations with Department of Juvenile Justice staff and clients that substantially less time was spent in therapeutic or educational activities in detention than in the intervention.

Results of the cost comparison are presented in the results section of this chapter.

Data analysis

Aim

The overall aim of the data analyses was to determine the nature and extent of a treatment effect from participation in the intervention relative to usual care. The analyses were conducted in three stages. The first stage was to conduct planned analyses to identify the effect of entry to the intervention relative to usual care. This was an 'intention-to-treat

analysis', so the intervention group included all study participants who commenced treatment at the intervention, regardless of how many days of treatment they received. The second stage was to conduct planned analyses to identify whether longer stays in the intervention were associated with improved outcome relative to dropping out early ('dose-response relationship'). The third stage were post-hoc analyses to explore the nature of the effects identified by the planned analyses.

Outcome variables

The variables used to indicate each of the domains of interest were:

1. Substance use: A composite score of substance use based upon frequency and amounts of use of each substance and the number of substances used. Details of the score are provided in Appendix C.
2. Personal and social functioning:
 - Social functioning: Scores from the Social Functioning Scale in the OTI.
 - Psychological distress: Scores from the General Severity Index (GSI) from the SCL-90-R.
 - Physical health: Scores from the Physical Health Scale in the OTI.
3. Public health and public safety threats:
 - Criminal behaviour: Scores from the Crime Scale in the OTI.
 - HIV risk-taking: Scores from the HIV Risk Behaviour Scale in the OTI.

Scoring of the OTI and the SCL-90-R were based upon procedures outlined by the developers of each instrument^{22 27} as described in Chapter 12.

Post-hoc analyses included analyses of items from scales that were of particular significance for their relevance as risk factors or problems associated with substance use. These items related to family conflict, unemployment and the proportion of friends who use substances from the Social Functioning Scale and suicidal ideation from the SCL-90-R.

Group differences at baseline

To determine whether or not the analyses needed to include covariates, the statistical significance of baseline differences between the study participants who were followed-up to Test 3 from the intervention and comparison groups were tested by multivariate logistic regression with backward elimination. Two models were tested, one in which the level of use of each substance was entered separately, the other in which the total Substance-Use Scale score was used. Independent variables in both models were the outcome variables: Crime Scale scores, gender, Social Functioning Scale scores, HIV Risk-taking Behaviour Scale scores, GSI (psychological distress) and Physical Health Scale scores. The model that included separate substance use scores found no significant differences between the groups on any of the predictor variables. The model with the Substance-Use Scale score produced significant results when the Substance-Use Scale score and the GSI were in the model. This model was significantly better than chance at predicting group ($\chi^2=6.6$, $df=2$, $p=.04$) and correctly predicted 66% of cases. At baseline, while there was no significant group difference in substance use ($p=.1$), GSI scores were significantly higher among the intervention group ($M=1.3$, $SD=.7$) than the comparison group ($M=1.0$, $SD=.7$) ($\chi^2=5.0$, $df=1$, $p=.02$). After adjusting for substance use, the probability of being in the intervention group increased by 2.2 for each unit increase in the GSI score. Given this baseline group difference, GSI scores at baseline was entered as a covariate in the planned analyses (below).

Planned analyses

For the **intention-to-treat** analyses, five repeated measures ANCOVAs³⁶ and one repeated measures ANOVA were planned to test for group (intervention or comparison) differences in each of the outcome measures across the three occasions of measurement. GSI (psychological distress) at Test 1 was included as a covariate because of the group difference in GSI scores at baseline, described above. The three occasions of measurement, Test 1, Test 2 and Test 3 refer to the baseline assessments, the short-term posttests and the medium-term follow-ups respectively. Main (group, occasion) and interaction (group by occasion) effects were tested. The planned comparisons are detailed below.

Occasion: If occasion was significant, the planned comparisons were:

- | | | | | |
|---------------------------------------|-----------------------------|---|----|----|
| a) short-term effect: | Test 1 compared with Test 2 | 1 | -1 | 0 |
| b) maintenance of short-term changes: | Test 2 compared with Test 3 | 0 | 1 | -1 |

Group: Planned comparisons were not necessary if group was significant as there were only two groups to be compared.

Group by occasion interaction: If the group by occasion interaction was significant, tests of linear and quadratic trend were planned.

ANOVAS and *t* tests were conducted with SPSS MANOVA and SPSS paired *t* tests. Changes in substance use were described by descriptive tables using SPSS SUMMARY statistics.

For the **dose-response** analyses, four standard multivariate linear regression (MLR) models were tested with posttest (Test 2) scores on the four outcome variables of most interest (substance use, criminal behaviour, social dysfunction and psychological distress) as continuous dependent variables, and the respective baseline scores and the number of days in the intervention as the independent variables. MLR analyses were performed using the SPSS REGRESSION procedure.

Post-hoc analyses

Subsequent, post-hoc tests were conducted to investigate the nature of the findings of the planned analyses. Analyses were conducted to explore the effect of social dysfunction on change in substance involvement (repeated measures ANCOVA); changes in items of particular interest: employment, family conflict, the proportion of friends who use substances and suicidal ideation (repeated measures ANOVA); baseline predictors of change in substance use (hierarchical multivariate linear regression); posttest correlates of change in substance use (standard multivariate linear regression); program completers compared with early leavers (repeated measures ANOVA); the intervention compared with detention (repeated measures ANOVA); and outcome including drop-outs (χ^2 for linear trend). Details of the analyses (rationales and statistical tests) are presented in the results section.

Multiple testing is commonly conducted, but can be problematic because the greater the number of tests, the higher the probability that the null hypothesis will be incorrectly rejected. There has been substantial controversy regarding when and how multiple testing should be handled.⁸² It has been argued that, under certain conditions, the risk of an inflated error rate from multiple testing is more important and needs to be addressed. These conditions include a) when the results are to be regarded as confirmatory rather than exploratory, b) when a large number of tests and data manipulations have been used to

obtain a result, and c) when serious action is likely to be taken in light of the results.⁸² Ward has argued that, if safeguards are implemented to prevent unwarranted inferences being drawn, controls for any possible inflation of the Type I error rate need not be applied.⁸³ These safeguards are to a) reduce the number and type of tests to only those that are based upon a careful consideration of the relevant research; b) report the results of all tests, whether positive or negative; and c) report the source of the hypothesis for each test, that is, whether the hypothesis was suggested by previous research, the study findings, or 'fishing' through the data set. Ward noted that most weight should be given to hypotheses generated a priori by previous research, least weight should be given to findings generated by 'fishing'. Further, Ward noted that new findings should be regarded as indicators of probable relationships in need of further confirmation. Following the arguments of Ward and others,^{83 84} adjustments for multiple testing were not made in this study, however Ward's safeguards and cautions were incorporated.

Self-assessments

Responses to the questions asking participants to give a self-assessment of changes to substance use and to 'life in general' were cross-tabulated and group differences were tested by chi-square analyses. The reported reasons for change, or lack of change, were categorised and reported descriptively.

Data preparation

The data were checked for errors and for violations of assumptions for the planned statistical tests using the guidelines of Harris for ANOVA⁸⁵ and Tabachnick and Fidell for ANCOVA and multivariate linear regression.³⁶ The data from the 88 study participants tested to Test 3 were adequate to meet ANOVA and ANCOVA's assumptions relating to independence, equal sample sizes, normality, within-cell outliers, homogeneity of variance, within-cell linearity, homogeneity of regression and reliability of covariates. During data preparation, four responses were identified as univariate outliers (z scores more than 3.29 standard deviations) and adjusted to equal 1 unit more than the next highest score:

1. Crime Scale score	Test 3	reduced from 11 to 10	comparison group
2. Crime Scale score	Test 3	reduced from 10 to 9	comparison group
3. Crime Scale score	Test 2	reduced from 15 to 10	intervention group
4. HRBS score	Test 2	reduced from 25 to 19	intervention group

The data from the 106 study participants tested to Test 2 were adequate to meet the MLR assumptions relating to normality of variables (the Crime Scale score outlier at Test 2 described above was also adjusted for the MLR); normality, linearity and homoscedasticity of residuals; multicollinearity and singularity of models; and outliers in solutions for the planned analyses. Two cautions were identified with the planned MLR for testing the dose-response relationship between the number of days in the intervention and changes in outcomes. With only 59 study participants followed-up at Test 2 and two dependent variables in each model, MLR was only able to detect large effects of individual predictors. Secondly, examination of the scatterplots to identify the normality, linearity, and homoscedasticity of residuals identified that two of the four models (predicting change in substance use and criminal behaviour) could have been weakened by heteroscedasticity.

Data were similarly checked for each post-hoc analysis to ensure their adequacy for each test.

Results

Intention-to-treat analyses

Repeated measures ANCOVAs and ANOVA were used to test for group differences in changes in the outcome domains across the three occasions of testing. Psychological distress at Test 1 was included as a covariate because of group differences in this domain (described above). The results of these analyses are presented in Table 13 and illustrated in Figures 1 to 14. The analyses identified that the study participants scores on each of the outcome variables significantly improved across occasions of testing, but there were no significant differences between the groups in these changes. There were no overall differences between the groups, except in social dysfunction: the intervention group had significantly higher levels of social dysfunction than the comparison group across the study period. These results indicated that the only contrasts that needed to be tested were the tests of changes between Test 1 and Test 2 and changes between Test 2 and Test 3.

Table 13: Results of repeated measures ANOVA and ANCOVA on outcome domains for group and occasion

Outcome variable	Source of variation	<i>df</i>	<i>F</i>	<i>t</i>	<i>p</i>
Substance use	Group	1	1.2		.7
	Covariate (GSI)			3.6	.001
	Occasion	2	48.5		<.0001
	Group by occasion	2	1.5		.2
Criminal behaviour	Group	1	.7		.4
	Covariate (GSI)			.5	.6
	Occasion	2	37.2		<.0001
	Group by occasion	2	.5		.6
Psychological distress	Group	1	2.1		.1
	Occasion	2	15.0		<.0001
	Group by occasion	2	1.7		.2
Social	Group	1	7.0		.009

Outcome variable	Source of variation	<i>df</i>	<i>F</i>	<i>t</i>	<i>p</i>
Physical health	Covariate (GSI)			1.2	.2
	Occasion	2	15.0		<.0001
	Group by occasion	2	1.7		.2
	Group	1	.02		.9
Physical health	Covariate (GSI)			7.3	<.0001
	Occasion	2	5.1		.007
	Group by occasion	2	.8		.4
	Group	1	.2		.7
HIV risk behaviour	Covariate (GSI)			2.5	.01
	Occasion	2	5.8		.004
	Group by occasion	2	0.0		.9
	Group	1			

Table 14: Changes in use of each substance between Test 1 and Test 2 (*n*=106)

Substance	Test	Level of involvement			
		0 (none)	1 (low)	3 (moderate)	5 (high)
Alcohol		No use	a. Non-daily, 5 drinks a day or b. daily, < 2 drinks a day	a. Non-daily, 5-12 drinks a day or b. daily, 2-4 drinks	a. Non-daily, >12 drinks a day or b. daily, 5+ drinks
	1	37%	8%	17%	39%
	2	43%	15%	19%	23%
		No use	Non-daily & <20 'cones' a day	a. Non-daily & 20+ cones a day or b. daily & <10 cones a day	Daily & 10+ cones a day
Cannabis	1	17%	23%	12%	48%
	2	31%	27%	14%	27%
		No use	Less than weekly use	Weekly to less than daily use	Daily use
	1	37%	5%	9%	49%
Heroin	2	61%	12%	8%	19%
		No use	Non-daily, 1-2 a day	Non-daily, 3-4 a day	a. Daily or b. Non-daily, 4+ on any day.
	1	63%	8%	8%	20%
	2	84%	8%	2%	6%
Stimulants		No use	Less than weekly	1-6 times a week	Daily
	1	55%	26%	9%	9%
	2	83%	10%	4%	3%
		No use	1-2 times in past month	1-3 times a week	4 or more times a week
Designer drugs	1	89%	5%	6%	1%
	2	95%	5%	0%	0%
		No use	1-2 times in past month	1-3 times a week	4 or more times a week
Hallucinogens		No use	1-2 times in past month	1-3 times a week	4 or more times a week

Substance	Test	Level of involvement			
		0 (none)	1 (low)	3 (moderate)	5 (high)
Inhalants	1	78%	15%	7%	0%
	2	90%	10%	0%	0%
		No use	1-2 times in past month	1-3 times a week	4 or more times a week
	1	88%	8%	3%	2%
	2	95%	5%	0%	0%

Note. Tests of the significance of the changes across occasions were not tested as the significance of the change in substance use was tested by the repeated measures ANCOVA

Paired *t* tests to test for the significance of differences between Test 1 and Test 2 results among the participants who were followed-up to Test 3 (*n*=88) verified that there were significant reductions during this period in all six outcome variables:

- substance use ($t=7.4$, $df=87$, $p<.0001$)
- criminal behaviour ($t=7.2$, $df=86$, $p<.0001$)
- social dysfunction ($t=4.2$, $df=87$, $p<.0001$)
- psychological distress ($t=4.7$, $df=87$, $p<.0001$)
- physical health ($t=2.8$, $df=87$, $p=.007$)
- HIV risk-taking behaviour ($t=3.4$, $df=87$, $p<.0001$).

Further significant changes did not occur between Test 2 and Test 3:

- substance use ($t=0.3$, $df=87$, $p=.8$)
- criminal behaviour ($t=-0.4$, $df=87$, $p=.7$)
- social dysfunction ($t=0.8$, $df=87$, $p=.4$)
- psychological distress ($t=0.6$, $df=87$, $p=.6$)
- physical health ($t=0.6$, $df=87$, $p=.6$)
- HIV risk-taking behaviour ($t=-0.3$, $df=87$, $p=.8$).

To describe the nature of the changes that were being reflected by reduced scores on the Substance-Use Scale, changes in the use of specific substances are presented in Table 14. From this table, it can be seen that the rates of high-level involvement in substance use were generally reduced by about half. High-level involvement was reduced from 39% to 23% for alcohol use, from 48% to 27% for cannabis, from 49% to 19% for heroin and from 20% to 6% for benzodiazepines. The rates of non-use of specific substances increased a small amount from 37% to 43% for alcohol, and more substantially from 17% to 31% for cannabis, from 37% to 61% for heroin and from 63% to 84% for benzodiazepines. To further illustrate the nature of changes in the Substance-Use Scale scores, changes in the average amounts of alcohol, cannabis and benzodiazepines consumed by study participants who used those respective substances at both Test 1 and Test 2 are presented in Table 15.

Table 15: Average amount of use of each substance at Test 1 and at Test 2, by study participants who had used the respective substance on both occasions

Substance	Test 1	Test 2	Units	<i>n</i>
Alcohol	13	6	Standard drinks	45
Cannabis	15	8	Cones	65
Benzodiazepines	10	6	Pills	9

Dose-response analyses

To identify whether the number of days in the residential intervention had an effect on outcome, four standard multivariate linear regression (MLR) models were tested. The dependent variable in each model was the Test 2 score on one of the four outcome variables of most interest: a) substance use, b) criminal behaviour, c) social dysfunction and d) psychological distress. The independent variables in each model were the respective Test 1 scores of the dependent variable and the number of days in the intervention. Appendix F contains details of the tests of these MLR models. The model testing for the effect of days in the intervention on substance use was not significant ($p=.4$). The models predicting change in criminal behaviour and social dysfunction were significantly better than chance at predicting the dependent variables, but only accounted for 12% of the variance. The model predicting psychological distress was significant and accounted for 34% of the variance. This model identified no significant effect of the number of days in the intervention on changes in psychological distress. In sum, the models did not identify a significant dose-response relationship. That is, no significant association was found between the number of days in the intervention and changes in substance use, criminal behaviour, social dysfunction nor psychological distress.

Change in substance involvement adjusting for social dysfunction at Test 1

The results of the planned ANCOVA tests identified that social dysfunction significantly differed between the two groups across the three occasions of testing. To check whether this difference was affecting the group comparisons, the effect of social dysfunction at Test 1 was added to the ANCOVA model that tested for changes in substance involvement over time by each group. Social dysfunction at Test 1 was not a significant covariate and did not change the findings from the planned, ANCOVA. That is, substance involvement significantly changed across time, but substance use was not significantly different between the groups across the three occasions of testing, and the change across time was not significantly different between the groups after adjusting for social dysfunction at Test 1 (Table 16).

Table 16: Change in substance use across occasions by group, adjusting for psychological distress and social dysfunction at Test 1

Outcome variable	Source of variation	<i>df</i>	<i>F</i>	<i>t</i>	<i>p</i>
Substance	Group	1	1.2		.7

Outcome variable	Source of variation	<i>df</i>	<i>F</i>	<i>t</i>	<i>p</i>
	Covariate (GSI)			3.1	.003
	Covariate (Social)			.4	.7
	Occasion	2	48.5		<.0001
	Group by occasion	2	1.5		.2

Change in items of particular interest

Unemployment, family conflict, the proportion of friends who use substances, and suicidal ideation have been identified as important predictors or consequences of substance abuse by adolescents (Chapters 2 to 3). For this reason, group differences in changes in these variables across occasions of testing were tested by univariate ANOVA with repeated measures.

Unemployment and family conflict: The intervention group had significantly higher levels of unemployment and family conflict across the three tests than the comparison group. While unemployment and family conflict significantly reduced across the three occasions of testing, there was no significant group difference in the changes over time (Figures 1-2, Table 17).

Proportion of friends who use substances: There was no significant difference between groups, across occasions, or between groups in change over time in the proportion of friends who used substances (Table 17).

Suicidal ideation: Suicidal ideation significantly reduced across the three tests. Some level of distress about thoughts of ending one's life was reported by 54% of the sample at Test 1, 35% at Test 2 and 38% at Test 3. There was no significant group difference overall, nor in the change over time (Table 17).

In sum, study participants reported significant improvements in unemployment, family conflict, and suicidal ideation across the three testing occasions. There was no such change in the proportion of friends who use substances. There were no group differences in these trends. The only group differences were that the intervention group participants had consistently higher levels of unemployment and family conflict than the comparison group participants across the three tests.

Table 17: Results of repeated measures ANOVA on unemployment, family conflict, friends who use substances and suicidal ideation for group and occasion

Outcome variable	Source of variation	<i>df</i>	<i>F</i>	<i>p</i>
Unemployment	Group	1	4.9	.03
	Occasion	2	5.9	.003
	Group by occasion	2	2.0	.1
Family conflict	Group	1	9.4	.003
	Occasion	2	4.0	.02
	Group by occasion	2	1.6	.2
Proportion of friends who use substances	Group	1	.1	.8
	Occasion	2	.3	.7
	Group by occasion	2	1.9	.2
Suicidal ideation	Group	1	.9	.4
	Occasion	2	3.8	.02
	Group by occasion	2	.6	.6

Baseline predictors of change in substance use at Test 2

Hierarchical MLR was used to identify the effect of the intervention after adjusting for the effects of other possible predictors of change in substance use at Test 2. This was done to a) determine whether study participant variables could predict outcome and b) ascertain whether or not a group difference was being masked by baseline differences between the groups. Analyses were limited to Test 1 and Test 2 data to reduce the effect of drop-out. The dependent variable was substance use at Test 2. Block 1 of IV's comprised study participant variables: gender and substance use, psychological distress, unemployment, family conflict, the proportion of friends who use substances, and criminal behaviour at Test 1. Block 2 of IV's comprised other treatment variables: detention in the 3 months prior to Test 2, community-based intervention from the juvenile justice system, community-based intervention from a health facility, non-government organisation or private agency. Block 3 was group (intervention or comparison).

After entering Block 1 (the study-participant variables) into the model, the model accounted for 10% of the variance and was not significantly better than chance at predicting substance use at Test 2 ($p=.2$). The subsequent Block, other treatment variables, reduced the adjusted R^2 from .03 to .008 and the model remained not significantly better

than chance at predicting the substance use at Test 2 ($p=.4$). Similarly, with group added as a third Block, the model was not significant ($p=.2$). In this last stage of the regression, the only variable that was significantly associated with substance use at Test 2, after adjusting for all of the variables in the model, was gender ($p=.04$). However, given that the model was not significant, little confidence could be placed in the effect of gender on the change in substance use.^a

Posttest correlates of change in substance use at Test 2

Previous research has suggested that PSUD-treatment outcomes tend to be associated with social dysfunction, criminal behaviour and psychological distress.^{10 11 86} Standard multivariate linear regression was used to test for these correlates of change in substance use at Test 2. The independent variable was substance use at Test 2. Dependent variables were substance use at Test 1, gender, and criminal behaviour, psychological distress and social dysfunction at Test 2. Group (intervention or comparison) was added to the model to check whether a group difference in the change in substance use was masked by these potential correlates of change.

The model explained 49% of the variance in the dependent variable and was significantly better than chance at predicting the dependent variable ($p<.0001$). Model statistics, B , the 95% confidence interval for B and the significance of each B are presented in Table 18. The model indicated that substance use at Test 2 was significantly associated with criminal behaviour at Test 2 and psychological distress at Test 2. After adjusting for these significant variables, substance use at Test 1, gender, social dysfunction at Test 2 and group were not significantly associated with substance use at Test 2. An inspection of the beta coefficients indicated that, after accounting for the other variables in the model, there was a .8 increase in the study participants' scores on the Substance-Use Scale for every unit increase in the Criminal Behaviour Scale score at Test 2; and there was a two-fold increase in the study participants' scores on the Substance-Use Scale for every unit increase in the GSI (psychological distress) at Test 2. In sum, substance use at Test 2 was significantly associated with criminal behaviour and psychological distress at Test 2. After adjusting for these significant variables, substance use at Test 2 was not significantly associated with substance use at Test 1, gender, social dysfunction at Test 2 nor group.

Table 18: Standard multiple regression of gender and outcome variables at Test 2 on changes in substance use at Test 2

Variables	B	95% CI	p
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^a To check whether or not gender was a significant predictor of treatment outcome, the effect of gender across the three occasions of testing was tested with a repeated measures ANOVA. As identified in the planned analyses, substance use significantly decreased across occasions of testing for both genders ($F=48.6$, $df=2$, $p<.0001$), however there was no significant gender by occasion interaction ($F=2.9$, $df=2$, $p=.06$). There was also no significant difference in substance use across three occasions of testing ($F=1.2$, $df=1$, $p=.3$).

Substance use Test 1	.05	-.08	-	.18	.4
Gender	-1.2	-2.6	-	.3	.1
Crime Test 2	.8	.5	-	1.1	<.00001
Psychological distress Test 2	2.1	.8	-	3.3	.002
Social dysfunction Test 2	.07	-.04	-	.2	.2
Group	.1	-.07	-	.2	.9

Note. Multiple $R=.70$; $R^2=.49$; Adjusted $R^2=.46$

Program completers compared with early leavers

The effect of the number of days in the intervention on outcome was tested with a null result (above). It was possible that the null result was caused by the bimodal distribution of the number of days in the intervention (Figure 8). As a check on the effect of length of stay in the intervention on outcome, a repeated measures ANOVA was used to compare changes in substance use across the three tests between program completers (study participants who spent more than 11 weeks in the intervention) and early leavers (study participants who left in the first 10 weeks of the intervention). The results of this analysis were consistent with the previous analyses of dose-response. There was a significant reduction in substance use across the three testing occasions ($F=13.7$, $df=2$, $p<.0001$) and there was no significant difference between program completers and early leavers in substance use across the testing period ($F=2.9$, $df=1$, $p=.1$) nor in the change over time ($F=.2$, $df=2$, $p=.8$). These results confirmed that the length of stay in the intervention did not significantly affect changes in substance use.

The intervention compared with detention

There has been some interest in the value of detention for people with a PSUD and many view detention centres as nontherapeutic.⁸⁷ One of the main alternatives to the intervention was detention: 34% of the comparison group went to detention in the 3 months prior to Test 2. Comparisons between detention and the intervention were additionally pertinent because both were residential interventions. Consequently, comparison group participants who went to detention in the 12 weeks prior to Test 2 (the ‘detention’ group, $n=16$) were compared with the intervention group participants who did not go to detention in the 12 weeks prior to Test 2 (the ‘intervention_(no-detention)’ group, $n=55$). The detention group had higher substance involvement scores across the three tests, and different trends in substance involvement across the three tests to the intervention_(no-detention) group (Figure 1, Table 19). The MANOVA test of the quadratic trend identified a significant difference between groups ($F=4.3$, $p=.04$). While the detention group had higher substance involvement scores than the intervention_(no-detention) group at Test 1 ($t=3.2$, $df=58$, $p=.002$), it decreased those scores at a greater rate than the intervention_(no-detention) group to reach equivalent substance use at Test 2 ($t=.1$, $df=58$, $p=.9$) and Test 3 ($t=1.5$, $df=58$, $p=.1$).

Table 19: Change in substance use across time by the intervention group participants who did not attend detention ($n=55$) and comparison group participants who went to detention ($n=16$)

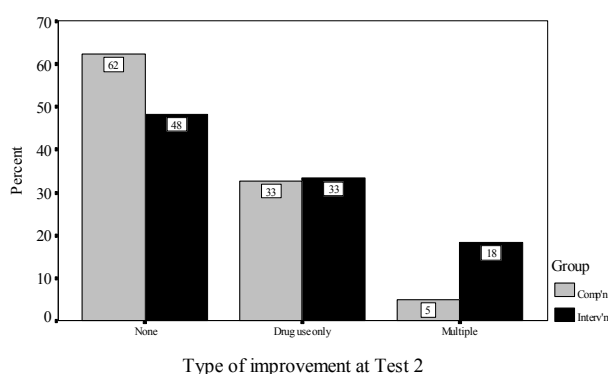
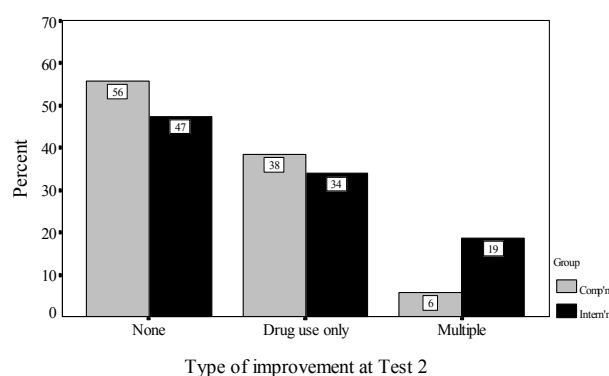
Outcome variable	Source of variation	<i>df</i>	<i>F</i>	<i>p</i>
Substance use	Group	1	6.2	.02
	Occasion	2	34.2	<.0001
	Group by occasion	2	3.7	.03

Outcome including drop-outs

As described above, there was significantly more loss to follow-up among the comparison group than the intervention group, and those who were lost to follow-up were significantly more likely to have been using heroin at Test 1 than those who remained in the study. This differential drop-out could have affected the outcome results for the two groups. Given that the best predictor of heroin use at Test 2 was heroin use at Test 1, it is likely that the effect of the differential drop-out was to artificially improve the outcome results for the comparison group.

Two methods were used to incorporate data from study drop-outs. The more conservative method was to score the study participants for whom a negative outcome was definitely known as 'not improved'. This was those who died, remained in detention, admitted to a psychiatric unit or 'on the run'. The less conservative method, based upon a method used elsewhere,⁸⁸ was to designate all drop-outs as 'not improved'. This method assumed that, if participants could not be or did not want to be followed-up, they were likely to have been involved in substance abuse. Test 1 and Test 2 data were used to rate the intervention and comparison group participants as having a) not improved, b) reduced substance use only, or c) multiple improvements. Multiple improvements were identified by reduced substance use plus reduced criminal behaviour, psychological distress and/or social dysfunction.

With the conservative method of rating drop-outs, the intervention group participants were more likely to report multiple improvements than the comparison group (Figure 1), but this difference was not statistically significant ($\chi^2=2.5$, $df=1$, $p=.1$). With the less conservative method of rating all drop-outs as 'not improved' (Figure 19), the Mantel-Haenszel test for linear association indicated that the intervention group participants had significantly better outcomes than the comparison group ($\chi^2=4.7$, $df=1$, $p=.03$).



Self-assessment

Most of the participants (71%) reported that their substance use had improved since the first interview, 17% reported that it had worsened and 12% reported that it had stayed the same. A smaller majority (63%) felt that their life in general had improved, 15% felt it had worsened and 22% felt that it had stayed the same. There were no significant differences between the intervention group and the comparison group in these patterns of responses ($p > .05$).

The main reasons given for positive changes in substance use related to family support, support from friends, staying away from substance-using friends, involvement with education or employment, the negative consequences of substance abuse, and intrapersonal factors. Intrapersonal factors included 'willpower', not wanting to use anymore ('sick of using', 'had enough'), and realising the need for change ('can't go on the way I was'). The negative consequences of substance abuse included psychological problems, lack of money because of using all resources to buy substances, detention, and being unable to live with family because of substance use. The intervention group participants usually mentioned the intervention as a contributing factor. Those who did not mention the intervention were asked if the intervention had helped, and most study participants said that it had done so. Data on prompted versus unprompted mention of the intervention was not reliably recorded. The intervention group participants were asked what particular aspect of the intervention helped them. The most common responses were the skills training and the time out. Study participants who reported that their substance use had increased tended to cite association with substance-using friends as the main cause.

Cost of the intervention relative to detention

The cost per day per client and the staff:client ratios in the intervention and in detention were investigated because detention was one of the main alternate interventions experienced by the comparison group participants. The average number of study participants per day in the intervention was 5.6 (2,064 study participant-days in 1997 divided by 365). The number of staff dedicated to the intervention was 13.5: seven residential-care workers, one skills trainer, one family therapist, one case manager, one clinical coordinator, one administrative officer, half of a chief executive^a, one administrative/accounting officer. The ratio of study participants to staff and the cost per study participant per day in the intervention and in detention are presented in Table 20.

On the basis of the information available, it appears that the intervention had a higher number of staff per study participant than detention, but was less costly per client per day than detention. The costs of and number of study participants in the intervention in 1997 represented costs and study participant numbers during a period in which staff positions were often unfilled due to lack of funding and beds were left empty because of the lack of staff to run the intervention. Subsequent costings of implementing the intervention have indicated that about \$750,000 per annum is required to implement the intervention. If eight beds are filled 365 days per year, the number of client-days would increase to 2,920, so the cost per day with full funding and full beds could be \$257. This amount is identical to the actual amount experienced during 1997, suggesting that the number of study participants was decreased proportionately with funding.

Table 20: Costing comparison between the intervention and detention

Item	The intervention	Detention
Clients/detainees per FTE operational staff	.4	1.6
Cost per study participant per day	\$257.32	\$316.00

Discussion

The results set out above indicate that the study participants improved on all of the outcome variables between pretreatment (Test 1) and 6 months later at posttreatment (Test 2) and this improvement was maintained 4 months later at follow-up (Test 3). The study participants reported reductions in substance use, criminal behaviour, social dysfunction (including unemployment and family conflict, but not the proportion of friends who use substances), psychological distress (including suicidal ideation), HIV risk-taking behaviours and physical health symptoms. The reductions in substance use were substantial. For example, between Test 1 and Test 2, the prevalence of smoking 10 or more cones of cannabis a day reduced from 48% to 27%, daily heroin use reduced from 49% to 19%, daily or binge use of benzodiazepines reduced from 20% to 6%, and high level drinking was reduced from 39% to 23%. Among those who continued to use substances between Test 1 and Test 2, the amounts of use were reduced by approximately half. Study

^a Half of the Chief Executive's time was allocated to the intervention because approximately half of this position's time was devoted to other organisational activities.

participants who drank alcohol reduced the average number of drinks from 13 to 6, cannabis smokers reduced the average number of cones from 15 to 8, and benzodiazepine users reduced the average number of pills from 10 to 6.

There was no significant difference between the intervention and the comparison group in these changes across time, even when adjustments were made for possible confounders (particularly psychological distress and social dysfunction). This finding was consistent with the research literature on treatment outcome as reviewed in Chapter 5: Exposure to treatment is generally associated with improved outcome, across a variety of types of treatment.^{46 48} However, there was a significant difference in drop-out between the two groups which was likely to have biased the results in favour of the comparison group (discussed below). One method of dealing with this problem used by similar studies has been to classify drop-outs as treatment failures.⁸⁸ Study participants' change scores were used to classify study participants as 'not improved', 'substance use reduced', or 'multiple improvements'. Multiple improvements were defined as a reduction in substance use plus a reduction in criminal behaviour, psychological distress, and/or social dysfunction. When study drop-outs were rated as 'not improved', the intervention group participants were significantly less likely to report no improvement and more likely to report multiple improvements than comparison group participants. This analysis of improvement is not sufficient basis for claiming that the intervention definitely produced superior outcomes relative to usual care. It cannot be assumed that all drop-outs were treatment failures. It does, however, provide a basis for doubt about the findings that the intervention group participants and comparison group participants had equal outcomes.

The internal validity of a study relates to the confidence with which one can infer that relationships between variables are causal or the lack of relationships implies the absence of cause.⁵¹ Cook and Campbell have described multiple possible threats to the internal validity of a study.⁵¹ In consideration of the multiple threats described by Cook and Campbell, possible reasons for the improvements by both groups and for the lack of difference between the intervention group and the comparison group on the outcome domains are explored below.

Reasons for improvements

The baseline data for the study sample had suggested a poor prognosis (Chapter 12). The sample had high scores on the Severity of Dependence Scale, half of the sample was using heroin on a daily basis, half were binge drinking an average of 18 standard drinks on drinking days, most of the sample were smoking cannabis on a daily basis, an average of 16 cones were consumed on each day that they smoked. Relative to samples of adults with substance dependence problems, this adolescent study sample had high rates of crime, social dysfunction and physical health symptoms. Relative to adolescents in the general population, this treatment sample had very high levels of psychological distress, with about half of the females and a quarter of the males identified as 'cases' by the Symptom Checklist 90 (Revised).²⁷ Given the severity of substance use and related problems, the amount of change was impressive. The overall improvement could have been due to a number of factors, including the combination of interventions, regression to the mean, the timing of posttests and follow-up assessments, natural recovery, maturation, self-managed change, history, testing, exaggeration of problems prior to program entry and the effects of social desirability. These factors are described and discussed below:

The combination of interventions: The combination of positive influences such as exposure to interventions, support from family and friends, and involvement in education

or employment could have, collectively, assisted the study participants to manage their substance use. Most study participants received multiple interventions and study participants could have self-selected the interventions that best suited them.

Regression to the mean: Test 1 was conducted when the study participants were in crisis, applying for an intensive, residential PSUD-treatment program. Variables that are measured at such a time tend to moderate towards the mean of the population from which the sample were drawn over time.⁵¹ This artefact could have caused the scores to abate.

The timing of posttests and follow-up assessments: Study participants were sometimes unable to be followed-up when (and because) their substance use was substantial and problematic. Some of these study participants were later interviewed when their substance use 'settled down', so they reported lower levels of substance use than they would have reported if the posttest or follow-up had been conducted on the scheduled date. The size of the effect of such substance-use-related delays in posttests and follow-up assessments is not known. However, from comments made by study participants, this was a factor in the reduction of some scores.

Natural recovery: Substance abuse problems among adolescents might tend to be short-lived and naturally reduce over a short period of time. However, the scores on the SDS and the frequency and quantity of substance use suggested that the sample was substance dependent and substance dependence is known to be a chronic, relapsing disorder generally characterised by compulsion, loss of control and continued use despite adverse consequences.²⁹ Furthermore, longitudinal studies of substance abuse and delinquency among adolescents suggest that most adolescents with significant problems do not simply recover within a few months.⁸⁹⁻⁹² The chronic nature of dependence would make natural recovery an unlikely reason for the treatment outcomes found by the study.

Maturation: Changes in test scores can result from study participants growing older, wiser and more experienced. Perhaps the study participants matured between Test 1 and Test 2 and, in this process, developed the skills to deal with their PSUD problems. As argued above in the context of natural recovery, the chronic nature of PSUDs makes maturation an unlikely reason for the positive outcomes, particularly in the relatively short period of time between Test 1 and Test 2 ($M=6$ months).

Self-managed change: This term refers to achievement of a positive outcome without the assistance of a treatment intervention. The study participants might have simply decided it was time to change and used their own resources to achieve this change. Many of the study participants gave such reasons for changes in their substance use at the follow-up interview. However, it is possible that some of those who reported that they achieved change on their own were failing to recognise the importance of other factors such as interventions, sources of support and life events.

History: Changes in substance use and associated problems could have been the result of historical changes such as a reduction in the availability of substances, an increase in youth employment opportunities, changes in the education system to attract and retain adolescent substance abusers, or changes in family functioning due to a state-wide program to improve family functioning. The effect of such historical artefact is unlikely, however, as no such changes were noted during the study period. In fact, the only change was perhaps an increase in the supply of heroin and the use of heroin by young people in New South Wales.¹³

Testing: The attention received during assessment could have been sufficient to highlight the study participant's problems and motivate the study participants to address those problems.

Exaggeration of problems prior to program entry: It is possible the adolescents applying for the PSUD-treatment program were exaggerating their substance use and other problems to ensure entry to the intervention. If this was the case, and there was no motivation to exaggerate at Test 2 and Test 3, then the result would have been an artificial treatment effect. However, previous research on the reliability of pretreatment reports of substance use by adolescents contradicts this suggestion.^{93 94} In particular, Stinchfield found that the pretreatment reports of adolescents were significantly lower than the retrospective posttreatment reports.⁹⁵ Stinchfield was not able to identify the cause of the discrepancy, but concluded that underreporting prior to treatment could be attenuating measures of treatment effects. On the other hand, the research cited above was conducted in the US where different factors might influence people seeking treatment for a PSUD. Aiken suggested that minimising problem severity could have been due to the applicants' perceptions that this would increase their chances of obtaining a place in the treatment program. In contrast, adolescents applying for the intervention from this study and their referrers appeared to perceive that they needed to be demonstrate that they were in great need to compete for a place in the intervention.

Social desirability: This refers to bias from study participants falsely answering questions to give a socially desirable impression. Study participants could have wanted to demonstrate that they were improving on the outcome variables at Test 2 and Test 3. Intervention group participants could have been motivated to give the impression that they had improved out of a sense of loyalty to the intervention. In addition, all participants could have wanted to give the impression that they had improved for other reasons, for example, for fear that the researcher would pressure the participant to seek professional assistance for their problems when the participant was not ready to do so, or out of embarrassment at not having managed the problems presented at Test 1.

Comment: The study could not conclusively identify the reasons for change across time. Previous research has identified that treatment does produce positive outcomes for adolescents with a PSUD, regardless of the type of treatment.⁴⁸ Furthermore, studies of youth who have received no or minimal treatment have reported substantial reductions in substance use between pretest and posttest or follow-up.^{96 97} It is likely that a combination of factors such as those described above contributed to the change.

Reasons for lack of group differences

Of particular concern to the study was the lack of group difference in changes in the outcome variables. The failure to find significant group differences is unlikely to be related to low statistical power because sample size and power calculations identified that 40 study participants per group provided sufficient power to detect a moderate group difference and the study sample contained 51 intervention group participants and 37 comparison group participants at Test 3 and more than this number at Test 2. The lack of group differences could have been because adolescents with PSUD will improve whether or not they receive an intervention. Given that most of the study participants received at least one type of intervention, it could mean that all of the interventions are equally effective. The following alternate explanations are discussed below: program implementation, selection bias, equalisation of interventions, diffusion of innovation, compensatory equalisation of treatments, exposure to the intervention, and mortality.

Program implementation: It is generally recommended that an outcome evaluation does not commence until it has been established that the 'management basics' are in place⁷⁵ and the intervention is being satisfactorily implemented.^{76 77} The assessment of the

implementation of the intervention indicated that the intervention was not fully implemented. In particular, there was very little after-care and the family program was not completely implemented. Also, staff positions were often unfilled and staff tended to have insufficient experience, training and supervision to implement the intervention as well as possible. Furthermore, program protocols tended to be not well documented. The evaluation commenced within 1 year of the beginning of the intervention implementation, before adequate funding could be obtained and protocols and resources could be developed. Problems with program implementation were not unique to this intervention: Studies of the implementation of PSUD-treatment programs in the US have identified that 'best-practice' is often not implemented.⁹⁸⁻¹⁰⁰ Despite the problems with program implementation, there were indications that the intervention was implemented sufficiently to have some positive benefit. For example, self-report by the intervention group participants and the assessments by the intervention's clinical staff suggested that the intervention was helpful.

Selection: An effect (or lack of effect) can be caused by differences in group composition. Study participants were not randomly allocated to the intervention or comparison groups. All study participants had applied to enter the intervention, but about half chose to not come when a place became available. The study participants in both the intervention and the comparison groups could have been self-selecting the most effective intervention for their individual needs. Those who did not come to the intervention might have had less need or have had better alternatives (for example, a more supportive home environment) than those who came to the intervention. Some evidence for selection bias was provided by analyses that identified that the intervention group suffered more psychological distress than the comparison group participants at Test 1, and had greater social dysfunction than the comparison group across the three tests. However, there were no significant differences found between the two groups on the majority of baseline measures.

Equalisation of interventions: When study participants who do not receive the intervention seek and/or receive alternate treatments, the effect of the interventions received by the two groups can be equivalent. Between Test 1 and Test 2, nearly 80% of the comparison group and nearly half of the intervention group received some other intervention. Other interventions included detention, and community-based interventions such as counselling and detoxification. While a 'no-treatment' comparison group was not planned, the extent of interventions received by the comparison group was substantial. The intervention group received many of the same interventions the comparison group received, so that the treatment experiences of the two groups overlapped. The intervention was one of many interventions to which the study participants were exposed, so it would have had to have been very potent to have had an additional effect.

Diffusion of innovation: The study participants tended to know each other because they often attended the same services, including detoxification programs, detention, and refuges. It is possible that information and skills acquired by intervention group participants during their participation in the intervention were shared with comparison group participants, thus reducing group differences. Given the importance of peers as a source of information relating to substance use, diffusion of innovation was feasible. However, the information, skills, and support provided by the intervention were probably too complex to be easily transferred to comparison group participants. Furthermore, the study participants were widely dispersed (mostly around New South Wales), so contact opportunities for diffusion of innovation to occur were minimal.

Compensatory equalisation of treatments: The research upon which the intervention

was based (Chapters 1 to 10), and the intervention plan (Chapter 11), were published as a National Drug and Alcohol Research Centre Monograph and available to other programs during the study period.¹ Hundreds of copies of this monograph were purchased and distributed during the study period. It is likely that other programs changed their practices in a way that reduced the difference between those programs and the intervention. In fact, a brochure publicising a new, short-term residential PSUD treatment program for adolescents attended by many study participants stated that the new program was based upon the background research to this study. Such changes could have minimised the difference between the intervention and other interventions.

Exposure to the intervention: If study participants are not adequately exposed to an intervention, a treatment effect is unlikely to be achieved.¹⁰¹ Those who came to the intervention tended not to stay for the full 12 weeks, so the intervention group tended to not receive the full 'dose' of the treatment. The average length of stay during the study period was 7 weeks; half of the study participants stayed less than 5 weeks; 31% stayed 11 weeks or more. Early departure from PSUD-treatment programs is not exclusive to the intervention. Early departure from residential treatment has been found to be the rule rather than the exception for adults¹⁰² and for adolescents.⁷ A significant association between the time spent in the intervention and outcome would have supported the notion that failure to receive a full 'dose' of the intervention affected the study's ability to detect a treatment effect. However, contrary to previous research,¹⁰¹ such an association was not found. It is possible that short stays were effective for some study participants, particularly as efforts were made to refer study participants to other services when they left the intervention. Clients and staff in this study reported that even a short period of time out from the normal environment was sometimes beneficial, for example, giving the study participants an opportunity to make decisions about their lives. This is consistent with Toumbourou's evaluation of a therapeutic community, in which staff and study participants did not indicate that program length was the most significant factor in outcome.¹⁰³ Furthermore, nearly half of the intervention group participants received other interventions between the pretest and the posttest, perhaps compensating for shorter stays in the intervention. Another possible reason for a lack of association between length of stay and treatment outcome was a 'floor effect'. Research has identified that a treatment duration of 3 months or more has predicted improved outcome.¹⁰⁴ However, nearly all of the intervention group stayed in the intervention for less than 3 months, before such an effect could be measured. Without a controlled trial of the effect of length of stay in the intervention, it is difficult to determine whether greater exposure to the intervention would have produced better outcomes. In sum, failure to stay for the full 12 weeks of the intervention, let alone receive after-care, might have diluted the treatment effect of the intervention, however the effect of this possible confounder is equivocal.

Mortality: This refers to differential drop-out between the study groups. Study participants from the comparison group were less likely to be followed-up, and those who were less likely to be followed-up were more likely to have been using heroin on a daily basis at baseline. Previous research has identified that study participants who are more difficult to follow up tend to have worse treatment outcomes than study participants who are easier to find.^{58 59} The Food and Drug Administration research guidelines,¹⁰⁵ cited by McLellan and colleagues,⁴⁹ have recommended a minimum of 70% contact at follow-up as lower follow-up rates are likely to overestimate the effect of an intervention. Given that the follow-up rate at Test 3 for the comparison group was 61% and the best predictor of heroin use at Test 2 was heroin use at Test 1, it is likely that differential drop-out was a significant

source of bias, making the comparison group appear artificially ‘better’ than the intervention group at follow-up.

Summary: In sum, there were a number of factors that diluted the possible effect of the intervention (for example, less than optimal program implementation; high levels of exposure to other interventions for all study participants, especially comparison group participants; and low exposure to the intervention for the study participants in the intervention group) and reduced the equivalence of the groups in a manner that improved the outcome results for the comparison group (for example, selection bias and differential drop-out). Even if a randomised controlled trial had been implemented, the factors that diluted the possible effect of the intervention and differential drop-out would still have affected the results. It is possible that, if each of these factors were addressed, that the intervention group participants could have had a significantly better outcome than the comparison group participants. In fact, in light of the nonequivalence of the groups, it is reasonable to conclude that the intervention achieved outcomes that were equivalent to the outcomes achieved by the rest of the service system, and it achieved this with a more difficult group.

Other findings

The study provided an opportunity to explore the predictors and correlates of outcome. The model used to predict outcome, using baseline characteristics, could account for only 10% of the variance and was not significantly better than chance at predicting outcome. Gender and pretreatment levels of involvement in substance use, psychological distress, unemployment, family conflict, the proportion of friends who use substances, and criminal behaviour were not significantly predictive of changes in substance use at posttest. Given the high rates of problems among the study group (Chapter 12), the lack of association could have been a ceiling effect. That is, levels of problems were high among the whole group so that there was not the range in the predictor variables to detect any effects.

The model used to test for correlates of change in substance use at posttest accounted for half of the variation in scores and identified that gender and social dysfunction at posttest were not associated with changes in substance use. After adjusting for these nonsignificant variables, criminal behaviour and psychological distress at posttest were positively correlated with changes in substance use at posttest. This result was consistent with other studies that have found associations between psychological distress¹¹ and criminal behaviour¹⁰⁶ and substance use.

The lack of association between changes in substance use at Test 2 and social dysfunction at Test 2 was unexpected, given a) the study participants' reports of the importance of education, employment, family and friends on substance use; and b) previous research that has found associations between positive treatment outcome and support from parents, increased association with prosocial peers, decreased association with substance-using peers, improved functioning in school and recreational settings as well as improved emotional functioning.¹⁰⁷⁻¹⁰⁹ Given that the Social Functioning Scale in the Opiate Treatment Index was developed with adults, it is possible that such associations could not be found because the scale was not sufficiently sensitive to social functioning among adolescents.

In sum, pretreatment participant variables were not helpful in predicting outcome, perhaps because of high rates and severity of problems across the whole sample. Correlates of posttreatment substance use concurred with previous research in the association between substance use, criminal behaviour and psychological dysfunction.

Implications for the intervention

Even allowing for the lack of between-group differences in changes in individual outcomes, information from the evaluation study suggests that the intervention was an effective program. Multiple improvements were significantly more prevalent in the intervention group. Clients reported that the intervention assisted them to manage their substance use, citing the ‘time-out’ and the skills training as particularly helpful. The clinical assessments of the impact of the intervention indicated improvement on risk factors such as interpersonal skills (for example, assertiveness, conflict resolution), intrapersonal skills (for example, mood management, decision making), relapse prevention skills, and dealing with family issues. The intervention was associated with significantly less use of other services, suggesting that it was not duplicating service provision. The intervention appeared to be less expensive and to have a higher staff:client ratio relative to the other main residential option, detention.^a The intervention plan was based upon substantial research and consultations suggesting that the intervention logic was good. Reviews of the literature relating to the nature and treatment of adolescents with a PSUD written since the intervention plan was written have reached equivalent conclusions about the need for multimodal interventions to address the multiple risk factors and consequences of substance abuse.⁷³ The infrastructure and some resources (for example, the group skills manual) have been developed by the intervention. In sum, there are indications that the intervention plan was valid and that the intervention was effective, but there are areas for improvement (below) that, if addressed could result in better outcomes for clients of the intervention. The main problems with the intervention related to program fidelity, client retention, preparation for re-entry to the community, overreliance on the residential phase of treatment and lack of after-care. These interrelated areas are discussed below.

Program fidelity: Research has demonstrated that program fidelity affects outcome.¹¹⁰ The implementation study identified that program implementation was variable and often deficient.^b Some particular problems included a lack of after-care (discussed below), insufficient family-based interventions, ineffective management of clients within a residential setting, variable implementation of program components such as assessment and the recreation program and a lack of program monitoring and evaluation mechanisms. Some suggestions for improving program implementation are provided below.

Program fidelity is enhanced by procedures being clearly documented and correctly implemented,¹¹⁰ Detailed, research-based protocols for each component of the intervention, for example, case management,^{111 112} including assessment,³³ could assist program fidelity.

Effective therapist characteristics and staffing patterns can improve program effectiveness.¹⁰⁰ For example, appointment of specific staff members to manage each component of the intervention, in particular, case management, the recreation program and the skills-training program could improve the quality and effectiveness of each program

^a The level of detail in information required to assess costs was not available from the Department of Juvenile Justice, so the validity of the cost comparison with the intervention is not known. Items included in one budget might not have been included in the other budget.

^b It is noted that program implementation was particularly affected by inadequate funding. An increase in funding has been obtained since the study period and this should facilitate program implementation.

component.

Further, strategies to improve the ability of staff to effectively manage adolescents in a residential environment and implement the intervention components could be developed and implemented. While the intervention's management recruited the best available staff, more attention to staff requirements and staff supervision and training might be helpful. As has been found in the USA,⁹⁹ there is not a large pool of qualified people to work effectively with this difficult client group, so the organisation needs to put significant resources into creating and maintaining an effective staff team. The need for regular and frequent supervision and training of staff had been identified as an important component of an 'ideal' service by service providers consulted for this study (Chapter 8).

A particular issue for the management of the client group of adolescents with a PSUD in a residential environment related to managing problem behaviour. There was a tendency during the study period to use punishment to manage the behaviour of intervention-group participants and to discharge those who continued to act inappropriately. The use of psychosocial strategies to engage clients and encourage appropriate behaviour is essential for engaging and retaining clients in treatment, as well as encouraging positive changes in client behaviour.² Simpson has identified a range of strategies and resources to assist staff in this area, including the use of contingency-management techniques using tokens¹¹³ or recreational and leisure activities¹¹⁴ to encourage compliance. While these strategies were developed with adults, the psychological principles upon which they were based are applicable to adolescents. For example, Kellam successfully modified the aggressive behaviour of adolescents in a classroom setting.¹¹⁵

Consideration might also be given to the qualifications required for the implementation of specific tasks. For example, cognitive-behavioural skills training requires skills in teaching adolescents, knowledge of the psychological principles underpinning the activities and an understanding of adolescent and PSUD issues. Residential care workers did not appear to be able to effectively coordinate and conduct educational and skills-training groups. It is recommended that a suitably qualified and experienced professional be employed to manage and lead the education and skills-training groups. Similarly, case management, the substance-free recreation program, and after-care need to be coordinated by suitably qualified staff.

The effectiveness of programs has been positively associated with ongoing program improvement based upon systematic program evaluation.¹¹⁶ The development of process and impact evaluation mechanisms that can inform ongoing program development could improve the quality and effectiveness of program implementation.

Client retention: The majority of intervention group participants left prior to the intervention period of 12 weeks. Length of time in treatment has been consistently associated with treatment outcome.^{101 117} The short length of stay in the residential program was quite likely to have negatively affected treatment outcome for intervention group participants. Client retention has been found to be positively associated with factors such as motivation to change,¹¹⁸ involvement of family^{88 119} and significant others¹²⁰ in treatment, accessibility of the service,¹²¹ clients feeling that staff want them to stay,¹²² and counselling sessions that reduce anxiety about treatment and strengthen commitment to change.¹²⁰ It has also been proposed that client retention could be improved if programs were more 'adolescent friendly'.¹²³ This could mean making the residential program more fun (for example, more outdoor activities), and ensuring that staff are able to engage positively with adolescent clients. Behaviours and qualities that have been found to assist

engaging youth in helpful relationships include having a sense of humour, using nonthreatening behaviour, maintaining consistent limits, being friendly, being a good listener, being able to play, honesty and being able to identify what is needed ('being in tune').¹²⁴ It is recommended that attention be given to such factors. For example, given that the setting of the treatment facility is a residence in an urban area, more weekend trekking and camping trips could provide a respite from the cognitive and emotional work done during the week.

Preparation for re-entry to the community: There is a number aspects of preparing for re-entry to the community that are important for adolescents in PSUD-treatment programs. These include considering what the adolescent will do after treatment and who will support the adolescent in the community. Engagement in an educational-vocational program is an important aspect of preparing for re-entry to the community for adolescents with a substance-use disorder. Substance abuse by adolescents has been found to negatively impact educational-vocational performance in adult life, particularly for males.¹²⁵ Friedman and Glickman studied 30 PSUD-treatment programs for adolescents to identify program characteristics associated with successful outcomes. Having a special school for school drop-outs and vocational services were among the intervention elements associated with reduced substance use.¹²⁶ Furthermore, effective functioning at school has been associated with maintenance of positive outcomes after a PSUD-treatment program.¹²⁷ Consistent with this research were the self-reports of some study participants that involvement in education or employment had assisted them to manage their substance use. Involvement in education and employment provides meaningful activity to replace substance use behaviours, a sense of purpose, and an opportunity to meet non-substance-using peers. It is acknowledged that achieving educational or employment goals after treatment is a difficult task. Spear and Skala have suggested that posttreatment services need to be timely and intense so that clients can experience success in this area.¹²⁸ However, with some notable exceptions, the intervention rarely conducted vocational assessments or worked actively with clients to organise and support education or employment.

Another factor that study participants reported as helpful in assisting them to manage their substance use was the support of family and non-substance-using friends. The intervention usually employed at least one family therapist to work with families and assist clients with family issues. However, the geographic distance of families from the intervention site and limited resources limited the extent to which families could be engaged in the treatment process. Negligible effort was made to assist intervention group participants to extend their friendship networks. Skills in making and maintaining non-substance-using friends can be incorporated in the skills-training groups and strategies for making new friends, for example, joining sports teams, can be explored and trialed while clients are in the intervention. Again, the distance of the clients' communities from the intervention site made this a difficult task. Another possible source of support within the community that could be worth exploring is the use of mentors. Mentors are people from the adolescents community, not necessarily related to the adolescent, who can support the adolescent in the community on a regular basis. This could include taking the adolescent out for recreational activities and providing nonjudgmental support. The use of mentors has been used in the NSW juvenile justice system and overseas. While there is sparse evidence for the effectiveness of mentors, it is possible that they could be a source of culturally appropriate and geographically close support for adolescents dealing with a PSUD.¹²⁹

Another aspect of re-entry to the community is the notion of feeling a part of

society, rather than alienated from society.¹³⁰ An outcome study of a multifaceted PSUD-treatment program for adolescents was conducted by Dobkin and colleagues.¹¹ This study identified that a sense of alienation increased the likelihood of early departure from the intervention; and reduced substance use following treatment was significantly associated with identification with middle-class values. While identification with middle-class values is not synonymous with societal connectedness, it is an indicator of connecting with society. Eckersley has written extensively on how social detachment and alienation have contributed to problem behaviours including substance abuse.¹³¹ Eckersley has described how societal factors such as increased inequality, disadvantage, unemployment and society's failure to provide an adequate cultural framework of values, hope, meaning, purpose and belonging have increased distress, alienation and problems such as suicide and substance abuse. From Eckersley's perspective, society needs to change to accommodate individuals. In the meantime, however, the feeling of societal alienation in adolescents with a PSUD needs to be addressed. As discussed, associating with prosocial peers and engagement in education, employment or community activities might assist this process.¹³²

The role of residential treatment: Given a) that evaluation studies have not demonstrated any superiority of residential treatment over nonresidential treatment;^{133 134} b) the importance of environmental factors such as family, friends, school, and employment;¹³⁵ and c) evidence that long-term, nonresidential treatment provides superior outcomes to short-term residential treatment for adolescents with relatively more severe social lifestyle problems, family problems, employment problems and psychiatric problems; there have been calls for less restrictive forms of treatment for adolescents with a PSUD in their natural environment.⁴⁶ On the other hand, reports from the intervention group participants and clinical staff identified that time-out from the natural environment were beneficial, at least for the early stages of treatment and particularly for clients who came from particularly dysfunctional environments. Further, residential treatment is a means of making treatment accessible for clients from remote areas, unable to access local services and some clients of the juvenile justice system who require 24-hour supervision. On balance, retaining residential treatment is likely to be useful for some clients, at least for a short period. However, greater effort is required in the client's natural environment. In fact, it is recommended that the residential stage of the intervention be regarded as the beginning, not the end of treatment.

After-care: Price reviewed the literature on best practice in nonresidential PSUD-treatment and concluded that substance dependence is a chronic condition so treatment needs to be continuous, with a focus on relapse prevention, and actively initiated by the treatment service.¹⁰⁰ In particular, research evidence has indicated that after-care is associated with improved treatment outcome for adolescents with a PSUD.^{128 136} After-care includes a range of individual and group activities to provide booster-sessions for the skills learnt during treatment, social support and case management.¹³⁷ The intervention was particularly thwarted in attempts to provide after-care because of the geographical distance of most of the intervention group participants from the intervention site. There is no simple answer to this problem. However, some options are suggested below:

- The intervention staff could follow-up clients by telephone and travel regularly to their homes or communities to provide ongoing support and assistance. Such an option would be very expensive, requiring significant resources in staff time and travel costs.
- After-care could be contracted out to other services. Unfortunately, to date, this has not been successful as there has been a lack of other services to provide the after-

care required.

- The intervention could work with only one or a small number of local communities. This would reduce the reach of the intervention, but would allow for better quality of service to those who stay within specified communities.
- Satellite programs could be established regionally to provide nonresidential services and after-care for clients. This is an expensive option, but it is likely to be an effective option as it increases service provision to the rural communities, not just to clients of the intervention.

In sum, the intervention was evaluated during an early period of its development. The model of multiple interventions to address multiple problems associated with a PSUD was consistent with other reviews of this literature, supporting continued commitment to the intervention plan.^{8 49 138} However, program fidelity needs to be addressed to maximise the potential benefit for clients.

Conclusion

In conclusion, the intervention group participants did significantly improve, clinically and statistically. It is possible that the failure to detect a difference between the intervention group and the comparison group was due to a number of factors that diluted the possible effect of the intervention and reduced the equivalence of the groups, or that the intervention and usual care exerted equivalent effects through the same or different mechanisms. The intervention plan of multiple interventions to address multiple problems is consistent with current opinion on best practice, and improved implementation of the intervention is likely to improve the outcome.

Chapter 14. Discussion

Introduction

The aim of this research was to increase knowledge of the nature and treatment of PSUDs among adolescents. Between 1994 and 1996, information was collected by literature review and original research. This information was used to design a new intervention which was then implemented and subjected to an outcome study between 1997 and 1998. Chapters 1 to 3 contained reviews relating to the epidemiology of substance abuse by adolescents: the prevalence of abuse; the types of substances used; and the risk factors, correlates and consequences of substance abuse. Chapter 4 explored the characteristics of adolescents with a PSUD, based upon previous research. Chapters 5 to 7 contained reviews of PSUD-treatment issues: screening and assessment, treatment outcome and client retention. The results of original research were summarised in Chapters 8 and 9: a survey of services and service providers and consultations with adolescents with substance-use problems; plus a descriptive study of a range of intervention models. The findings presented in the first nine chapters were synthesised into recommendations for service planning and delivery (Chapter 10) and then used for the development of a new PSUD-treatment intervention for adolescents with a PSUD (Chapter 11). A study of the patterns and correlates of substance use among adolescents who applied for the intervention (Chapter 12), and an outcome study of the intervention compared with usual care were conducted (Chapter 13). This chapter contains a summary of the main findings of the previous 13 chapters, with references to literature published since the completion of the first 11 chapters in 1996, and ends with a consideration of the implications of the findings for treatment and research. Further details and research references to the findings summarised below can be found in the previous chapters.

Study findings

Prevalence of problematic substance use by adolescents

Studies on the epidemiology of substance use and abuse have suggested that substance use that is sufficiently problematic to warrant treatment is rare among adolescents.¹³⁹⁻¹⁴² Further, most illicit substance use by young people is not problematic (apart from the activity being illegal).^{141 143} Most of those who have substance-related problems tend to use and abuse a number of substances on which they might become dependent. When this literature was reviewed in 1995, the main substances of abuse by adolescents in treatment were cannabis and alcohol among males, opioids among females.¹² There were indications of an increase in heroin use among young people in the population¹³ and in treatment.¹² A tendency towards poly-substance abuse suggested that it might not be useful to concentrate upon substance-specific interventions. Rather, attention was paid to those factors that made this minority of the population different to the rest of the population.

Causes and correlates of PSUDs among adolescents

The review of risk factors for substance abuse among adolescents identified a number of important issues for treatment. Firstly, there is no single 'cause' of substance abuse. There are multiple factors associated with substance abuse (summarised below). The chance of an individual experiencing a PSUD increases as the number of 'risk factors' increases.^{144 145} A risk factor has been defined as 'an aspect of personal behaviour or lifestyle, an environmental exposure, or an inborn or inherited characteristic, which on the basis of

epidemiologic evidence is known to be associated with health-related condition(s) important to prevent.' (pp 115-116) ¹⁴⁶ Secondly, the presence of protective factors can increase resilience to the operation of risk factors. ^{135 147 148} Treatment interventions need to address or minimise as many risk factors as possible while promoting or enhancing as many protective factors as possible. ¹⁴⁹ Attention to a single risk factor would be too narrow an approach, when so many other factors are important.

Secondly, substance abuse by adolescents is rarely an isolated behaviour. It is usually accompanied by other problematic behaviours including delinquency or criminal behaviour, and educational or vocational failure. ^{106 150} These other problem behaviours tend to have similar risk and protective factors to substance abuse. ¹⁵¹ The constellation of related, problem behaviours has been called the problem behaviour syndrome. ^{106 151}

Two such problem behaviours are briefly discussed below:

Delinquency: While antisocial behaviour and delinquency (including criminal behaviour) generally precede substance abuse, there is substantial evidence for viewing delinquency and substance abuse as parts of a problem behaviour syndrome with a shared aetiology. ^{151 153} Many of the crimes are committed either to obtain money to purchase substances or due to the influence of substances (for example, alcohol related violence). ¹⁵⁴ Interventions that reduce substance abuse can reduce involvement in crime. ¹⁵⁵

Education and employment: Adolescents with a PSUD are highly likely to do poorly in school, ¹⁵⁶ drop out of school early, and experience unemployment. ^{125 157} Further, effective functioning at school has been associated with maintenance of positive outcomes after PSUD-treatment. ¹²⁷ Assistance with achieving educational or employment goals can facilitate re-engagement with society, an increase in prosocial peers and a sense of purpose. However, Spear and Skala warn that achieving educational or employment goals after treatment is a difficult task so posttreatment services need to be timely and intense so that clients can experience success in this area. ¹²⁸

Interventions that are effective in reducing substance use can potentially have positive impacts upon other problem behaviours. In fact, failure to address these other problem behaviours can contribute to relapse, as the behaviours are interrelated.

Mental health problems: Mental health problems can precede substance abuse, be exacerbated by substance abuse or be triggered by substance abuse. Whatever the causal link, mental health problems, including suicidality, ¹⁵⁸ are so prevalent among adolescents with a PSUD that routine screening and referral to appropriate psychological or psychiatric treatment is indicated. ^{159 160}

The risk factors for substance abuse by adolescents for which the literature review (Chapter 2) found support are summarised below:-

Genetic predisposition: While most of the biological research has been in the area of alcohol, it appears that genetic factors do influence various manifestations of behaviour, including substance abuse. ^{161 162} While genes cannot be changed, genetic factors can be mediated by other environmental factors.

Societal alienation: Adolescents need to feel part of their community and valued by their community, to feel that its values are relevant and important. ^{130 163} Feeling that needs are not being met by society has been associated with substance use. ¹⁶⁴ Eckersley has argued that social detachment and alienation have contributed to problem behaviours including substance abuse. ¹³¹ Eckersley describes how societal factors such as increased inequality, disadvantage, unemployment and society's failure to provide an adequate cultural framework of values, hope, meaning, purpose and belonging have increased distress, alienation and problems such as suicide and substance abuse. Strategies that

reduce feelings of alienation from society are likely to facilitate a reduction in substance abuse.

Family problems: Poor family management, family communication, family relationships and family role-modelling have significant effects on adolescent substance use.^{165 166} The family has been described as ‘the single most influential childhood factor in buffering the child and in shaping later adaptation’. (p. 22)¹⁶⁶ Family-based interventions can enable the family to be a positive support to the adolescent during and after treatment rather than a contributor to the problem.^{46 167 168} When the family cannot be contacted or the family is not able to change in a positive manner, other people can be identified who can provide the level of support required by an adolescent.¹²³

Trauma: Traumatic experiences, such as childhood abuse and refugee experience can increase the risk of a PSUD.¹⁶⁹⁻¹⁷³ Treatment implications include the need to provide a safe environment, coping strategies and therapy.¹⁷⁴ However, the pace of disclosure and therapy need to be dictated by the client.¹⁷⁵ Furthermore, Howard argues that interventions that are unable to deal effectively with trauma, such as 2-week detoxification programs, should assist the client to contain the issue for the time being, until it can be dealt with properly.¹²³

Socioeconomic status: Lower socioeconomic status has been associated with substance abuse, at least indirectly by its effect upon risk factors such as peer associations and social norms.^{176 177} Consideration of the environmental factors that encourage a client’s substance abuse is likely to be helpful. For example, clients might benefit from practical assistance or skills training in dealing with problems such as unemployment and lack of substance-free recreational opportunities.

Knowledge: While an understanding of the specific harms associated with specific behaviours is not sufficient to eliminate risky or harmful behaviours,¹⁷⁸⁻¹⁸⁰ it is an important element of the decision-making process. The provision of accurate and nonjudgmental information on the health and legal consequences of specific substance-use behaviours to adolescent clients of PSUD-treatment programs has been recommended.¹⁸¹

Coping with stress: An inability to cope with stress, rather than the presence of stress per se, can contribute to substance abuse.^{182 183} Training in cognitive-behavioural skills for coping with stress and strengthening of social supports can help clients to deal with stress and reduce substance abuse.¹⁸⁴

Peers: Association with peers who use substances is one of the strongest risk factors for substance abuse.^{135 185} Factors that appear to influence association with substance-using peers include a lack of social skills¹⁸⁶ and bonds with family and school.¹⁸⁷ Strategies such as social skills training, and involvement in school, employment and recreational activities can help clients to make new prosocial friends and prevent relapse.

Labelling: Negative labels, such as ‘addict’, can exacerbate substance abuse because adolescents will tend to adopt the label as an identity.^{188 189} Resisting labels for clients of PSUD-treatment programs is important for assisting clients to adopt new roles.

Reviews of the literature on the aetiology of substance abuse by adolescents published since Chapter 2 was written have been consistent with the review summarised above.⁸ Models such as Rhodes and Jason’s Social Stress Model,¹⁸³ discussed in Chapter 2, illustrate the need to look at all of the risk factors and protective factors when planning treatment. In addition, the functional reasons for substance use and abuse need to be considered. For example, when boredom is a factor, exploring fun, substance-free recreational activities can be helpful.

Consequences of PSUDs among adolescents

Substance abuse by adolescents has multiple consequences.¹⁹⁰⁻¹⁹³ Services that do not consider the clients' specific substance-related problems or the risks associated with the clients' behaviours when planning PSUD-treatment programs and developing case plans can be suboptimal in effect.⁷³ Consequences of substances abuse are summarised below.

Physical health problems: Substance-use related health problems for adolescents include overdose, injury, respiratory problems, transmittable diseases (for example, HIV, hepatitis and tuberculosis), and adverse reactions to low-quality or impure substances.¹⁹⁴⁻¹⁹⁶ Some physical health problems require medical intervention, others require education regarding prevention.

Maturational lag: Adolescents who present for PSUD-treatment will generally have spent a significant proportion of their adolescence under the influence of substances. This prolonged intoxication can interfere with the adolescents' opportunities to mature, to face challenges and to learn how to effectively deal with life. While many of their life experiences will make them feel like they are adults, the maturational processes have not had the opportunity to occur.^{157 193 197 198} A longitudinal study of adolescents at high risk for serious delinquent behaviour identified that prematurely adopting 'adult' roles was associated with further substance-use problems.¹⁹⁹ It has been suggested that programs need to be developmentally appropriate, staff need to understand the developmental stage of the client, to be able to handle 'acting out', to set developmentally appropriate learning tasks and to allow clients to play.²⁰⁰

Family: While poor family communication and relationships can contribute to adolescent substance abuse, that substance abuse can then exacerbate parent-child interactions.²⁰¹⁻²⁰³ The family of adolescents with substance problems often suffers and needs support and advice to deal with past issues as well as to deal effectively with the adolescent upon return to the home environment.²⁰⁴

In sum, there are multiple consequences of substance abuse by adolescents and PSUD-treatment programs need to address these problems, not just concentrate on substance abuse as an isolated problem.

Characteristics of the client group: Adolescents with PSUDs

Consideration also needs to be given to the characteristics of the client group of adolescents with a PSUD. Adolescents in PSUD-treatment programs are different to adults in PSUD-treatment programs and programs that do not cater for adolescent needs will tend to experience high drop-out and treatment failure.²⁰⁰ Adolescence is a time of physical and mental development.²⁰⁵⁻²⁰⁸ Adolescents have basic needs such as the need for structure, for fun and for support and nurturing. Adolescents are also a diverse group. They differ by gender, maturity, cultural background,²⁰⁹ mental health status, involvement in crime, sexual orientation, family circumstances,²¹⁰ and so on. It is not possible, nor necessarily advisable, to have specific programs for every specific subgroup of adolescents requiring a PSUD-treatment program. Treatment programs need to have the capacity and flexibility to deal with the diverse issues and needs of their heterogenous client group.⁴⁶ It is not likely to be feasible to meet every need of every individual. However, on the basis of a review of the literature and original research, Beutler and colleagues have argued that there is some support for matching a) the personal qualities of clients and therapists, and b) specific treatment strategies to particular characteristics and needs of clients.²¹¹ Communication with each individual client, his/her family, and significant others in the community can inform the treatment plan, the program staff and other clients to positive effect.

Screening and assessment

The principle mechanism for identifying and investigating the substance-use patterns, risk factors, protective factors, consequences and individual issues of each client is screening and assessment. The purpose of screening is to identify the potential presence of a particular problem, and to indicate whether or not there is a need for a more comprehensive assessment. The main purposes of assessment are to a) accurately identify whether or not an adolescent needs treatment b) identify other support people who can be involved in the assessment and treatment, c) inform the treatment plan, and d) provide baseline information for monitoring progress. Assessment needs to incorporate a comprehensive review of a variety of areas in the adolescents life by multiple methods including interviews, observation, and the use of external sources of information. Assessment instruments need to be easy to administer, presented in a format and language that is appropriate and acceptable for the client group and psychometrically sound.^{33 212} The literature review emphasised that assessment is a process, not an event, that should engage the client.

Review of treatment-outcome studies

Having identified the issues to be addressed, what strategies should be used to address them? Research into treatment outcome for adolescents with substance problems is sparse and much of the research has had flawed designs with inconclusive results.^{8 46 73} The main approaches that have been reported include behaviour therapy, skills training, family therapy and Alcoholics/Narcotics Anonymous. Outcome studies have suggested that treatment is associated with positive outcomes, but no single strategy has been proven to be superior to any other.⁴⁶ Promising results have been found with cognitive-behavioural skills training and with family-based therapy.^{8 46 167}

A number of factors were identified as being important for treatment outcome. These included therapist characteristics and staffing patterns,¹⁰⁰ program 'fidelity' (procedures clearly documented and correctly implemented)¹¹⁰ and the provision of after-care.¹²⁸ There has been some debate about the cost-effectiveness of residential treatment relative to nonresidential treatment. Residential treatment is more expensive than nonresidential treatment,⁶ has been criticised as lacking ecological validity because it is conducted outside the client's natural environment,⁴⁶ and there is no evidence that residential treatment is superior to nonresidential treatment.¹³⁴ However, it could be beneficial in some situations, for example, when the client's living situation is particularly conducive to substance abuse.⁴

Client retention

A particular issue for PSUD-treatment programs is keeping clients in treatment.²¹³ While there is some debate about the benefits of retention in treatment,¹⁰² retention in treatment has been associated with positive treatment outcomes.¹⁰¹ Numerous factors that have been found to assist client retention were identified. These included external pressure to stay in treatment, for example, by family and/or legal pressures,^{122 214-217} involving clients in decision-making in the program,¹¹⁹ involving the family and other external supports,¹¹⁹ valuing and developing the skills of the client, and a perception by clients that staff want them to stay.^{122 218} The National Institute on Drug Abuse has published a research monograph that focuses on methods for increasing retention in treatment,²¹³ including client-therapist matching,²¹¹ consideration of stages of change,²¹⁹ establishing and maintaining a therapeutic alliance with clients,^{220 221} and using cognitive therapy skills to

keep clients in treatment.²²²

Survey of services, service providers and adolescents with a PSUD

To complement the literature review, consultations with service providers, other experts and the target client group were conducted. A range of service delivery models were also investigated. These consultations and visits suggested that no one method of service delivery is clearly superior. There were benefits claimed for drop-in centres, day programs and short- and longer-term residential programs. It appeared that, across the service system, there needed to be a range of service types to meet the different needs of the client group. Issues that were deemed important by the service providers and other experts were a) the need to consider adolescent tendencies, developmental stages, issues, needs and cultural background when planning and implementing a service; b) the need to balance consistency and flexibility when interacting with adolescent clients; c) the need for services to be comprehensive and to coordinate with other services; and d) the need for services to be close to the clients' homes so that continuous support can be provided.

The issues raised by adolescents with a PSUD were consistent with those raised by service providers. Additionally, the adolescents were concerned about having an active role in treatment, and being understood and respected by staff.

The information obtained from these consultations was consistent with the literature review (Chapters 1 to 7), suggesting that those who were consulted were well-informed about service delivery for adolescents with a PSUD and that the predominantly US-based literature has relevance for Australia.

Principles of best practice

The information obtained by the literature review and original research was synthesised into principles of best practice. A range of service delivery models, including outreach, open-ended services, and structured residential and nonresidential programs were considered useful within a service system to meet the varied needs of adolescents. Whatever, the program model, the principles of harm-reduction and comprehensive care were advocated. Abstinence was considered unrealistic for many adolescents with a PSUD. Comprehensive care entails addressing the multiple contributors to, and consequences of, PSUDs. For example, a combination of family and peer programs to improve the levels of support at home and in social life, recreational programs to increase the repertoire of activities to replace substance use, educational and vocational programs to reconnect adolescents to society and to provide purposeful activities, counselling and psychiatric interventions to address psychological problems, case management to assist with planning and implementing plans, skills programs to address intrapersonal, interpersonal and living skills deficits and after-care to provide continuing care when adolescents are living in their communities was recommended. Adolescents with a PSUD need long-term support, not discrete programs. Subsequent reviews of PSUD treatment for adolescents have confirmed the need for intensive, multimodal interventions.^{73 74} It was noted that service quality also needs to be addressed. That is, services need to be adequately documented and staffed to ensure program fidelity, and they need to be accessible, appropriate and attractive to the target client group.

The intervention plan

On the basis of the literature review and original research described in Chapters 1 to 10, an intervention for adolescents with a PSUD was designed. The main underlying assumption

of the new intervention was that it needed to address the multiple risk factors, protective factors, correlates and consequences of substance abuse by adolescents, and that it needed to do so in a manner that was attractive, appropriate and effective for each individual. To do this, the intervention needed to be comprehensive, intensive and longer-term. The plan was to implement the intervention on a residential as well as nonresidential basis. A residential program was chosen because it provided an ideal setting for implementing the comprehensive, intensive style of intervention that had been designed. A nonresidential version of the intervention was also planned, but sufficient resources were not able to be obtained, so only the residential version was implemented.

The intervention had multiple components, including case management (assessment, case planning, support), individual counselling, a family program, cognitive-behavioural skills training, harm-reduction education, a substance-free recreation program, training in living skills, incentives for behaviour modification and an after-care program.

Description of adolescents presenting to treatment

Assessment data from the adolescents who applied for the intervention during the evaluation period (October 1997 to February 1998) were analysed to obtain an understanding of the patterns and correlates of substance use among adolescents seeking PSUD treatment. The level of involvement in substance use and crime, and the levels of social dysfunction and psychological distress suggested that the adolescents studied were severely affected by their PSUDs. In fact, the adolescent sample had worse scores in these areas than samples of adults in treatment. For example, scores on the substance dependence scale suggested high levels of dependence, half the sample was using heroin on a daily basis, the average number of standard drinks consumed by drinkers on the last day of drinking was 18, 83% of the sample had smoked cannabis in the previous month and the average number of 'cones' smoked on the last day of smoking was 16. In terms of social functioning, 75% of the sample reported being unemployed for most or all of the previous 3 months and 88% of the sample had committed some type of crime in the previous month, mostly property crime to fund substance use. More than half of the females (56%) and one quarter of the males (25%) were classified as 'cases' or at risk of having a psychiatric condition. In sum, the profile suggested that the client group had a poor prognosis for treatment outcome, so a substantial treatment effect was not anticipated.

The profile of adolescents applying for the intervention was consistent with other studies of descriptions of adolescents in residential treatment. Jainchill and colleagues reviewed studies of adolescents in residential treatment.⁷ A similar tendency towards referrals from the criminal justice system, suggesting that legal pressure is a primary motivation to enter and stay in treatment, was noted. The psychological profiles of adolescents were described as similar to adults in treatment in that both were characterised by 'moderate levels of depression, anxiety and low self-esteem' (p. 212).⁷

A limitation of the study was that it did not measure motivation for treatment, an important issue for client retention and treatment outcome.^{219 223} Another limitation was that the generalisability of the descriptive data from this study was not known. It was likely that the profile represented the most severely substance-affected adolescents in New South Wales. The symptom profile was consistent with the indicators for intensive, residential PSUD-treatment program outlined by the guidelines for treatment matching for adolescents published by the Center for Substance Abuse Treatment.⁴

Outcome study

The primary focus of the outcome study was the comparison in outcomes between adolescents with a PSUD who attended the intervention relative to usual care (Chapter 13, summarised below). Process, impact and economic assessments were also conducted, as minor substudies, to provide a context for the outcome study results.

Assessment of process: The implementation of the intervention was reviewed by an action research study and an implementation ‘survey’. The implementation of the plan suffered as a result of insufficient resources, the lack of trained and experienced staff^a, and the geographic spread of the client group’s places of residence. These problems affected program fidelity, client retention, preparation for re-entry to the community and the provision of continuing care. Particular deficits related to vocational assessment and assistance, the after-care program, the family program, the development of friends who are not involved in substance abuse, staffing and program monitoring and evaluation. There was some variability in program implementation during the study period as the program developed and staffing changed. Increasing resources and experience have improved program implementation during and since the evaluation period.

Cost comparison: A cost-comparison suggested that the intervention had a higher staff-client ratio, but was less expensive per client per day to implement than detention. The cost comparison was based upon available information and was subject to error due to different items being included in the costs of detention relative to the items included in the costs of the intervention. However, if the direction of the differences in costs and staffing were correct and the outcomes were at least comparable, the results would support funding places in the intervention rather than detention. Most of the referrals to the intervention were involved with the juvenile justice system and detention was the alternative for many of the intervention’s clients.

Assessment of impact: The impact of the intervention was rated by clinical assessments of intervention group participants by their case managers. On average, the case managers rated the clients as moderately improved in all of the areas that the intervention aimed to impact, including interpersonal functioning, intrapersonal functioning, relapse-prevention skills and motivation to change. This assessment of impact was retrospective and subjective, so the validity of these results is questionable. However, it did suggest that, on average, clients were benefiting from the therapeutic, educational and skills-based strategies employed by the intervention.

Outcome study: The outcome of the intervention was measured by a pretest, 6-month posttest and 10-month follow-up study of adolescents who applied to enter the intervention. The intervention group comprised adolescents who entered the intervention. The comparison group comprised adolescents who, for various reasons, did not enter the intervention when a place became available and received ‘usual care’. The study participants improved on all of the outcome variables between pretest and posttest, and this improvement was maintained at follow-up. The study participants reported reductions in substance use, criminal behaviour, social dysfunction (including unemployment and family

^a The staff were dedicated and capable professionals. The problem for the program was that there were very few people with specific experience in the treatment and care of adolescents with a PSUD. The intervention’s management generally had to recruit people with some relevant qualifications, then train them ‘on the job’.

conflict, but not the proportion of friends who use substances), psychological distress (including suicidal ideation), HIV risk-taking behaviours and physical health symptoms. The reductions in substance use were substantial. For example, between pretest and posttest, the prevalence of smoking 10 or more cones of cannabis a day reduced from 48% to 27%, daily heroin use reduced from 49% to 19%, daily or binge use of benzodiazepines reduced from 20% to 6%, and high level drinking was reduced from 39% to 23%. Among those who continued to use substances between pretest and posttest, the amounts of use were reduced by approximately half. Study participants who drank alcohol reduced the average number of drinks from 13 to 6. Cannabis smokers reduced the average number of cones from 15 to 8. Benzodiazepine users reduced the average number of pills from 10 to 6. Study participants' self-reported substance use was not validated, for example, by urine tests. Given that data collection was mostly conducted by telephone interviews, such validation would have been impractical. Furthermore, there has been substantial research into the validity of self-reported substance use by young people and clients of treatment services which has suggested that, if there is no strong incentive to lie and questions relating to substance use are specific and time-limited, then self-report data is reasonably reliable and valid.^{72 224}

The cause(s) of the improvements in outcome variables were not able to be determined. As discussed in Chapter 13, the improvement in outcome variables could have been the result of a range of factors: a) nearly all of the study participants received a combination of interventions, formal and informal (for example, support from family and friends); b) pretest was conducted at a time of crisis and variables measured at an extreme time tend to moderate over time; c) posttests and follow-up assessments were often delayed until substance use was sufficiently under control for the study participants to be contacted and to be willing to be interviewed; d) PSUDs could have been subject to natural recovery within the study period; e) study participants could have matured during the study period and developed the skills required to manage their substance use; f) study participants could have managed their substance use themselves, independently of external assistance; g) historical changes such as a change in the availability of substances or an increase in youth employment opportunities could have influenced the sample's substance use behaviour; h) knowledge that their progress was being tested could have encouraged the study participants to manage their substance use; i) the study participants could have exaggerated their problems at pretest to increase their chances of obtaining a place in the intervention; and j) study participants might have faked responses to indicate a reduction in their substance use and related problems to impress the interviewer. Thus, multiple factors were likely to have been involved in the improved outcomes identified by the outcome study.

Of particular interest to the study was the lack of differences in outcomes between the groups, even when adjustments were made for possible confounders (particularly psychological distress and social dysfunction). This result was consistent with the research literature on treatment outcome: Exposure to treatment is generally associated with improved outcome, but no treatment method has been demonstrated to be superior to any other treatment for adolescents.^{46 48} Each intervention could have been equally effective or study participants could have self-selected the most appropriate intervention for their individual needs. A number of methodological and other problems discussed in Chapter 13 could have influenced the failure to detect a group difference in treatment outcome: a) program implementation was less than optimal; b) study participants were not randomly allocated to groups, and self-selection could have introduced systematic bias in group composition; c) the comparison group's exposure to alternate interventions could have

compensated for the study intervention; d) intervention group participants could have disseminated the knowledge and skills learnt in the intervention to comparison group participants; e) the other interventions to which the comparison group participants were exposed could have changed their practices to be more similar to the study intervention, reducing the differences between the intervention and usual care; f) intervention group participants tended to receive a low 'dose' of the intervention; and g) differential drop-out between the two study groups could have resulted in the comparison group appearing to have a better treatment outcome than if the two groups had equivalent drop-out rates. For these reasons, it might not be valid to conclude that there was no difference in outcome between the intervention group and the comparison group. Even if a randomised controlled trial had been implemented, any of the factors that might have diluted the possible effect of the intervention and differential drop-out would still have affected the results. Support for group difference was obtained by an outcome analysis which used a method that had been used elsewhere,⁸⁸ in which drop-outs were rated as 'not improved'. This analysis indicated that intervention group participants were significantly more likely to report multiple improvements by posttest than the comparison group participants. It appears, on balance, that the intervention was able to obtain results with a very difficult group that were at least as good as the rest of the service system was able to achieve with a less difficult group.

Implications of the research

As identified by previous research and the original research (Chapters 8, 9 and 12), adolescents with a PSUD seeking residential treatment have high levels of multiple problems - social, physical and psychological, suggesting the need for intensive, long-term, multimodal interventions to address the multiple problems. However, the outcome study was unable to definitively support the hypotheses that attendance at such an intervention would be associated with a greater reduction in the domains of substance use, personal and social functioning and public health and public safety threats in the short and medium term, relative to usual care. Further, there was little support from the literature or from the outcome study for a reliance on residential treatment. However, residential interventions are likely to be a necessary beginning of a PSUD-treatment program for those who need time-out from a particularly chaotic, dysfunctional lifestyle; for those who would not otherwise attend the intervention (for example, those who lack the motivation and support to attend treatment on a regular basis); for those who cannot access treatment because of the availability of services near their place of residence (particularly adolescents from rural areas); or for those involved with the juvenile justice system who require 24-hour supervision. Greater emphasis on long-term, community-based, nonresidential interventions that facilitate support from non-substance-abusing friends and family, and engagement with education and employment is recommended. Residential interventions might be a necessary beginning of the treatment process, however it appears that continuing care in the community is important for positive outcomes.

The study also emphasised the importance of treatment fidelity. The literature identified that, while program fidelity is important for achieving treatment outcomes,^{110 225} unless PSUD-treatment programs have substantial resources,²²⁶ they often fail to implement 'best practice'.⁹⁸ This study identified that implementing the study intervention plan, with its multiple strategies requiring resources, new program materials and staff with expertise in psychology, education, adolescence and PSUD treatment, was an ambitious task. Unless sufficient resources can be dedicated to the problem of PSUDs among adolescents, inadequate resources and the ability to recruit effective staff are likely to

continue to compromise the effectiveness of intensive programs such as that trialed by this study.

Further research

It is recommended that research be conducted in relation to the issues outlined below.

The service system: The study participants were receiving multiple interventions from multiple sectors. However, as identified during the consultations with service providers during the development of the intervention, there was no coordination of services. Bickman has reported on a study of a system to integrate services.²²⁷ A continuum was successfully implemented so that clients had better access, greater continuity of care, more satisfaction with the service received, and treatment within less restrictive environments. However, the cost of this system was higher and the clinical outcomes were no better than those at the comparison site. Clearly, more research is needed in the area of developing a cost-effective system of care for adolescents with a PSUD.

The value of detention: Most of the study participants were involved with the juvenile justice system and detention was an option for many of the study participants. In fact, the participants who went to detention rather than the intervention demonstrated a greater reduction in substance use than the intervention group between pretest and posttest. What does this mean? Diversion for juveniles in the detention system²²⁸ including the use of ‘drug courts’^{229 230} is an issue of considerable community and professional debate. Alternately, research suggests that PSUD-treatment programs in detention centres can be effective when certain conditions are met. These conditions are a) competent and committed staff, b) supportive organisational environment, c) sufficient resources, d) a comprehensive, intensive program, e) continuing care after release from detention.²³¹

This study included a simple cost-comparison of the intervention with detention. As a detailed costing from the Department of Juvenile Justice was not available, it was not possible to identify the degree to which the costings were comparable. There was also no quantitative information on the type, quality or intensity of interventions provided by the detention centres. While detention is not, strictly speaking, conceptualised as a ‘treatment option’, the effect of community-based treatment relative to detention is important for policy decisions about the promotion of diversion or detention. It is recommended that a cost-effectiveness study of detention compared with residential and nonresidential PSUD-treatment programs for adolescents be conducted. There are various forms of economic evaluation: cost-effectiveness, cost-utility and cost-benefit being the main types.⁸⁰ In cost-effectiveness evaluation, the consequences of an intervention are measured in ‘natural units’ (such as number of clients who complete the program, reduction in antisocial behaviours, years of life saved, or number of abstinent or nondependent clients as against dollar units). These consequences are compared with the cost of the program. Elements of a sound economic evaluation include identifying all relevant costs and consequences for a wide range of stakeholders, accurately measuring the value of those costs and consequences and conducting a sensitivity analysis.⁸⁰ A methodology for costing PSUD-treatment services for adolescents has been developed.⁶ This method identifies the cost per client per month for individual treatment and non-treatment services, the average number of services, the cost per unit of service, and the intensity of services.

Natural recovery: The natural rate of recovery from substance abuse and dependence among adolescents is not known. Little is known about what percentage of adolescents will simply ‘grow out’ of a PSUD, and what factors promote or hinder such change. A longitudinal study of the natural course of PSUDs among adolescents in

Australia would provide a baseline for PSUD-treatment programs.

Societal reintegration: Alienation from society has been identified as a significant risk factor for PSUDs among adolescents.^{130 163} However, knowledge of effective strategies and activities for reducing alienation and re-engaging adolescents into society is lacking. For example, does involvement in community activities, education or employment contribute to societal reintegration? What community activities are acceptable to adolescents and effective in decreasing societal alienation? Considering Eckersley's discussion on the failure of society to provide a positive environment for young people,¹³¹ what can communities do to encourage adolescents to feel part of the community? Research to increase understanding of social alienation among adolescents and to develop methods of increasing societal reintegration is required.

Conclusions

PSUDs have multiple risk factors, correlated problems and negative consequences. Interventions to assist adolescents to manage their substance use need to be multimodal to address the various problems associated with PSUDs. Continuing care, incorporating family-based interventions and re-connection with society (for example, re-entry to school, employment, and association with non-substance-using peers) are important aspects of such interventions. While residential PSUD-treatment programs are indicated for particularly severely affected adolescents, or for practical reasons, residential treatment should only mark the beginning, not the end of the treatment process.

Appendix A: Intervention screening form

PALM telephone screener : Information for intake officer

Purpose

1. To decrease the likelihood that youths who are not appropriate for the PALM program come to PALM.
2. To facilitate data collection.

Notes:

1. Places on the waiting list cannot be guaranteed at the time of first inquiry. Applicants will only be placed on the waiting list after receipt of a signed consent, contact details and an interview with the research officer.
2. If applicant is not suitable for the PALM program, still record the information for the database.

Outline:

1. Obtain basic contact information
2. Explain the client group of the program - check the applicant is eligible for the program.
3. Explain the nature of the program - check the applicant is interested in participating in the program
4. Conclude, informing the applicant of the next steps.

Nature of PALM (to be read to applicant)

PALM involves a 3 month intensive, residential program followed by an aftercare program. The first three months includes involvement in a structured program plus individualised case-management. The structured program includes a personal development courses (eg assertiveness, communication, anger management, problem solving, and relaxation skills), a family program, training in living skills and a recreational program.

The daily program generally entails structured group work in the morning and either individual appointments or recreational group work in the afternoon.

It is okay to smoke cigarettes, but not inside the buildings.

Residents are expected to be responsible for participating in the program (this includes participating in group work and in housework) and living within the house demands of no violence, no sex, no alcohol or other drugs. It is also a house demand that clients display honesty, respect and tolerance. In particular, discriminatory harassment such as racism and sexism are not acceptable within the program.

The family can be involved if X and the family wish and visitor's day is once a month.

There is a weekly fee of \$90 to cover food and accommodation - this is usually covered by social security benefits.

The program is currently part of an evaluation trial. This means that to apply to get into PALM, X must agree to be followed up even if he/she does not end up coming to PALM.

PALM telephone screener : Data collection form

1. Basic contact information

Date of telephone inquiry: ____ / ____ / ____

Name: _____

Gender: M / F

Age: ____ DOB ____ (stop here if older than 18 years of age - refer to ADIS)

Home suburb/town of youth: _____

Does X identify as an Aboriginal or Torres Strait Islander? Y / N

Does X identify with any (other) ethnic group? Y / N

If yes, which group/s _____

Referral source : Name:

Position:

Organisation:

Contact number/s:

3. PALM client group

PALM only accepts adolescents with significant drug use problems and who are capable of participating in the program. To check whether or not X is appropriate for the program, would you mind answering a few questions?

In the past year, has X had a maladaptive pattern of drug use that has caused significant impairment or distress, for example, that has:

<i>- caused significant problems such as failure at school or work, legal problems, family problems or social problems</i>	<i>y/n</i>
<i>- repeatedly placed X at risk of physical or other harm?</i>	<i>y/n</i>
<i>- been associated with symptoms of tolerance, withdrawal, inability to cut down</i>	<i>y/n</i>
<i>- taken up a great deal of X's time?</i>	<i>y/n</i>

If yes to any of these, continue the interview. If no, then refer elsewhere.

Does X have any of the following characteristics that may impede his/her ability to participate in the program:

<i>i. severe physical, developmental or psychiatric disorders</i>	<i>y/n</i>
<i>ii. inability to speak, read or write English</i>	<i>y/n</i>
<i>iii. medical condition that requires direct medical supervision (this includes insulin dependent diabetes if the young person cannot self-inject the insulin)</i>	<i>y/n</i>

If no to all of these exclusion criteria, then proceed. If yes to any, refer to ADIS.

Has X had a psychiatric assessment? Y/N If yes, can a copy be sent to us? Y/N

2. Nature of PALM

It sounds like X is eligible PALM. Before going any further, I will briefly describe the program to check that it is what X wants to participate in. Describe nature of PALM, as per information provided for intake.

Given this information, is X willing to apply for PALM?

yes/no

If yes, proceed; if no, refer to ADIS.

4. Conclusion

At this stage, it sounds as if this program is appropriate for X. To apply to go onto the wait list, X will need to agree to participate in PALM and its evaluation and be interviewed by the PALM research officer. This is usually done over the phone. You or X should call the research officer when he/she receives the application pack so the forms can be explained and a telephone interview can be organised.

Where should the forms be sent and to who should they be addressed?

Name:

Address

.....

Notes:

Record here any information that was given by the caller that may assist deciding whether or not the applicant is appropriate for PALM.

.....

.....

.....

.....

Name of person taking referral:

Information pack sent Yes/No (*tick as each is placed in envelope*):

- | | |
|--------------------------|--|
| <input type="checkbox"/> | cover letter |
| <input type="checkbox"/> | consent form (include parental consent form if applicant is <16 years) |
| <input type="checkbox"/> | interview format |
| <input type="checkbox"/> | contact details |
| <input type="checkbox"/> | PALM brochure |
| <input type="checkbox"/> | self-addressed (self/home-referrals only) |

Appendix B: Research instrument for outcome study

Data entered ☐ Data entry checked ☐ Case number Subject number

DATA ENTRY FORM Test: 1 / 2 / 3 First name

Face-to-face / Phone interview Surname

Interview conducted by at TNF/NDARC/home Date Time ..

SECTION 1: DEMOGRAPHICS/TREATMENT HISTORY

1. Date of Birth ____/____/____ Age:years
- 2.a. Gender: Female.....0 Male.....1
- b. With which ethnic group/culture do you identify? 1 None/Australian 2 Lebanese 3 Aboriginal/TSI
4 Pacific Islander 5 Indo-Chinese 6 Maori
7 Other
3. In the last 3 months, what help have you received in relation to your alcohol and/or drug use?

a. Name of agency	b. Service received	c. Number of hours/days/weeks

6. How many times, if at all, have you been in drug treatment programs before the last 3 months? (test 1 only) _____
7. What sort of drug treatment programs had you previously been in? (test 1 only) _____
.....
.....

SECTION 2: DRUG USE

Date of last day of use ____ / ____ / ____ Pretending today is ____ / ____ / ____ (test 1 only)

Alcohol yes / no

1. How many days since you last drank alcohol? _____
2. How much alcohol did you drink on that day?

Wine	Spirits	Beer	Fortified Wine
Wine Gl.	Nips (30ml)	Middies (285ml)	Port Gl.
Bottles (750ml)	Doubles	Schooners (425ml)	Bottles
Flagons	Bottles (750ml)	Cans/ Stubbies (375ml)	Flagons
Casks (lit.)		Bottles (750ml)	

3. How many days before that did you drink alcohol? _____
 4. And how much did you drink on that day? _____

Wine	Spirits	Beer	Fortified Wine
Wine Gl. (120ml)	Nips (30ml)	Middies (285ml)	Port Gl. (60ml)
Bottles (750ml)	Doubles	Schooners (425ml)	Bottles (750ml)
Flagons (1.5lit.)	Bottles (750ml)	Cans/ Stubbies (375ml)	Flagons (1.5lit.)
Casks (lit.)		Bottles (750ml)	

5. And how many days before that did you drink alcohol?

Pot (cannabis, marijuana, hash).....yes / no

6. How many days since you last used?
 7. How much did you have on that day?
 8. How many days before that did you use?
 9. How much did you have on that day?
 10. How many days before that did you use?

Speedyes / no

11. How many days since you last used?
 12. How much did you have on that day?
 13. How many days before that did you use?
 14. How much did you have on that day?
 15. How many days before that did you use?

Cocaine (coke, crack).....yes / no

16. How many days since you last used?
 17. How much did you have on that day?
 18. How many days before that did you use?
 19. How much did you have on that day?
 20. How many days before that did you use?

Tranquillisers/benzodiazepines (eg Serepax, Rohypnol, Mogadon, Valium)yes / no

21. How many days since you last used?
 22. How much did you have on that day?
 23. How many days before that did you use?
 24. How much did you have on that day?
 25. How many days before that did you use?

Hallucinogens (e.g. LSD/acid, **ecstasy, trips**) yes / no

31. How many days since you last used?
 32. How much did you have on that day?
 33. How many days before that did you use?
 34. How much did you have on that day?
 35. How many days before that did you use?

0 = Never Used	6 = 4-6 times per week
1 = No use in last using mth	7 = Once per day
2 = Once per month	8 = Twice per day
3 = Once every 2-3 weeks	9 = 3 or more times per day

Inhalants (amyl, glue, petrol, butane, soda bulbs)yes / no

36. How many days since you last used?
 37. How much did you have on that day?
 38. How many days before that did you use?
 39. How much did you have on that day?
 40. How many days before that did you use?

Tobacco (cigarettes).....yes / no

41. How many days since you last used?
 42. How much did you have on that day?
 43. How many days before that did you use?
 44. How much did you have on that day?
 45. How many days before that did you use?

Heroinyes / no

46. How many days since you last used?
 47. How much did you have on that day?
 48. How many days before that did you use?
 49. How much did you have on that day?
 50. How many days before that did you use?

Other Opiatesyes / no

51. How many days since you last used?
 52. How much did you have on that day?
 53. How many days before that did you use?
 54. How much did you have on that day?
 55. How many days before that did you use?

Other Drugs.....yes / no

- Specify:.....
 56. How many days since you last used?
 57. How much did you have on that day?
 58. How many days before that did you use?
 59. How much did you have on that day?
 60. How many days before that did you use?

4 = Once per week
5 = 2-3 times per week

Drug type	Freq of use

Drug type	Freq of use
Alcohol (beer, wine, spirits)	
Amphetamines (speed , goey)	
Tranquillisers / benzodiazapines (serapax, valium, rohypnol, normison)	
Cannabis (marijuana, hash, pot)	
Cocaine - (coke, crack)	
Designer drugs (ecstasy, GHB, Ketamine/Special K)	
Hallucinogens (trips)	
Nicotine (tobacco, cigarettes)	
Methadone	
Opiates (heroin , codeine)	
Solvents / inhalants (glue, petrol, amyl)	
Steroids	
Other (please specify)	

57. These questions are about how you felt about your drug use in the last 3 months.

a. Did you ever think your drug use was out of control?

Never or almost never 0
Sometimes 1
Often 2
Always 3

b. Did the prospect of missing a fix/drink/smoke etc make you very anxious or worried?

Never or almost never 0
Sometimes 1
Often 2
Always 3

c. Did you worry about your drug use?

Not at all 0
A little 1
Often 2
Always or nearly always.... 3

d. Did you wish you could stop?

Never or almost never 0
Sometimes 1
Often 2
Always 3

e. How difficult would you find it to stop or go without?

Not difficult at all 0
Quite difficult 1
Very difficult 2
Impossible 3

58 What problems (if any) do you have that have been caused by your alcohol/drug use or been made worse by your using? Problems can relate to your physical or mental health, education or work, family or social life, crime, accommodation or any other part of your life.

.....

.....

.....

.....

.....

59 If you keep using the way you have been using, what further problems do you risk having?

.....

.....

.....

.....

60. How much time in the last three months have you lived in the following places?

	<u>Weeks</u>	<u>Days</u>
A juvenile justice detention centre	_____	_____
Supported accommodation/refuge	_____	_____
With family	_____	_____
With friends	_____	_____
Other (please specify)	_____	_____
	total 12	

SECTION 3: INJECTING AND SEXUAL PRACTICES

DRUG USE

Did you inject in the last month ? Yes / No
If no, please go straight to question 7.

1. How many times did you hit up (i.e. inject any drugs) in the last month?

Didn't hit up	0
Once a week or less	1
More than once a week	2
(but less than once a day)	
Once a day	3
2-3 times a day	4
More than 3 times a day	5
2. How many times in the last month did you use a needle after someone else had already used it?

No times (skip Q3)	0
One time	1
Two times	2
3-5 times	3
6-10 times	4
More than 10 times	5
3. How many different people used a needle before you in the last month?

None	0
One person	1
Two people	2
3-5 people	3
6-10 people	4
More than 10 people	5
4. How many times in the last month did someone use a needle after you had used it?

No times	0
One time	1
Two times	2
3-5 times	3
6-10 times	4
More than 10 times	5
5. How often, in the last month did you clean needles before re-using them?

Didn't re-use (skip Q6)	0
Every time	1
Often	2
Sometimes	3
Rarely	4

Never..... 5

6. Before using needles again, how often in the last month did you use bleach to clean them?

- | | |
|---------------------|---|
| Didn't re-use | 0 |
| Every time | 1 |
| Often | 2 |
| Sometimes | 3 |
| Rarely | 4 |
| Never | 5 |

SEXUAL BEHAVIOUR

Did you have sex in the last month?yes / no
If no, please go directly to Section 4.

7. How many people (including clients) did you have sex with in the last month?

- | | |
|---------------------------|---|
| None | 0 |
| One person | 1 |
| Two people | 2 |
| 3-5 people | 3 |
| 6-10 people | 4 |
| More than 10 people | 5 |

8. How often did you use condoms when having sex with your regular partner(s)?

- | | |
|--|---|
| No reg. partner/No penetrative sex | 0 |
| Every time | 1 |
| Often | 2 |
| Sometimes | 3 |
| Rarely | 4 |
| Never | 5 |

9. How often did you use condoms when you had sex with casual partners?

- | | |
|---|---|
| No cas. partners/No penetrative sex | 0 |
| Every time | 1 |
| Often | 2 |
| Sometimes | 3 |
| Rarely | 4 |
| Never | 5 |

10. How often did you use condoms when you have been paid for sex?

- | | |
|--------------------------------------|---|
| No paid sex/No penetrative sex | 0 |
| Every time | 1 |
| Often | 2 |
| Sometimes | 3 |
| Rarely | 4 |
| Never | 5 |

11. If you had anal sex in the last month, how many times did you do so?	
No times	0
One time	1
Two times	2
3-5 times	3
6-10 times	4
More than 10 times	5

SECTION 4: SOCIAL FUNCTIONING

1. How many different places have you lived in over the last three months?	
One	0
Two	1
Three	2
Four	3
Five or more	4

2. How much of the last three months have you been unemployed and not in education or training?	
All of the time	4
Most of the time	3
Half of the time	2
Some of the time	1
None of the time	0

3. If you have been employed or in education in the last three months, how much have you had trouble (eg been fired, dropped out, missed classes or started failing)?	
None of the time	0
Some of the time	1
Most of the time	2
All of the time	3
Not employed or in education (skip Q4)	4

4. How often in the last three months have you had conflict with your relatives?	
Very often	4
Often	3
Sometimes	2
Rarely	1
Never	0
N/A	0

5. How often in the last three months have you had conflict with your partner(s)?	
Very often	4
Often	3
Sometimes	2
Rarely	1
Never	0
N/A	0

6. How often in the last three months have you had conflict with your friends?	
Very often	4
Often	3
Sometimes	2
Rarely	1
Never	0
N/A	4

7. About how many close friends would you estimate that you have? (INCLUDE PARTNER)	
None	4
One	3
Two	2
Three	1
Four or more	0

8. When you are having problems, are you satisfied with the support you get from your friends?	
Very satisfied	0
Satisfied	1
Reasonably OK	2
Not satisfied	3
Very unsatisfied	4
N/A	0

9. About how often do you see your friends?	
Very often	0
Often	1
Sometimes	2
Rarely	3
Never	4
N/A	4

10. How many of the people you hang around with now have you known for more than six months?	
None	4
Less than half	3
About a half	2
More than half	1
All of them	0
N/A	4

11. How much of the last three months have you been living with anyone who uses drugs?	
All of the time	4
Most of the time	3
Half of the time	2
Some of the time	1
None of the time	0

12. How many of the people you hung around with during your last month were users?
(INCLUDE PARTNER)

None 0
Less than half..... 1
About a half..... 2
More than half..... 3
All of them..... 4

SECTION 5: CRIME

Property Crime

Tick type of crimes committed in last month:

Break & enter _____ Stolen car _____
Robbery _____ Receiving stolen goods _____
Shoplifting _____ Stolen prescription pad _____
Other _____ (specify _____)

1. How often, on average, during the last month did you commit a property crime? That is, the number of times that you committed a property crime, not the number of times you've been caught.

No property crime..... 0
Less than once a week..... 1
Once a week..... 2
More than once a week..... 3
(but less than daily)
Daily..... 4

Dealing

Tick type of drugs dealt in month:

Heroin _____ Hallucinogens _____
Marijuana _____ Barbiturates _____
Cocaine _____ Tranquillisers _____
Speed _____ Other _____ (specify _____)

2. How often, on average, during the last month (of using) did you sell drugs to someone?(.....)

Fraud

Tick type of fraud committed in last month:

Forging cheques _____ Credit card _____
Forging prescriptions _____ Social security _____
Other _____ (specify _____)

3. How often, on average, during the last month (of using) did you commit a fraud?(.....)

Crimes Involving Violence

Tick types of violent crime done in last month:

Assault _____
Violent robbery _____
Armed robbery _____
Other eg murder, manslaughter, rape _____

4. How often, on average, during the last month (of using) did you commit a crime involving violence?(.....)

Current Convictions

1. Are you currently facing charges? Yes / No

SECTION 6: HEALTH

Yes=1 No=0

General

Y/N

1. Fatigue / energy loss
2. Poor appetite
3. Weight loss / underweight
4. Trouble sleeping
5. Fever
6. Night sweats.....
7. Swollen glands.....
8. Jaundice
9. Bleeding easily.....
10. Bruising easily
11. Teeth problems
12. Eye / Vision troubles.....
13. Ear / Hearing troubles
14. Cuts needing stitches.....

Injection Related Problems

Y/N

1. Overdose
2. Abscesses / Infections
3. Dirty hit (made feel sick)
4. Prominent scarring/bruising.....
5. Difficulty injecting.....

Cardio/Respiratory

Y/N

1. Persistent cough
2. Coughing up phlegm.....
3. Coughing up blood.....
4. Wheezing
5. Sore throat.....
6. Shortness of breath.....
7. Chest pains.....
8. Heart flutters/racing
9. Swollen ankles.....

Genito-urinary

Y/N

1. Painful urination
2. Loss of sex urge
3. Unusual discharge from penis/vagina
4. Rash on or around penis/vagina.....

Gynaecological

(WOMEN ONLY) (in the last few months) Y/N

1. Irregular period
2. Miscarriage.....

Musculo-skeletal

Y/N

1. Joint pains/stiffness.....
2. Broken bones
3. Muscle pain.....

Neurological

Y/N

1. Headaches ____
2. Blackouts ____
4. Tremors (shakes)..... ____
5. Numbness / Tingling..... ____
6. Dizziness..... ____
7. Fits / seizures ____
8. Difficulty walking..... ____
9. Head injury ____
10. Forgetting things ____

Gastro-intestinal

Y/N

1. Nausea..... ____
2. Vomiting ____
3. Stomach pains ____
4. Constipation..... ____
5. Diarrhoea ____

Test 2 only:

Number of days in PALM before Test 2: ____

Month / Year first entered PALM ____ / ____

Test 3 only:

Number of days in PALM before Test3: ____

Month / Year first entered PALM ____ / ____

For test 3 only:

Since I first interviewed you, has your drug use gotten better, worse, or stayed the same?

Better...3
Stayed same...2
Worse...1

In what way?

Why is this? What has contributed to the change / lack of change?

Since I first interviewed you, has your life in general gotten better, worse, or stayed the same?

Better...3
Stayed same...2
Worse...1

In what way?

Why is this? What has contributed to the change / lack of change?

SECTION 7: PSYCHOLOGICAL HEALTH (SCL-90-R)

0 = Not At All 1 = A Little Bit 2 = Moderately 3 = Quite A Bit 4 = Extremely

1	Headaches	46	Difficulty making decisions
2	Nervousness or shakiness inside	47	Feeling afraid to travel on buses, subways, or trains
3	Repeated unpleasant thoughts that won't leave your mind	48	Trouble getting your breath
4	Faintness or dizziness	49	Hot or cold spells
5	Loss of sexual interest or pleasure	50	Having to avoid certain things, places, or activities because they frighten you
6	Feeling critical of others	51	Your mind going blank
7	The idea that someone else can control your thoughts	52	Numbness or tingling in parts of your body
8	Feeling that others are to blame for most of your troubles	53	A lump in your throat
9	Trouble remembering things	54	Feeling hopeless about the future
10	Worried about sloppiness or carelessness	55	Trouble concentrating
11	Feeling easily annoyed or irritated	56	Feeling weak in parts of your body
12	Pains in heart or chest	57	Feeling tense or keyed up
13	Feeling afraid of open spaces or on the streets	58	Heavy feelings in your arms or legs
14	Feeling low in energy or slowed down	59	Thoughts of death or dying
15	Thoughts of ending your life	60	Overeating
16	Hearing voices that other people do not hear	61	Feeling uneasy when people are watching or talking about you
17	Trembling	62	Having thoughts that are not your own
18	Feeling that most people cannot be trusted	63	Having urges to beat, injure, or harm someone
19	Poor appetite	64	Awakening in the early morning
20	Crying easily	65	Having to repeat the same actions such as touching, counting, or washing
21	Feeling shy or uneasy with the opposite sex	66	Sleep that is restless or disturbed
22	Feelings of being trapped or caught	67	Having urges to break or smash things
23	Suddenly scared for no reason	68	Having ideas or beliefs that others do not share
24	Temper outbursts that you could not control	69	Feeling very self conscious with others
25	Feeling afraid to go out of your house alone	70	Feeling uneasy in crowds, such as shopping or at a movie
26	Blaming yourself for things	71	Feeling everything is an effort
27	Pains in lower back	72	Spells of terror or panic
28	Feeling blocked in getting things done	73	Feeling uncomfortable about eating or drinking in public
29	Feeling lonely	74	Getting into frequent arguments
30	Feeling blue	75	Feeling nervous when you are left alone
31	Worrying too much about things	76	Others not giving you proper credit for your achievements
32	Feeling no interest in things	77	Feeling lonely even when you are with people
33	Feeling fearful	78	Feeling so restless you couldn't sit still
34	Your feelings being easily hurt	79	Feelings of worthlessness
35	Other people being aware of your private thoughts	80	The feeling that something bad is going to happen to you
36	Feeling others do not understand you or are unsympathetic	81	Shouting or throwing things
37	Feeling that people are unfriendly or dislike you	82	Feeling afraid you will faint in public
38	Having to do things very slowly to insure correctness	83	Feeling that people will take advantage of you if you let them
39	Heart pounding or racing	84	Having thoughts about sex that bother you a lot
40	Nausea or upset stomach	85	The idea that you should be punished for your sins
41	Feeling inferior to others	86	Thoughts and images of a frightening nature
42	Soreness of your muscles	87	The idea that something serious is wrong with your body
43	Feeling that you are watched or talked about by others	88	Never feeling close to another person
44	Trouble falling asleep	89	Feelings of guilt
45	Having to check and double-check what you do	90	The idea that something is wrong with your mind

PALM clients only: Do you want this or any other information passed onto your PALM case-manager? yes/no

Thank you!

Appendix C: Development of the Substance-Use Scale

Development of the Substance-Use Scale

The Drug Use Scale of the OTI was not used as a composite score of involvement in substance use because it did not deal with the variety of substances used by the sample. The Scale treats each episode of use as the same, so that 1 shot of heroin, 1 cone of cannabis, one standard drink, one tablet of LSD, and so on, are equal. However, different substances have different effects at different levels of use so summary scores are not meaningful. Further, the OTI's Drug Use Scale could give misleading change scores. For example, a change from 2 shots of heroin per day to 3 standard drinks per day would be seen as an increase in substance use (negative outcome) when such a change could be a positive outcome. Consideration was given to testing changes in the use of individual substances. However, this was also problematic because:

- this would increase the number of variables to be tested, inflating the experiment-wise error rate if tested univariately; the sample size was too small for models with large numbers of independent variables
- this would not detect changes in the use of particular substance types. For example, shifts from heroin use to alcohol use would not be accounted for
- this would not detect changes in the level of poly-substance use
- the distribution of frequency by quantity scores for use of each substance were too non-normal for statistical tests that relied upon normal distributions (see Table 21 and Figures 20 to 25).

Table 21: Kurtosis and skewness of distributions of quantity by frequency scores for each substance at Test 1, Test 2 and Test 3

Test 1

Kurtosis	S.E. Kurt	Skewness	S.E. Skew	N	Variable
16.64	.44	3.44	.22	121	Alcohol
15.69	.44	3.82	.22	121	Benzodiazepines
56.33	.44	7.21	.22	121	Cocaine
-1.82	.44	-.10	.22	121	Heroin(max.2) ^a
7.21	.44	2.52	.22	121	Cannabis
33.87	.44	5.66	.22	121	Amphetamines

Test2

Kurtosis	S.E. Kurt	Skewness	S.E. Skew	N	Variable
8.92	.47	3.03	.23	106	Alcohol
80.71	.47	8.62	.23	106	Benzodiazepines
59.85	.47	7.59	.23	106	Cocaine
.03	.47	1.34	.23	106	Heroin (max.2)
8.28	.47	2.77	.23	106	Cannabis

^a Daily heroin use calculated allowing up to 2 spots or shots per day.

62.17	.47	7.31	.23	106	Amphetamines
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Test 3

Kurtosis	S.E. Kurt	Skewness	S.E. Skew	N	Variable
7.93	.51	2.83	.26	89	Alcohol
41.51	.51	6.37	.26	89	Benzodiazepines
79.86	.51	8.76	.26	89	Cocaine
.06	.51	1.36	.26	89	Heroin (max. 2)
7.44	.51	2.72	.26	89	Cannabis
28.81	.51	5.28	.26	89	Amphetamines

Note: values greater than ± 1 indicate non-normal distributions

Attempts to transform the scores did not adequately improve these values. Figures 20 to 25 illustrate how non-normal the distributions were at baseline, in terms of skewness, kurtosis and outliers. The number of outliers also affected the normality of the distributions.

Finally, the OTI provides scores of daily use of each substance. Much of the substance use by the participants was binge-use, not daily use. Consequently, an OTI score of, say, '1', denoting one episode of use per day, could mask binge use by dividing, say, 15 units of use twice in the month.

Given the problems identified above, a summary score reflecting involvement in substance use was developed. Other methods of calculating summary scores for poly-substance use were not found to be appropriate for this sample of adolescent substance abusers.^{232 233} For each type of substance, subjects were given scores of 0 for no use, 1 for the lowest level of use, 3 for the medium level of use, and 5 for the highest level of use of that substance. The scores for the use of each type of substance were then added to give a maximum possible score of 40. Scores of 1, 3 and 5 were used rather than 1, 2, and 3 so that small amounts of use of 3 substances did not provide the same score as the highest level of use of one substance. The use of tobacco, methadone and steroids were not included in the scale. Tobacco was used by nearly all subjects but tobacco use does not tend to have psycho-social consequences of concern. Steroid use was rare and the context of use was not known. Methadone use was not common and could be an appropriate form of treatment if medically prescribed. The scoring criteria were devised on the basis of previous research and with consideration for the personal and social consequences of the different levels of use, not just the medical consequences. For example, daily use of heroin could be medically safe, but is rated as highest level of involvement because it is associated with contact with heroin users and/or dealers and such contact tends to be associated with further use. The scoring system was then checked for face validity with experts in drug-treatment research and amended on the basis of comments received. Specific scoring of each substance is explained below.

Cannabis

Cannabis use was predominantly daily: 60% used on a daily basis. On the last day of smoking pot, the mean number of cones smoked by users was 17 cones ($SD=20$, range=1 to 100). More than 40 cones in one day was rare. All of those who reported smoking more than 40 cones on the last day of use also reported daily use.

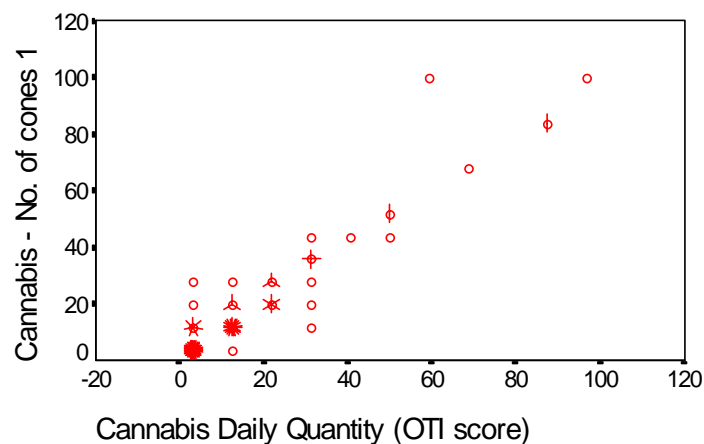


Figure 7 shows how subjects who had used 20 or more cones on their last day of use could have a low OTI scores if they used infrequently.

Cannabis ratings aimed to detect reductions in the frequency of use as well as number of cones smoked:

- 0 = no use;
- 1 = non daily use and less than 20 cones smoked on last day/s of use;
- 3 = non-daily use and 20 or more cones smoked on last day/s of use or daily use and less than 10 cones smoked on last day/s of use;
- 5 = daily use of 10 and more than 10 cones smoked on last day/s of use.

Heroin

Half the sample used heroin on a daily basis at baseline, 15% used on a non-daily basis. The scale only looked at reductions in the frequency of use, considering daily use (1 or more spots or shots a day) as being the highest level of involvement.

- 0 = no use;
- 1 = less than weekly use;
- 3 = weekly to less than daily use;
- 5 = daily use.

Alcohol

One-third of the sample had not used alcohol at all in the previous month, only 12% used on a daily basis. Alcohol use tended to be binge use. The average number of standard drinks consumed on the last day of drinking by drinkers was 19 ($SD=15$, range 1-92). The scale was concerned with detecting reductions in binge-drinking or habitual drinking of amounts that would be likely to cause intoxication.

- 0 = no alcohol use;
- 1 = non-daily use and less than 5 drinks on last day/s of use or daily use, less than 2 drinks on last day/s of use;
- 3 = non-daily use, 5-10 drinks on average or daily use, 2-4 drinks on average.
- 5 = non-daily use, more than 10 drinks on average or daily use, more than 4 drinks on average.

Benzodiazepines

Only 38% of the sample has used benzodiazepines in the previous month; 7% on a daily basis. Of most concern was binge use of benzodiazepines, particularly as daily use could be medically prescribed. The mean number of benzodiazepines consumed was 9 ($SD=9$, range=1-36). Binge use was defined as more than 4 pills in one day.

0 = no use.

1 = nondaily use, 1-2 used on last day/s of use.

3 = nondaily use, 3-4 used on last day/s of use.

5 = daily use or more than 4 on any day.

Stimulants

Use of amphetamines (39%) or cocaine (12%) was uncommon. Daily use of amphetamines (5%) or cocaine (5%) was even less uncommon. Those who did use, tended to use 4 or less lines or shots on a using day. Neither the OTI nor the ADAD distinguished between snorting and injecting so 2 lines was the same as 2 shots. Research has suggested that harm occurs with use more than 3 times a week, so the scale aimed to identify those more frequent users. This aim was difficult to achieve with reliability. Much of the use was binge-use. That is, a few days of daily use, no other use during the month. Neither the OTI nor the ADAD were equipped to measure binge-use. Both average the amount of use across the month. There was high concordance between the OTI and ADAD and both were able to distinguish 3 levels of use: non-use, nondaily use and daily use. The divisions within nondaily use are likely to be less reliable because of the binge nature of use, as just discussed. Stimulant users were rated as:

0 = no use

1 = use of cocaine and/or amphetamines once a week or less

3 = use of cocaine and/or amphetamines 2-6 times a week

5 = daily use of cocaine and/or amphetamines.

Hallucinogens, designer drugs and inhalants

Use of each of these other substances was rare:

hallucinogens: 23% had used, none on a daily basis

designer drugs: 12% had used, none daily

inhalants: 12% had used, 3% on a daily basis.

Most of the time, these substances appeared to be 'optional extras' in substance use, rather than substances of main abuse. Those who used inhalants on a daily basis would be a marked exception to this statement.

While there is variability in the dose-response of each substance, it was not possible to measure 'amounts' of use. For example, one ecstasy tablet compared with one trip compared with one sniff of amyl compared with one can of butane. Given that amounts of use were too difficult to incorporate, the scale only attended to the frequency of use. Each substance was scored as follows:

0 = no use

1 = used 1-2 times in past month

3 = used 1-3 times a week

5 = used 4 or more times a week.

The scoring system is summarised in Table 22.

Table 22: Scoring system for substance use scale

	0	<u>Score and associated substance involvement</u>		
		1 (lowest involvement)	3 (medium involvement)	5 (highest involvement)
Cannabis	No use	Nondaily & <20 cones a day	a. Nondaily & 20+ cones a day or b. daily & <10 cones a day	Daily & 10+ cones a day
Heroin	No use	Less than weekly use	Weekly to less than daily use	Daily use
Alcohol	No use	a. Nondaily, 5 drinks a day or b. daily, < 2 drinks a day	a. Nondaily, 5-12 drinks a day or b. daily, 2-4 drinks	a. Nondaily, >12 drinks a day or b. daily, 5+ drinks
Benzo-diazepines	No use	Nondaily, 1-2 a day	Nondaily, 3-4 a day	a. Daily or b. Nondaily, 4+ on any day.
Stimulants	No use	Less than weekly	1-6 times a week	Daily
Hallucinogens	No use	1-2 times in past month	1-3 times a week	4 or more times a week
Designer drugs	No use	1-2 times in past month	1-3 times a week	4 or more times a week
Solvents	No use	1-2 times in past month	1-3 times a week	4 or more times a week

The distribution of scores at baseline for each substance are presented in Table 23.

Table 23: Distribution of scores for each substance by Test 1

	0%	1%	3%	5%	
Alcohol		36	7	16	40

Benzodiazepines	60	9	8	22
Designer Drugs	88	6	5	1
Hallucinogens	77	17	6	0
Heroin	35	6	9	50
Inhalants	88	7	2	2
Cannabis	17	20	15	49
Stimulants	55	26	10	8

Test 2

	0	1	3	5
	%	%	%	%
Alcohol	43	15	19	23
Benzodiazepines	84	8	2	6
Designer drugs	95	5	0	0
Hallucinogens	90	10	0	0
Heroin	61	12	8	19
Inhalants	95	5	0	0
Cannabis	31	27	14	27
Stimulants	83	10	4	3

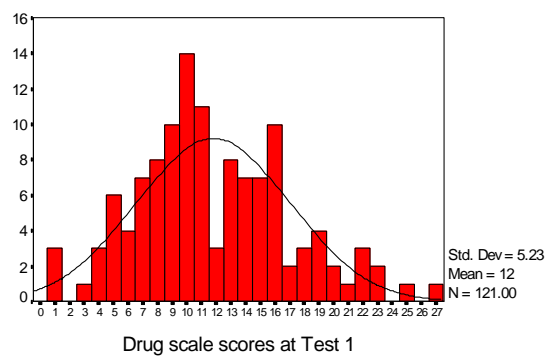
Test 3

	0	1	3	5
	%	%	%	%
Alcohol	39	18	22	20
Benzodiazepines	80	9	3	8
Designer Drugs	94	6	0	0
Hallucinogens	93	7	0	0
Heroin	63	11	9	17
Inhalants	99	1	0	0
Cannabis	37	28	11	24
Stimulants	80	13	2	4

It is acknowledged that the scoring system is somewhat arbitrary and does not constitute recommendations for safe use. However, this system does address the problems of

assessing changes in poly-substance use and multiple testing for each substance.^a Numerous drafts of the system were trialed, with different ratings within substance types, different numbers of substances in the scale and different scales (0-2 was trialed). Outcome results were tested with each model and were essentially the same with each variation of the drug use scale. The distributions of the scores at each Test (Figures 1-4) and their corresponding values of kurtosis and skewness demonstrate that the substance use scale provided an acceptably normal distribution.

^a Consideration was given to dividing the use scores for each substance into quartiles to give scores. However, the high percentage of non-users of some of the substances would be problematic for this method. Furthermore, this statistical method of division does not allow for meaningful measurement of change in the levels of harmful substance use and does not create categories that denote equivalent substance involvement across substance types.



Kurtosis .028
S.E. Kurt .437

Skewness .422
S.E. Skew .220

Kurtosis .335
S.E. Kurt .465

Skewness .735
S.E. Skew .235

Kurtosis -.218
S.E. Kurt .514

Skewness .483
S.E. Skew .260

Appendix D: Action research

Action research

Introduction

During the first year of the implementation of the intervention, an action research model was used to monitor and assist program implementation. The main aim of the action research was to ensure the program was being optimally implemented before resources were used for outcome evaluation.⁷⁷ Action research continued after the outcome study commenced with the aim of increasing program integrity during the outcome evaluation.⁷⁹

Action research involves the use of multiple research methods to assist system development. Specifically, action research involves identifying and analysing problems within a system (organisation or community), then planning, implementing and evaluating strategies to address those problems.²³⁴ Some of the characteristics of action research are that it is:

cyclic: a cycle includes the four steps: plan, act, observe, reflect. Then in light of one cycle, the next cycle commences²³⁵

participatory: clients (in this case, clients are PALM clients, staff and management) are active participants in the process²³⁶

multi-method: all types of methods of gathering information can be used, qualitative methods are generally used more than quantitative methods

reflective: critical analysis of the process and the outcomes are an important part of the cycle.

While action research does not generally meet the criteria of positivist science, it does produce information that is useful for problem solving within the specific context of a particular system at a particular time.²³⁷

Method

Information on program implementation was collected via:

- individual discussions with clients, staff and management
- group discussions and meetings with clients (client feedback groups), clinical staff (staff meetings) and management (executive committee meetings)
- participant observation by acting as a 'relief staff person' and interacting with clients on an informal basis.

The common focus of these discussions and observations was identifying implementation failures and problems and generating suggestions for remedying these. Action plans were developed collaboratively and implemented on a trial basis.

Information and decisions for action were recorded in minutes of client feedback groups, minutes of staff meetings, and minutes of executive committee meetings. Discussions with individuals and notes from participant observation were not recorded separately because relevant information from such discussions and observations were taken to the appropriate meetings and discussed and recorded at those meetings.

Results

Program refinements were suggested and implemented as a result of the information collected. Some action plans were implemented successfully and were maintained as part of the program. A successful innovation was the graduation ceremony, which included other clients, staff and family members. Some plans were implemented with partial success. One partially successful plan was the incentives system whereby clients were given a daily

score for behaviour and given daily rewards for good behaviour. The main problems with the incentives system were that appropriate rewards were not able to be identified, staff often forgot to score the clients each day and staff tended to use the system as a means of punishment rather than reward. That is, neither the plan for nor the implementation of the incentives system were ideal so it tended to falter and needed to be constantly reviewed. Some ideas were never implemented. In particular, the after-care program and the skills-training program for parents had not been implemented. Meetings were held and plans formulated to implement these components of the plan. However, only minimal after-care and no parent training program were implemented. The main reason for these failures to implement components of the plan was a lack of staff resources.

At the time that baseline interviews were due to commence (October 1996), the program was not fully and optimally implemented. For example, in addition to the lack of after-care and family skills training program, the adolescent skills training manual had not been finalised. While concerned about the program integrity, the co-investigators decided that implementation was sufficient to warrant commencement of the evaluation study. In fact, the co-investigators were concerned that if the evaluation study was postponed until implementation was perfect, the study could be delayed indefinitely.

Discussion

Action research was a useful means of assisting the implementation of the intervention. It enabled clients, staff and management to identify problems and contribute to organisational change. It is recommended that action research methods continue to be used in program implementation as different staff and different clients bring new problems, new ideas and different capabilities to the program.

The decision to proceed with the outcome study, even though the program was not being ideally implemented, could be criticised as a waste of evaluation resources. It is argued that the decision was defensible because programs are rarely implemented as well as possible and evaluation of an attempt to implement 'best-practice' can provide valuable information for practice. Evaluations of programs implemented to a gold standard are rare and costly. For example, Project Match, an evaluation of three types of treatment conducted in the United States of America, cost many millions of dollars to implement and evaluate.

²²⁶ While multi-million dollar trials can be an ideal, such resources are rarely available, particularly outside the US. Further, the information from an evaluation of a 'real-world' attempt to implement 'best-practice' could be more generalisable than a multi-million dollar trial. Finally, it would be even more reprehensible to do no evaluation at all, than to evaluate an attempt to implement a best-practice program in the 'real world'.

Appendix E: Clinical assessment of intervention group participants: Method and instrument

Clinical assessments of clients

Introduction

According to the intervention plan, the outcomes to be achieved (such as decreased substance use, decreased involvement in crime) are dependent upon the achievement of a number of shorter-term objectives. The objectives for clients to:

- increase pro-social behaviour (for example, not engaging in harassing others, being violent, being dishonest, or manipulating others)
- increase motivation to change
- improve intra-personal skills (for example, mood management, decision making, and relaxation skills)
- improve inter-personal skills (for example, communication, assertiveness, and conflict resolution skills)
- improve psychological functioning (for example, the ability to deal with personal issues and to demonstrate maturity)
- develop external supports such as friends not in the drug scene, local services and/or positive support people
- deal with family issues as demonstrated by acknowledging and understanding the situation at home, working towards dealing with that situation, and improving family relations
- increase participation in drug-free activities such as art, sport and other activities
- increase societal connectedness, as demonstrated by acknowledging notions of responsibility to society, and accepting traditional values of right and wrong
- increase feeling of hope for the future as demonstrated by expressing hope for the future and actively planning for the future
- improve living skills such as cooking, cleaning, self-care, and dealing with the service system
- increase relapse prevention skills as demonstrated by expressing an understanding of factors that contribute to a lapse and self-responsibility for lapse situations, an ability to pinpoint potentially risky situations and to suggest positive strategies for avoiding or dealing with those situations.

As impact evaluation had not been conducted, a retrospective, clinical assessment of the impact of the intervention on participants was conducted. The impact evaluation also aimed to elicit qualitative information about other benefits or problems with the intervention from clinical staff.

Method

A survey of case managers responsible for subjects who attended the intervention was conducted. The study participants were all clinical staff who had worked at the intervention during the study period with main responsibility for case management of subjects from the main outcome study.

The procedure for data collection involved the following steps:

Step 1. Each case manager was spoken to by telephone to explain the aims and method of the study and enlist cooperation.

Step 2. Each case manager was sent a:

- cover letter reiterating the purpose of the exercise and instructions
- list of the intervention clients who were part of the research study
- set of questionnaires (one for each client seen by the case manager)

Step 3. Each case manager who did not respond within two weeks of the mail-out was called by telephone to check if there were any barriers to completing the task and to encourage them to return the completed questionnaires.

The data collection form, called the Clinical Assessment of PALM Clients Form (CAPC) was designed specifically for this study and based on the intervention's case management monitoring form (CMF). The CMF had been designed in collaboration with clinical staff (as part of the action research), and was based upon planned program objectives. As the form had been used for monitoring the progress of the intervention's clients on a weekly basis during the study period, most of the clinical staff who completed the CAPC were familiar with the CMF and experienced in completing it. The CAPC asked clinical staff to rate the changes in their client's behaviours and attitudes from program entry until program exit as:

A lot better	5
Some improvement	4
No change.....	3
Some deterioration	2
A lot worse	1

Clinical staff were then asked to answer the question:

'Overall, how much do you think X benefited from coming to PALM?

A lot.....	5
A fair bit	4
A little bit.....	3
Not at all	2
It made things worse.....	1'

Staff were also asked two open-ended questions:

Q.1 Did PALM contribute to any other positive or negative changes that might not be identified by the outcome study or this form?

Q.2 In what way/s did PALM help or not help X to change?

A copy of the CAPC is below.

Data analysis comprised descriptive statistics of the quantitative data, using SPSS; and simple content analysis of the qualitative data. When clients had more than one case manager, the assessment given by the case manager who had most time with that client was used. Nine clients who had been in PALM for less than one week were excluded from the analyses. Assessments were not obtained for 6 clients. The final number of completed, usable CAPC's was 48.

Clinical assessment of PALM clients

The aim of this form is to ascertain for each PALM client, the impact and outcomes of PALM. Impact refers to changes achieved by the time the client leaves PALM. Outcome refers to changes that are sustained after leaving PALM. Ratings are to be given on a number of different domains. These domains are relevant to the planned objectives of PALM. There is also space to write your own comments about other types of impact and/or outcomes of PALM. Ratings to be used are:

A lot better	5
Some improvement	4
No change	3
Some deterioration	2
A lot worse	1

For each client (one client per form) you have worked with, please rate the changes in the client's behaviours and attitudes from program entry until program exit and write down these ratings under 'impact' in Table 1. If you have information about the client after leaving PALM, please also provide ratings under 'outcome' in Table 2. Ratings should be given with consideration for the client's abilities.

Client's name: _____

Your name: _____

Your involvement with the client: (eg case manager for the whole time, case manager for part of the time, counsellor) _____

Table 1: Impact of PALM

Domain	Impact
Pro-social behaviour Not engaging in picking on others, violence, being dishonest, manipulating others	
Motivation to change Expressing motivation to change lifestyle/drug use, working on change	
Intra-personal skills Mood management, decision making, relaxation	
Inter-personal skills Communication, assertiveness, getting on well with others	
Psychological functioning Dealing with personal issues, demonstrating maturity	
Development of external supports Friends not in the drug scene, contact with local services and/or positive support people	
Dealing with family issues Acknowledging/understanding the situation at home, working towards	

Domain	Impact
dealing with that situation, positive family relations	
Participation in drug-free activities Participating in art, sport & other activities	
Societal connectedness Expressing notions of responsibility to society, being part of society, caring about role in society, accepting traditional values of right and wrong	
Feeling of hope for the future Expressing hope for the future, actively planning for the future	
Living skills Cooking, cleaning, self-care, dealing with the service system	
Relapse prevention Expressing an understanding of factors that contribute to a lapse and self-responsibility for lapse situations (it doesn't just happen), ability to pinpoint potentially risky situations and to suggest positive strategies for avoiding or dealing with those situations	

Table 2: Outcomes from PALM

Domain	Outcome
Harmful substance use eg number of substances used, frequency of use, quantity of use, bingeing, risky use	
Problem behaviour eg amount and severity of criminal activity	
Intra-personal functioning eg life satisfaction, negative mood states	
Inter-personal functioning eg involvement with non-substance-abusing friends, involvement in non-substance-related recreation	

Overall, how much do you think X benefited from coming to PALM?

A lot 5
 A fair bit 4
 A little bit..... 3
 Not at all 2
 It made things worse..... 1

Did PALM contribute to any other positive or negative changes that might not be identified by the outcome study or this form?

.....

.....

.....

In what way/s did PALM help or not help X to change?

.....

.....

.....

Appendix F: Multivariate linear regression tests of dose-response

Multivariate linear regression tests of dose-response

Tables 24-27 display the correlations between the variables, the unstandardised regression coefficients (B), the 95% confidence intervals for B, the probability that B is significant (*p*) and R^2 for each regression model.

Table 24: Standard multiple regression of substance use at Test 1 and number of days in the intervention on substance use at Test 2

Multiple $R=.19^{\#}$ $R^2=.04$ Adjusted $R^2=.00$	Variables	<i>r</i> with substance use T2 (DV)	<i>r</i> with substance use T1	B	95% CI	<i>p</i>
	Substance use T1	.15 [#]		.2	-.1 - .4	.2
	Days in the intervention	-.1 [#]	.1 [#]	-.02	-.04 - .02	.4

Notes: * $p<.05$; $\#p>.05$

Change in substance use: The model explained only 4% of the variance in substance use at Test 2 ($R^2=.04$) and the model was not significantly better than chance at predicting substance use at Test 2 ($F_{2,56}=1.0$, $p=.4$) so other statistics from the analysis of this model were not valid.

Table 25: Standard multiple regression of criminal activity at Test 1 and number of days in the intervention on criminal activity at Test 2

Multiple $R=.35^*$ $R^2=.12$ Adjusted $R^2=.09$	Variables	<i>r</i> with criminal activity T2 (DV)	<i>r</i> with criminal activity T1	B	95% CI	<i>p</i>
	Criminal activity T1	.33 [*]		.35	.1 - .6	.01
	Days in the intervention	.02 [#]	.02 [#]	-.008	-.03 - .01	.4

Notes: * $p<.05$; $\#p>.05$

Change in criminal activity: The model explained 12% of the variance in criminal activity at Test 2 ($R^2=.12$) and the model was significantly better than chance at predicting criminal activity at Test 2 ($F_{2,56}=3.9$, $p=.03$). After adjusting for the effect of criminal activity at Test 1 on Test 2, criminal activity at Test 2 was not significantly associated with the number of days in the intervention ($p=.4$).

Table 26: Standard multiple regression of social dysfunction at Test 1 and number of days in the intervention on social dysfunction at Test 2

Multiple R=.35* R ² =.12 Adjusted R ² =.09	Variables	<i>r</i> with social dysfunctio n T2 (DV)	<i>r</i> with social dysfuncti on T1	B	95% CI	<i>p</i>
	Social dysfunction T1	.34*		.5	.1 - .8	.01
	Days in the intervention	-.05 [#]	.02 [#]	-.01	-.06 - .04	.7

Notes: * $p < .05$; [#] $p > .05$

Change in social dysfunction: The model explained 12% of the variance in social dysfunction at Test 2 ($R^2 = .12$) and the model was significantly better than chance at predicting social dysfunction at Test 2 ($F_{2,56} = 3.9, p = .03$). After adjusting for the effect of social dysfunction at Test 1 on Test 2, social dysfunction at Test 2 was not significantly associated with the number of days in the intervention ($p = .7$).

Table 27: Standard multiple regression of psychological distress at Test 1 and number of days in the intervention on psychological distress at Test 2

Multiple R=.56* R ² =.32 Adjusted R ² =.29	Variables	<i>r</i> with psych. distress T2 (DV)	<i>r</i> with psych. distres s T1	B	95% CI	<i>p</i>
	Psych. distress T1	.6*		.5	.3 - .7	<.0001
	Days in the intervention	-.03 [#]	.07 [#]	-.001	-.005 - .003	.6

Notes: * $p < .05$; [#] $p > .05$

Change in psychological distress: The model explained 32% of the variance in psychological distress at Test 2 ($R^2 = .32$) and the model was significantly better than chance at predicting psychological distress at Test 2 ($F_{2,56} = 13.0, p < .00001$). After adjusting for the effect of psychological distress at Test 1 on Test 2, psychological distress at Test 2 was not significantly associated with the number of days in the intervention ($p = .6$).

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