Characteristics of heroin users entering three treatment modalities in New South Wales: Baseline findings from the Australian Treatment Outcome Study (ATOS)

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CHARACTERISTICS OF HEROIN USERS ENTERING THREE TREATMENT MODALITIES IN NEW SOUTH WALES: BASELINE FINDINGS FROM THE AUSTRALIAN TREATMENT OUTCOME STUDY (ATOS)

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EXECUTIVE SUMMARY

Introduction

Heroin use, with its associated harms, represents a serious public health concern, and generates many challenges for treatment providers. In Australia, an estimated 74,000 individuals are thought to be heroin dependent, with more people treated for dependence on opioids than any other drug class. Despite this, little is known about how effective the main treatment options are in practice.

The Australian Treatment Outcome Study (ATOS) is the first large scale longitudinal study of treatment outcome for heroin dependence to be conducted in Australia. ATOS is coordinated by the National Drug and Alcohol Research Centre (NDARC), and is conducted in collaboration with the Drug and Alcohol Services Council (DASC) and Turning Point.

The aims of ATOS are:

1. To describe the characteristics of people seeking treatment for problems associated with heroin use in Australia;
2. To describe the treatment received; and
3. To examine treatment outcomes and costs at 3 and 12 months after commencement of treatment.

The current report addresses the first aim and presents data from the New South Wales arm of the study.

Method

Nineteen treatment agencies were randomly selected from within the three main treatment modalities (methadone/buprenorphine maintenance therapy; detoxification; residential rehabilitation) stratified by area health service. Five hundred and thirty five individuals entering treatment and 80 heroin users not seeking treatment were recruited into the study and interviewed by NDARC staff using a structured questionnaire. Valid and reliable instruments such as the Opiate Treatment Index (OTI), Short Form-12 (SF-

12) and Composite International Diagnostic Interview (CIDI) were used to measure drug use, health, criminal activity, and psychiatric comorbidity. Consent and locator details were obtained to facilitate follow-up at 3 and 12 months.

Results

- Entrants to treatment for heroin dependence tend to be long-term polydrug users with previous treatment experience. A significant minority (8%) had only ever smoked heroin.

- There were high levels of criminal involvement reported, with over half of participants having committed crime in the preceding month.

- There are extremely high levels of depression among the sample, with a quarter being clinically depressed at the time of interview.

- Suicide is a major clinical issue among heroin users, with 34% of the sample having ever attempted suicide, and 13% having done so in the preceding year.

- Post Traumatic Stress Disorder is common (41%) among the sample and, like suicide, is a major clinical issue for heroin users.

- While high levels of psychiatric distress and other drug-related harms were evident across all treatment modalities, the residential rehabilitation group reported more severe problems than the other modalities.

Conclusion

Comorbid psychiatric and drug problems are prevalent among the ATOS sample and are likely to influence treatment outcomes. These baseline findings will be taken into consideration when assessing the 3 and 12 month follow-up data.

1.0 Introduction

Over the past decade heroin use and dependence has emerged as an issue of increasing public health concern. A dramatic rise in the rate of fatal opiate overdoses,[1,2] increases in the number of heroin users,[3,4] an increase in the number of people enrolled in methadone maintenance treatment (MMT)[5] and reports by police and Customs of increased amounts and availability of heroin in Australia,[3,6] collectively highlight a growing problem. With approximately 74,000 Australians estimated to be dependent on heroin,[7] it is not surprising that Australian Governments are currently giving greater attention both to increasing access to treatment for opiate dependence and to expanding the range of treatment alternatives available. More people are treated in Australia for opioid dependence than for any other drug class, licit or illicit, with over 30,000 enrolled in methadone maintenance alone.[8] Despite this, there is a lack of consensus on how treatment services should be delivered and whether they are effective in practice.

1.1 *Harms associated with heroin use*

Heroin dependence is associated with major health risks, and accounts for a significant proportion of the total burden of disease and injury due to illicit drugs in Australia.[9] The harm associated with heroin use broadly includes fatal and non-fatal heroin overdose, blood borne virus transmission, increased psychopathology, increased criminality and the effects of prescription drugs. Mortality among heroin users is high, with annual mortality rates reported by overseas longitudinal studies in the order of 2-3%.[10,11] The standardised mortality ratio of heroin users is 13 times that of their non-heroin using peers.[11]

The number of deaths attributed to heroin overdose among Australian adults aged 15 to 44 years increased from 6 in 1964 to 725 in 2000.[12] During 2001 there was a 58% reduction in the number of overdose deaths (n=306), thought to be attributable to the heroin shortage across Australia that began in December 2000.[8] It is cause for concern that there was only a 20% reduction in deaths among those aged 45-54 years, a fact that supports the view that it is the older, more experienced heroin users that are at greatest risk of death from overdose.[2]

Non-fatal overdose is also highly prevalent among heroin users.[13,14] Sixty eight percent of a sample of Sydney based heroin users had overdosed, 29% in the preceding 12 months.[13] These findings have since been replicated.[14,15] To date there are no prospective data on the prevalence and patterns of heroin overdose, or the impact of treatment on its incidence among Australian heroin users.

Blood borne viruses (particularly the hepatitis viruses and HIV) represent a major harm associated with the injection of heroin and other drugs. Eighty percent of new hepatitis C (HCV) infections in Australia are considered to be the result of injecting drug use, and 50-60% of needle and syringe program (NSP) attendees have been infected with HCV. Despite the availability of vaccination against the hepatitis B virus (HBV), it is estimated that 30-60% of IDU have been infected with HBV.[16,17] Clearly it is important to measure changes in health risk behaviours such as needle-sharing when assessing treatment outcomes.

Heroin users have high rates of psychiatric morbidity, with the most common diagnoses being mood disorders, anxiety disorders, and anti-social personality disorder (ASPD).[18,19,20] In addition, high rates of post-traumatic stress disorder (PTSD) and borderline personality disorder (BPD) have been reported among dependent heroin users.[21,22,23] In the recent Australian National Survey of Mental Health and Wellbeing (NSMH&WB), opioid users exhibited elevated rates compared to the general population of major depression (18.7% v 0.8%), PTSD (31.3% v 1.3%), and borderline personality disorder (15.2% v 1.0%).[24] They were also more likely to have scores on the Short Form-12 indicative of severe mental (17.7% v 3.9%) and physical (28.9% v 7.0%) disability.

The high prevalence of psychopathology among heroin users has direct implications for treatment outcome and clinical practice. Psychopathology has consistently emerged as a salient predictor of poor treatment outcome.[25] Relatively little is known about differences in psychopathology between heroin users in and out of treatment, because most research has been carried out in the treatment setting. It is also unclear how levels of psychiatric

morbidity differ across treatment modalities and to what extent psychiatric distress is ameliorated by treatment.

A large proportion of the heroin dependent population regularly engages in criminal activity, most commonly drug dealing and acquisitive property crime.[26,27] The question of how interventions for heroin users impact on criminal behaviour is also important for the implementation and evaluation of treatment services, and for the development of effective policy responses.

It is well documented that the harms related to heroin use are exacerbated by the use of prescription drugs. Benzodiazepine use is widespread among heroin users and is associated with higher rates of psychopathology and injection-related risk-taking behaviour, poorer social functioning, poorer health, higher levels of criminal involvement and an increased risk of fatal and non-fatal overdose.[28,29,30] The injection of benzodiazepine tablets and methadone syrup by heroin users is also linked to greater physical and psychological harm.[29,30,31]

To date there have been no large scale longitudinal studies examining the effectiveness of treatment services for heroin dependence conducted in Australia. Longitudinal studies have the potential to examine a wide range of issues relating to the assessment of disorders, treatment seeking, continuity and change in disorders, and the long-term consequences of drug use and other psychiatric disorders. The major advantages of a longitudinal design are its ability to provide a natural history account of behaviours and events as they occur over time, and its ability to provide tests of causality based on temporal sequencing. Much of what is known about typical treatment outcomes is based on large scale longitudinal cohort studies conducted overseas.

1.2 *Longitudinal studies overseas*

The most widely published and influential overseas longitudinal cohort studies of treatment outcome are the Drug Abuse Reporting Program (DARP),[32,33] Treatment Outcome Prospective Study (TOPS),[34] Drug Abuse Treatment Outcome Study

(DATOS),[35] and the National Treatment Outcome Research Study (NTORS).[36,37] These studies have shown that existing behavioural, psychosocial, and pharmacological treatments can effectively reduce drug use and dependence, in the context of adequate treatment lengths.[38]

It would be unwise to generalise findings from overseas to Australia, given the differences between countries in government policies and health care delivery systems. The US system of social service provision is considerably more restrictive than the Australian system, with access to benefits being very limited for dependent heroin and other drug users. Treatment provision in both the United Kingdom and the United States is also markedly different from that provided in Australia. Specifically, the British system of methadone prescription is less tightly regulated than in Australia, with methadone and other opiates (including heroin) being prescribed by General Practitioners, with little or no supervision of drug administration.[39] Conversely, the system in the United States is considerably more restrictive, with access to methadone being very limited.[40] The system in Australia appears to lie somewhere between these models in terms of both access to treatment and restrictions placed on those in treatment. Longitudinal studies conducted in the Australian context are needed to determine treatment effectiveness and the burden imposed by heroin use in Australia.

A limitation of the studies cited above is that they used treatment entrants from purposely selected treatment programs, with no attempt at representative sampling. Furthermore, none of these studies included a comparison group of heroin users who were not in treatment on admission to the study. The use of appropriate controls would allow for more confident attribution of outcomes to treatment. A comprehensive examination of psychiatric morbidity, using valid and reliable instruments, would also appear warranted, given the high prevalence of psychiatric disorders among heroin users.

1.3 *Aims of the Australian treatment Outcome Study (ATOS)*

The Australian Treatment Outcome Study (ATOS) is the first large scale longitudinal study of treatment outcome for heroin dependence to be conducted in Australia. ATOS is

coordinated by the National Drug and Alcohol Research Centre (NDARC) and is conducted in collaboration with the Drug and Alcohol Services Council (DASC) of South Australia, and the Turning Point Alcohol and Drug Centre of Victoria.

Specifically, the aims of ATOS are:

1. To describe the characteristics of people seeking treatment for problems associated with heroin use in Australia;
2. To describe the treatment received; and
3. To examine treatment outcomes and costs at 3 and 12 months after commencement of treatment.

The current report is based on NSW data, and addresses the first aim of the study, with particular attention given to differences in client characteristics across the three treatment modalities examined: methadone/buprenorphine maintenance treatment (MT), detoxification (DTX) and residential rehabilitation (RR), and a non-treatment group. The key findings have also been published in a bulletin (Appendix A). The baseline ATOS findings from South Australia and Victoria have been published as separate reports and may be obtained through DASC and Turning Point.

2.0 Method

2.1 Mapping and selection of treatment agencies

Drug and alcohol treatment services in NSW were identified from lists provided by the NSW Health Department. A brief telephone survey conducted with each agency to establish the range of services they provided and to obtain an estimate of how many new heroin dependent clients were treated each month. Only agencies with a reported throughput of 8 or more new clients per month were included for possible random selection. Recruitment sites were also restricted to the Sydney region bounded by Gosford in the north, Penrith in the west and Campbelltown in the south-west, as it was not feasible for interviewers to travel any further. The mapping exercise identified three main treatment modalities: methadone (and later buprenorphine) maintenance, detoxification and residential rehabilitation services.

Thirty two treatment agencies met criteria for inclusion, 19 of whom were randomly selected within treatment modality and stratified by regional health area. All agencies agreed to participate in the study. Ten agencies provided methadone and buprenorphine maintenance therapy (MT), four provided residential rehabilitation (RR) and nine detoxification (DTX). Four agencies provided both maintenance and detoxification services.

A comparison group of heroin users not currently in treatment (NT) were recruited from needle and syringe programs in the regional health areas from which treatment entrants were recruited.

2.2 Procedure

All agencies were visited to enable recruitment issues to be discussed and methods explained. Recruitment occurred between February 2001 and August 2002. Entrants to treatment for heroin dependence at the selected agencies were approached by either treatment staff or researchers and screened for eligibility for inclusion in the study. In August 2001 buprenorphine became registered for use in the treatment of heroin dependence in Australia. Clients at the participating agencies who were commencing

buprenorphine detoxification or maintenance were also screened for eligibility, and invited to participate in ATOS. Screening in the NSPs was conducted by the researchers, as clients attended the service to obtain needles. Interviews were conducted at the treatment agencies and in other locations convenient to the participants. All interviews were conducted by trained research officers employed by the National Drug and Alcohol Research Centre and independent of the treatment agencies. The interviews (including the collection of locator information) took approximately 60-90 minutes to complete, and all participants were reimbursed $20 cash for their participation. The mean length of time participants had been in their current treatment at the time of interview was 5.1 days (SD 3.5, 1-21).

2.3 Eligibility criteria

The eligibility criteria for the study were that participants:

- were entering treatment for heroin dependence or were current heroin users not in treatment;
- were willing to provide locator information to allow follow up to occur;
- had a good understanding of English;
- were over 17 years of age; and
- had not been in treatment for heroin dependence or in prison in the month preceding interview.

2.4 Participation rate

In the treatment setting 1530 clients were approached, 535 (35%) were interviewed, 836 (55%) were ineligible (Table 2.1), 97 (6%) were passive refusals i.e. failed to attend the interview and 62 (4%) were direct refusals. In the non-treatment setting 434 clients were approached, 80 (18%) were interviewed, 213 (49%) were ineligible, 129 (30%) refused to be screened and 11 (3%) were eligible but refused to participate. In both the treatment and non-treatment setting, having been in treatment during the preceding month was the main cause of ineligibility.

Table 2.1: Exclusion criteria

	Treatment setting %	Non-treatment setting %
Other treatment in preceding month	65	82
Prison in preceding month	17	4
Unwilling to give contact details	4	1
Under 18 years of age	2	0.5
Already participating in ATOS	9	0
Non-English speaking	1	0.5
Had not used heroin	0	13
Other	2	0

2.5 Structured Interview

A structured interview was developed that examined demographic characteristics, treatment history, drug use history, heroin overdose history, injection-related risk-taking behaviour, injection-related health problems, general health, criminal activity, Major Depression, Post-Traumatic Stress Disorder (PTSD), Anti-Social Personality Disorder (ASPD) and Borderline Personality Disorder (BPD). The areas covered by the questionnaire are outlined in greater detail below.

2.5.1 Demographic characteristics

The demographic details obtained included: date of birth, age, gender, Aboriginal/Torres Strait Islander status, country of birth, level of school and tertiary education attained,

main source of income in the preceding month, number of children under their care, usual form of accommodation, whether they have a prison history, and if so their longest period of incarceration and the length and recency of their last imprisonment.

2.5.2 Treatment history

Participants were asked how many times they had commenced the various treatment options for heroin dependence and how recently they had attended each type of treatment. They were also asked the first type of treatment that they had sought and what age they were at the time. Other data collected from participants entering treatment included: whether the current treatment episode was the result of a drug court order or other legal reason, how many days they had been in treatment, and what they hoped to achieve in terms of their heroin use as a result of treatment (abstinence/a break/reduction in use/no change).

2.5.3 Drug use history

Participants were asked which drugs they had ever used, which ones they had ever injected, and which they had injected in the preceding six months. Drug use in the preceding month was assessed using the Opiate Treatment Index (OTI).[41] The OTI Drug Use Section has 0.90 test-retest reliability, a kappa of 0.70 between self-reported drug use and urinalysis, and a kappa of 0.83 between self-reported drug use and collateral reports. Other information collected included: age at first intoxication, drug used at time of first intoxication, age at first injection, drug first injected, age at first heroin use and injection, age at first regular heroin use, main route of heroin administration and number of heroin use days in the preceding month.

2.5.4 Heroin overdose history

Questions regarding non-fatal heroin overdose were based on earlier work conducted by the authors.[13] Information recorded included: the number of times participants had overdosed on heroin, the recency of the last overdose and recency of the last naloxone administration.

2.5.5 Injection-related risk-taking behaviour

The injecting sub-scale of the HIV Risk-Taking Behaviour Scale (HRBS), a component of the OTI, was used to measure current injection related risk behaviour.[41] Questions address the frequency of injecting, borrowing and lending used injecting equipment in the preceding month.

2.5.6 Injection-related health

The injection-related sub-scale of the OTI health scale was used to assess injection-related health problems.[41] Scores range from 0-5, with higher scores being indicative of poorer injection-related health.

2.5.7 General health

The Short Form-12 (SF-12) is a standardised, internationally used instrument that provides a general measure of health status.[42] The 12 items on the SF-12 are summarised in two weighted summary scales, and generate a mental health and a physical health score. Lower scores are indicative of more severe disability. Cut-offs have been established for the mental health score to determine degree of disability.[43] A score of less than 30 indicates severe disability, 30-39 moderate disability, 40-49 mild disability and 50 or higher no disability.

2.5.8 Criminal activity

Using the criminality scale of the OTI,[41] participants were asked how frequently they had committed any property crime, dealing, fraud and/or violent crime in the preceding month. Scores on the criminality scale range from 0-16, with higher scores denoting greater criminal involvement. The Crime Scale has 0.96 test-retest reliability, and correlates 0.54 with Addiction Severity Index crime days, both of which measure crime in the preceding month.

2.5.9 Current Major Depression

The version of the Composite International Diagnostic Interview (CIDI) used in the National Survey of Mental Health and Wellbeing (NSMHWB)[44] was modified to

provide DSM-IV diagnoses of current Major Depression based on the month preceding interview. The CIDI questions operationalise the DSM-IV criteria for Major Depression (Appendix B).

2.5.10 Post Traumatic Stress Disorder

DSM-IV diagnoses of Post Traumatic Stress Disorder (PTSD) were obtained using the version of the CIDI used in the NSMHWB.[44] The diagnostic criteria appear in Appendix C.

2.5.11 Anti-Social Personality Disorder

As used in an earlier study,[15] a modified version of the Diagnostic Interview Schedule[45] was used to obtain DSM-IV diagnoses of antisocial personality disorder (ASPD).

2.5.12 Borderline Personality Disorder

Participants were screened for potential ICD-10 diagnoses of Borderline Personality Disorder (BPD) using the NSMHWB version of the CIDI.[44]

2.6 Locator information

To facilitate follow-up at 3 and 12 months the following information was sought at baseline: full legal name, nicknames/street names, other surnames that had been used, height, distinguishing physical features, current address, name of person whose address this was, participant's phone number/s, where they expect to be living in 12 months time, name of a doctor or community health centre that would know how to reach the participant, the first person they would contact if arrested, where they would go if they could no longer stay at their current address, places where they spend time, where messages could be left for them, and the contact details of at least two friends, relatives or associates who could be contacted if needed to assist in locating the participant for follow-up.

2.7 Statistical analyses

One-way ANOVAs and t-tests were used for continuous variables. Where data were highly skewed medians are reported and Mann-Whitney U tests performed. Chi squared analyses were conducted in order to examine group differences involving dichotomous categorical variables, and Odds Ratios (OR) with 95% Confidence Intervals (95%CI) were calculated.

3.0 Results

3.1 Sample Characteristics

The sample consisted of 615 heroin users: 201 entering MT, 201 entering DTX, 133 entering RR and 80 NT subjects (Table 3.1). The mean age of subjects was 29.3 yrs (SD 7.8, range 18-56), and 66% were male. Males were significantly older than females (30.0 v 27.8 yrs, t_{613}=3.3, p<0.005). The majority of the sample (79%) were born in Australia, and 5% identified themselves as being of Aboriginal origin. The sample had completed a mean of 10.0 yrs (SD 1.7, range 2-12) school education. Twenty nine percent had completed a trade/technical course, 6% a university degree and 65% had no tertiary qualifications. The three most commonly reported sources of income for the preceding month were: government allowance (46%), criminal activity (24%) and employment (18%).

A prison history was reported by 41% of the sample, with 17% having been incarcerated in the 12 months preceding interview. The median length of the longest sentence ever served was 12 mths (range <1-138), with the median length of last prison sentence being 6 months (range <1-126 mths). Males were more likely to have been imprisoned than females (48% v 27%; OR 2.50, 95% CI: 1.74-3.59). A fifth (20%) of the sample were living alone in the month preceding interview, and this did not differ according to treatment modality or gender. The majority of the sample (60%) were not living in their own rented or mortgaged accommodation in the month preceding interview. Thirty percent were living in their parents' home, 7% had no fixed address and 5% were in a boarding house or hostel. Females were more likely than males to have been in their own accommodation during the preceding month (47% v 37%, OR 1.48, 95% CI: 1.06-2.08). A fifth of the sample were living alone in the preceding month.

There were no significant treatment group differences in age, length of school education, current employment, independent accommodation and proportion born in Australia. The percentage of male participants recruited differed according to treatment modality (χ^2 3df=14.3, p<0.005), with fewer males recruited through MT than DTX (56% v 73%, OR 0.47, 95% CI: 0.31-0.72) and NT (56% v 71%, OR 0.52, 95% CI: 0.30-0.91). The

likelihood of having a prison history also varied significantly according to treatment modality (χ^2 3df=12.4, p<0.01), with non-treatment subjects being more likely to have been imprisoned than those entering treatment (54% v 39%, OR 1.83, 95% CI: 1.14-2.93).

Table 3.1: Demographics

	MT (n=201)	DTX (n=201)	RR (n=133)	NT (n=80)	Total (n=615)
% Male *	56	73	68	71	66
Age in years (mean)	29.1	29.9	27.9	30.6	29.3
Years of school completed (mean)	9.8	10.1	10.3	9.7	10.0
Tertiary education (%):					
None	67	60	63	76	65
Trade/Technical	27	35	29	19	29
University/college	6	5	8	5	6
Aboriginal or TSI origin (%):					
Aboriginal	8	5	1	8	5
TSI	0	0	0	0	0
Country of birth (%):					
Australia	77	78	87	76	79
NZ	5	4	2	4	4
UK/Ireland	3	4	5	3	3
Vietnam	4	3	1	1	3
Other	11	11	5	16	11
Main income in past month (%):					
Govt benefit	52	44	40	44	46
Criminal activity	19	25	26	31	24
Wage/salary	16	20	19	14	18
Other	13	11	15	11	12
Living alone in past month (%)	14	21	24	25	20
Main accommodation in the past month (%):					
Own house/flat (includes renting)	47	37	39	33	40
Parents' home	29	31	32	23	30
Homeless/NFA	3	9	8	15	7
Boarding house/ hostel	3	4	5	11	5
Shelter/refuge	2	2	1	3	2
Other	16	17	15	15	16
% Ever imprisoned #	44	39	31	54	41
Of those ever imprisoned:					
Mths since last released (mdn)	24	25	16	12	21
Mdn length of last sentence (mths)	6	6	7	6	6
Mdn length of longest prison term served (mths)	12	12	11	7	12

* Significant group difference exists ($p<0.005$) # Significant group difference exists ($p<0.01$)

3.2 Drug Use History

The mean age of first intoxication was 13.7 years (SD 3.3, range 2-34), the most commonly used intoxicants being alcohol (46%) and cannabis (36%) (Table 3.2). The age of first intoxication varied according to treatment modality ($F_{3,611}$=5.66, p<0.005), with the RR group being significantly younger than the MT, DTX and NT groups. No gender difference with regards to age of first intoxication was detected.

The majority of the sample (94%) had injected a drug at some stage. The mean age of first injection was 19.4 years (SD 5.2, range 10-43), with heroin (58%) and cocaine (34%) being the drugs most commonly injected on the initial occasion. The sample had used a mean of 9.0 (SD 1.7, range 2-11) drug classes, 6.2 (SD 1.9, range 2-11) in the preceding 6 months, and 4.9 (SD 1.7, range 2-10) in the preceding month. A mean of 3.6 (SD 1.6, range 0-7) drug classes had been injected, 2.5 (SD 1.4, range 0-6) in the preceding 6 months. No gender differences were noted regarding the number of drug classes used and injected.

The number of drug classes ever used varied according to treatment modality ($F_{3,611}$=4.4, p<0.01), with the RR group having used significantly more drug classes than the MT (9.5 v 8.9, p<0.01) and DTX groups (9.5 v 8.9, p<0.05). Similarly, the number of drug classes used in the preceding 6 months differed according to treatment modality ($F_{3,611}$=4.8, p<0.005), with the RR group having used more drug classes than the MT (6.7 v 6.0, p<0.01) and DTX groups (6.7 v 6.1, p<0.05). A group effect was also evident regarding the number of drug classes ever injected ($F_{3,611}$=6.9, p<0.001), and the number injected in the preceding 6 months ($F_{3,611}$=9.1, p<0.005). The RR group had injected more drug classes than the MT (Ever: 4.0 v 3.4, p<0.005; last 6 months: 2.9 v 2.2, p<0.001) and DTX groups (Ever: 4.0 v 3.5, p<0.05; last 6 months: 2.9 v 2.4, p<0.05). The NT group had also injected more drug classes than the MT (Ever: 4.0 v 3.4, p<0.05; last 6 months: 3.0 v 2.2, p<0.001) and DTX groups (Last 6 months: 3.0 v 2.4, p<0.01). Other than heroin, the most widely injected drugs in the preceding 6 months were cocaine (56%), amphetamines (46%) and other opiates (30%) (Table 3.3). A notable proportion (17%) had injected benzodiazepines.

The mean number of drug classes used in the month preceding interview was 4.9 (range 2-10), and this differed across treatment modalities ($F_{3,611}$=7.2, p<0.001). The NT group had used significantly more drug classes than the MT (5.5 v 4.6, p<0.005) and DTX (5.5 v 4.7, p<0.01) groups, and the RR group had used more than the MT group (5.5 v 4.6, p<0.01). Aside from heroin, the most commonly used drugs in the preceding month were tobacco (96%), cannabis (68%), alcohol (53%) and benzodiazepines (48%). The OTI score for each drug class (excluding tobacco and inhalants) is shown in Table 3.3. The mean number of cigarettes smoked per day in the preceding month was 21.4 (SD 12.4, range 1-200). Due to difficulties in quantifying inhalant use, participants were asked whether they had used inhalants: 'not at all', 'less than once a week', 'once a week', 'more than once a week' or 'daily'.

Table 3.2: Drug Use History

	MT (n=201)	DTX (n=201)	RR (n=133)	NT (n=80)	Total (n=615)
Mean age 1st intoxicated #	14.0	14.0	12.7	14.3	13.7
Drug 1st intoxicated on (%):					
Alcohol	48	46	50	34	46
Cannabis	36	36	32	43	36
Alcohol & Cannabis	7	5	6	6	6
Heroin	4	6	3	5	4
Amphetamines	1	2	2	3	2
Hallucinogens	1	1	2	3	1
Benzodiazepines	2	1	2	0	1
Other	1	3	3	6	4
% Injected a drug	93	91	98	100	94
Age 1st injected (Mean)*	19.5	19.7	18.7	19.7	19.4
Drug 1st injected (%):*					
Heroin	57	63	52	60	58
Amphetamines	37	27	41	30	34
Cocaine	3	5	4	6	4
Other	3	5	3	4	4
Mean number of drug classes:					
Ever used #	8.9	8.9	9.5	9.0	9.0
Used in last 6 mths #	6.0	6.1	6.7	6.5	6.2
Ever injected #	3.4	3.5	4.0	4.0	3.6
Injected in last 6 mths #	2.2	2.4	2.9	3.0	2.5

*Excludes non-injectors
Significant difference exists between treatment modalities

Table 3.3: Prevalence and frequency of drug use

Drug Class	Ever used %	Ever Injected %	Used lst 6 mths %	Injected lst 6 mths %	Used last month %	Median OTI Score*/ Frequency of use in the last month	
Heroin	100	93	100	92	99	2.0	> once a day
Other Opiates	69	49	47	30	29	0.4	> once a week
Amphetamines	91	79	49	46	30	0.1	1x per week or less
Cocaine	91	80	61	56	40	0.4	> once a week
Hallucinogens	82	28	28	9	9	0.1	1x per week or less
Benzodiazepines	88	31	66	17	48	1.1	Daily
Antidepressants	45	2	23	1	14	1.0	Daily
Alcohol	99	-	71	-	53	1.0	Daily
Cannabis	98	-	78	-	68	3.5	> once a day
Inhalants	43	-	4	-	2	-	< once a week
Tobacco	98	-	96	-	96	-	Daily
Polydrug use (Mean number of drug classes):	9.0	3.6	6.2	2.5	4.9	-	

* Median OTI score for those participants who had used the drug class in month preceding interview

3.3 Heroin Use and Dependence

The mean age of first heroin use was 19.7 yrs (SD 5.3, range 9-43). The mean length of heroin use career at time of interview was 9.6 years (SD 7.4, range <1-35), with males having used heroin for a significantly longer period than females (10.3 v 8.2 years, t_{613}=3.3, p<0.005), and no significant difference existing between the treatment modalities. Regular heroin use was commenced at a mean age of 20.5 yrs (SD 5.5, range 11-43). Eight percent of treatment entrants had only ever smoked heroin. The mean age at which heroin had first been injected was 20.3 yrs (SD 5.4, range 11-43). Heroin had been used daily or more by 79% of the sample over the preceding month, with a median heroin OTI score of 2.0 (range 0-77) (Table 3.3). The frequency of heroin use did not differ according to treatment modality or gender.

DSM-IV criteria for heroin dependence were met by 98% of the sample. The mean number of dependence criteria endorsed was 5.5 (SD 1.2, range 1-7), but this differed significantly according to treatment modality ($F_{3,611}$=5.1, p<0.005), with the NT group (mean=5.1) meeting fewer criteria than the MT (5.5, p<0.05), DTX (5.6, p<0.01) and RR (5.7, p<0.005) groups. Six of the seven dependence symptoms were reported by more than 80% of the sample (Table 3.4).

Table 3.4: Current prevalence of DSM-IV heroin dependence symptoms

Dependence symptoms	%
Tolerance	90
A great deal of time spent acquiring/using/recovering	89
Important activities given up or reduced	87
Withdrawal	85
Use continued despite knowledge of physical or psychological ill effects	83
Taken in larger quantities/for longer than intended	82
Persistent desire/unsuccessful efforts to cut down	36

3.4 Treatment History

The majority (89%) of the sample had been in a formally recognized treatment for their heroin dependence in the past (Table 3.5). A median of 5 treatment episodes (range 1-218) had been undertaken, and a mean of 2.6 treatment types (SD 1.3, range 1-6). The mean length of time since the last treatment episode was 6 months (range 1-168).

The likelihood of having been in treatment varied according to treatment modality (χ^2 3df=9.6, $p<0.05$), with the RR group being more likely to have been in treatment than the MT (OR=3.03, 95% CI: 1.3-7.2) and NT (OR=7.09, 95% CI: 1.3-9.2) groups. Similarly, the RR group had experienced a greater median number of previous treatment episodes than the other treatment modalities (8 v 4, U=23,956.5, $p<0.001$).

The most commonly tried treatment types were inpatient detoxification (60%), methadone maintenance (53%) and outpatient detoxification (48%). Given that detoxification is required prior to entrance to RRs, it is not surprising that inpatient detoxification had been attempted by 84% of the RR group.

The mean number of treatment types experienced varied significantly according to treatment modality ($F_{3,611}$=9.2, p<0.001), with the RR group having tried a broader range of treatments than the MT (2.8 v 2.0, p<0.001) and NT (2.8 v 2.1, p<0.005) groups. The DTX group had also experienced more treatment types than the MT group (2.4 v 2.0, p<0.05).

Ninety seven percent of the sample were either currently in treatment or had been enrolled in treatment in the past. The mean age when participants first sought treatment was 23.8 years (SD 6.3, range 12-54). The main types of treatment first sought were: inpatient detoxification (34%), methadone maintenance (29%), outpatient detoxification (18%) and residential rehabilitation (10%).

Abstinence from heroin use was the most common treatment goal (97%) among treatment entrants. Two percent were required to attend treatment as part of a drug court order, and 6% gave other legal reasons for attending treatment, such as an impending court case or a condition of bail.

Table 3.5: Exposure to previous treatment

	MMT	DTX	TC	NT	Total
Past treatment (%)*	86	90	95	84	89
Median number of previous treatment episodes*	3	4	8	4	4
Past treatment types (%):					
Methadone maintenance	57	50	46	65	53
Outpatient detoxification	42	52	57	40	48
Inpatient detoxification	47	64	84	46	60
Rapid opiate detox using naltrexone	9	10	12	9	10
Naltrexone maintenance	15	16	20	11	16
Other maintenance therapy (e.g. buprenorphine, LAAM)	5	7	5	5	5
Residential rehabilitation	28	43	59	36	41
Mean number of treatment types tried previously*	2.0	2.4	2.8	2.1	2.3

* Significant group difference exists

3.5 Heroin overdose

Fifty four percent of the sample had overdosed on heroin (Table 3.6), but the proportion varied significantly according to treatment modality (χ^2 3df= 12.2, p<0.01). Participants in the RR group were more likely to have overdosed than those in the MT (67% v 49%, OR=2.13, 95% CI: 1.35-3.35) and DTX (67% v 51%, OR=1.96, 95% CI: 1.25-3.09) groups. Similarly, 25% of the sample had overdosed in the preceding 12 months, and a significant group difference was noted (χ^2 3df= 11.3, p<0.05). The RR group was more likely to have overdosed in the preceding 12 months than the other modalities (36% v 22%, OR=1.98, 95% CI: 1.31-2.99) who did not differ from each other. The RR group had also overdosed on more occasions (3 v 2, U=8794.5, p<0.01) and more recently (9 v 18 mths, U=8559.0, p<0.01) than the other treatment modalities.

There was no significant difference between males and females with regards to the proportion who had overdosed ever (55% v 52%) or in the preceding 12 months (28% v 24%).

Table 3.6: heroin overdose history

	MT	DTX	RR	NT	Total
Overdosed (%):					
Ever*	49	51	67	56	54
In preceding 12 mths*	23	22	36	19	25
Administered narcan (%):					
Ever	35	37	47	48	40
In preceding 12 mths	16	13	21	18	16
Number of overdose occasions (median)*#	2.0	2.5	3.0	3.0	3.0
Months since last overdose (median)*#	18	24	9	24	18

*Significant group difference exists
Excludes those who had never overdosed

3.6 Social Support

Twelve percent of the sample indicated that they had no close friends or people that they could rely on and 17% reported that they were unsatisfied or very unsatisfied with the support that they received from friends. Participants not in treatment were more likely than those in treatment to have no close friends (21% v 11%, OR=2.26, 95% CI=1.24-4.13). There was no gender difference regarding the proportion with no close friends (12% v 12%).

3.7 Criminal Activity

The sample was criminally active, with 55% reporting having committed some form of crime in the preceding month, with no difference evident across the treatment modalities (Table 7). Males were no more likely than females to have been criminally active in the

preceding month (57% v 51%, respectively). Property crime (39%) and dealing (25%) were the most commonly committed types of crime. The frequency with which crime had been committed, as indicated by the OTI crime score, did not differ significantly according to treatment modality.

Table 3.7: Criminal activity by treatment modality

	MT	DTX	RR	NT	Total
Any crime (%)	48	57	57	60	55
Type of crime committed (%):					
Property	32	40	44	44	39
Dealing	21	26	22	36	25
Fraud	10	16	22	18	16
Violent	5	12	9	10	9
OTI crime score (median)	0	1	1	2	1

3.8 General Physical Health

3.8.1 Physical health as assessed by the SF-12

The mean SF-12 physical health component score was 43.9 (SD 9.8, range 15.5-65.4), and did not differ according to treatment modality (Table 3.8). Females reported poorer physical health than males (41.5 v 45.1, t_{613}=4.4, p<0.001).

Table 3.8: SF-12 physical health component scores

	MT	DTX	RR	NT	Total
SF-12 physical health component score (mean)	43.6	43.7	44.2	44.5	43.9

3.8.2 Injection-related health

Seventy nine percent of the sample had injected at least daily in the preceding month (Table 3.9), including 30% who had injected more than 3 times a day. Of those who had injected in the preceding month (n=566), 20% reported having injected with a used

needle that they had borrowed from someone else, and 30% reported having lent a used needle to someone in that time. Thirty seven percent had shared (either borrowed or lent) a used needle in the preceding month, and this did not differ significantly between treatment modalities. The most common injection-related health problems in the month prior to interview were prominent scarring or bruising (66%), difficulty injecting (43%) and a 'dirty hit' (contaminated injection) that made them feel sick (21%). The mean score on the injection related health scale of the OTI was 1.5 (SD 1.1, range 0-5), with no difference between treatment modalities. Females reported significantly more injection related health problems than males (1.9 v 1.3, t_{564}=7.2, p<0.001).

Table 3.9: Injection related risk-taking and health in the month preceding interview

	MT %	**DTX** %	**RR** %	**NT** %	**Total** %
Injected daily or more	74	82	79	85	79
Borrowed a used needle #	15	19	29	20	20
Lent a used needle #	30	29	36	24	30
Shared a used needle (either borrowed or lent) #	34	37	45	31	37
Injection related health problems #:					
Overdose	5	12	18	4	10
Abscesses/infections	10	8	15	14	11
Dirty hit	21	17	24	25	21
Prominent scarring/ Bruising	62	67	74	59	66
Difficulty injecting	46	39	42	45	43
Mean OTI Injection related health score #	1.4	1.4	1.7	1.5	1.5

Overall N=566, excludes participants who had not injected in the preceding month

3.9 Mental Health

3.9.1 General mental health

The mean SF-12 mental health component score for the sample was 31.7 (SD 11.1, range 8.9-67.3), with 49% having scores indicative of severe disability (Table 3.10). Mental health scores differed significantly according to treatment modality ($F_{3,611}$=12.4, p<0.001), with RR participants showing greater disability than MT (28.2 v 33.0, p<0.001) and NT participants (28.2 v 36.8, p<0.001), and the DTX group showing greater disability than the NT group (30.5 v 36.8, p<0.001). Females reported poorer mental health than males (29.7 v 32.7, t_{613}=3.2, p<0.005), and were more likely to be classified as having severe disability (59% v 45%, OR=1.77, 95% CI: 1.26-2.48).

Table 3.10: SF-12 mental health component scores

	MT	DTX	RR	NT	Total
SF-12 mental health component score (mean)	33.0	30.5	28.2	36.8	31.7
% with severe disability	44	52	65	31	49

3.9.2 Depression

A quarter (25%) of the sample met DSM-IV criteria for a current diagnosis of major depression for the month preceding interview, with 15% being severely depressed. The prevalence of major depression did not differ significantly across treatment modalities, but females were more likely than males to meet criteria for depression than males (31% v 21%, χ^2 1df=7.6, p<0.01).

3.9.3 Suicidal Ideation

Over a fifth (23%) of the sample reported having thought a lot about committing suicide in the month preceding interview (Table 3.11), with the RR group being more likely to have thought about suicide than the remainder of the sample (32% v 21%, OR=1.76, 95% CI: 1.15-2.70). Fifteen percent had actually planned how they would commit suicide, with the NT group being less likely to have done so than the RR (8% v 18%, OR=0.37,

95% CI: 0.14-0.94) and DTX (8% v 17%, OR=0.38, 95% CI: 0.16-0.95) groups. Suicide had been attempted at some stage by 34% of the sample, with 5% having attempted in the preceding month and 13% in the preceding 12 months. There were no significant treatment group differences in relation to attempted suicide. Females were more likely than males to have ever attempted suicide (44% v 28%, χ^2 1df=16.3, p<0.001) and to have done so in the preceding 12 months (21% v 9%, χ^2 1df=16.6, p<0.001).

Table 3.11: History of suicide attempts

	MT	DTX	RR	NT	Total
Thought a lot about committing suicide in past month (%)*	20	24	32	15	23
Made a suicide plan in past month (%)*	13	17	18	8	15
Attempted suicide in past month (%)	4	7	7	4	5
Attempted suicide in past 12 months (%)	11	13	17	11	13
Ever attempted suicide (%)	31	30	42	35	34

* Significant group differences exist

3.9.4 Post Traumatic Stress Disorder

The vast majority (92%) of the sample had experienced at least one of the extremely stressful or upsetting events that DSM-IV acknowledges may lead to PTSD (Table 3.12). The mean number of incident types reported was 3.9 (SD 2.3, range 0-10), but this differed significantly according to treatment modality ($F_{3,611}$=5.0, p<0.005), with the RR group reporting a greater number of incident types than the MT group (4.5 v 3.5, p<0.005). DSM-IV criteria for a diagnosis of PTSD was met by 41% of the sample, with the prevalence differing according to treatment modality (χ^2 3df= 11.8, p<0.01). A diagnosis of PTSD was more common among the RR group than the DTX (52% v 37%, OR=1.81, 95% CI: 1.16-2.82) and NT (52% v 30%, OR=2.52, 95% CI: 1.40-4.52) groups.

Table 3.12: Prevalence of traumatic incidents and PTSD by treatment modality

	MT	DTX	RR	NT	Total
At least one traumatic incident reported (%)	89	93	95	90	92
Number of traumatic incident types reported (mean)*	3.5	3.9	4.5	4.1	3.9
Meets criteria for DSM-IV diagnosis of PTSD (%)*	42	37	52	30	41

* Significant group difference exists

The most common traumatic incidents reported were: witnessing someone being badly injured or killed (68%), being threatened with a weapon, held captive or kidnapped (62%) and being seriously physically attacked or assaulted (57%) (Table 3.13). Males were more likely than females to have witnessed someone being badly injured or killed (73% v 58%, OR=1.91, 95% CI: 1.34-2.72), to have been threatened with a weapon, held captive or kidnapped (66% v 57%, OR=1.48, 95% CI: 1.05-2.09) or to have been in a life threatening accident (55% v 37%, OR=2.01, 95% CI: 1.43-2.84). Females were more likely than males to have been raped (54% v 10%, OR=10.75, 95% CI: 7.04-16.43) or sexually molested (53% v 22%, OR=4.06, 95% CI: 2.83-5.82).

Table 3.13: Types of traumatic incidents experienced

Traumatic incident	Females %	Males %	Total %
1) Witnessed someone being badly injured or killed	58	73	68
2) Threatened with a weapon, held captive or kidnapped	57	66	62
3) Seriously physically attacked or assaulted	57	57	57
4) Involved in a life-threatening accident	37	55	49
5) Sexually molested	53	22	32
6) Raped	54	10	25
7) Involved in a fire, flood or other natural disaster	21	26	24
8) Tortured or the victim of terrorists	10	9	9
9) Direct combat experience in a war	2	4	3
10) Any other extremely stressful or upsetting event (excludes bereavement, chronic illness, business loss, marital or family conflict, book, movie or television)	20	21	21
11) Suffered a great shock because one of the events (1-9) happened to someone close to them	35	45	42

The incidents that participants considered the worst and upon which a diagnosis of PTSD was most likely to be based were being raped (22%), sexually molested (18%) and witnessing someone being badly injured or killed (14%). The type of incident nominated as the worst differed slightly according to gender. While the most commonly nominated worst incidents among females were being raped (36%), or sexually molested (21%), males were most likely to nominate witnessing someone being badly injured or killed (18%), or being sexually molested (16%).

No gender differences were detected with regards to the number of different traumatic events participants had been exposed to (Table 3.14), but females were significantly more likely than males to meet DSM-IV criteria for a diagnosis of PTSD (54% v 35%, χ^2 1df=21.0, p<0.001).

Table 3.14: Prevalence of traumatic incidents and PTSD by gender

	Females	**Males**	**Total**
At least one traumatic incident reported (%)	89	93	92
Number of traumatic incident types reported (mean)	4.0	3.9	3.9
Meets criteria for DSM-IV diagnosis of PTSD (%)*	54	35	41

* Significant gender difference exists

3.10 *Personality Disorders*

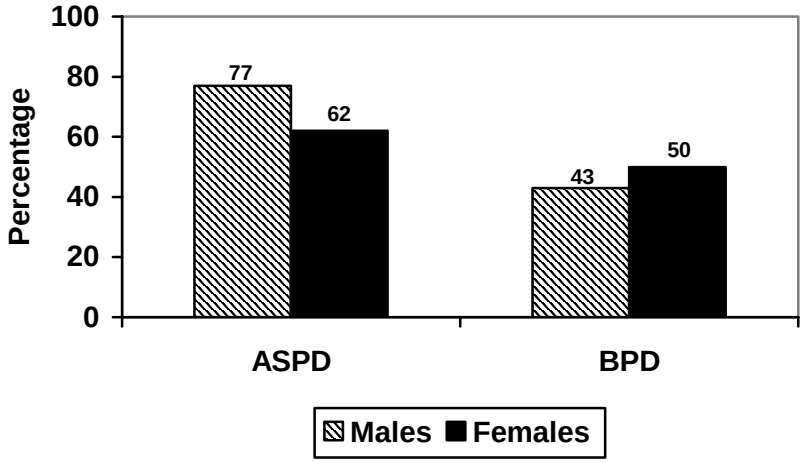
3.10.1 Antisocial personality disorder

DSM-IV criteria for a diagnosis of ASPD were met by 72% of the sample. The prevalence of ASPD did not differ according to treatment modality, but males were more likely than females to receive the diagnosis (77% v 62%, OR=2.05, 95% CI: 1.4-3.0) (Figure 3.1).

3.11.2 Borderline personality disorder

Forty six percent of the sample screened positive for BPD, with the RR group being more likely to screen positive than the remainder of the sample (62% v 41%, OR=2.4, 95% CI: 1.6-3.6). There was no gender difference with regards to the prevalence of BPD (Figure 3.1).

Figure 3.1: Prevalence of ASPD and BPD by gender



4.0 Discussion

4.1 *Major Findings*

Entrants to treatment for heroin dependence in NSW are typically long term heroin users, most of whom have previous treatment experience. Heroin overdose was common, with a quarter having overdosed in the last 12 months. Extensive polydrug use and criminal involvement are also widespread.

The high degree of psychiatric co-morbidity among the ATOS sample is of clinical significance, with 25% meeting DSM-IV criteria for current Major Depression, 41% meeting criteria for PTSD, and 34% having a lifetime history of attempted suicide. Personality disorders, such as ASPD and BPD, are also prevalent.

A major finding of the current study was the notable proportion of treatment entrants (8%) who had only ever smoked heroin. No previous study in Australia has documented non-injectors presenting for the treatment of opioid dependence.

While high levels of harms were reported by participants across all treatment modalities, these appeared most severe among the residential rehabilitation group. These participants had used and injected more drug classes in their lifetime and recently, had a younger mean age of first intoxication, were more likely to have overdosed and to have done so in the preceding 12 months, showed greater psychological distress according to the SF-12, and were more likely to meet criteria for PTSD and for BPD than other treatment modalities.

4.2 *Demographics*

The characteristics of the ATOS sample are similar to those reported by other studies of heroin users, both in Australia and overseas.[18,37,46] The mean age of the sample was 29.7 years, and 66% were male. The mean length of school education was 10 years, and 41% had a prison history.

4.3 *Drug Use*

The ATOS participants are typically long-term polydrug users, having used a mean of 9.0 drug classes in their lifetime, and 5.0 in the preceding month. Cannabis, alcohol, benzodiazepines and cocaine had been used by a large proportion of the sample on a regular basis. Clearly, treatment agencies need to be able to respond to a wide variety of drug problems among their heroin dependent clients.

Participants in the RR group exhibited a greater level of polydrug use than the MT and DTX groups, having used more drug classes in their lifetime, in the preceding 6 months and in the preceding month. The RR group also first became intoxicated at a younger age. While participants across all treatment modalities reported high levels of polydrug use, the RR group appear to be more drug entrenched than the other modalities.

4.4 *Heroin use and dependence*

Overall, the ATOS cohort is a group of long term, dependent heroin users. The mean length of heroin use career was 9.6 years, almost all of the sample met DSM-IV criteria for heroin dependence, and the majority had used heroin at least daily over the preceding month. Eight percent of treatment entrants in the study had only ever smoked heroin, yet were experiencing problems sufficient to induce them into treatment for heroin dependence. While non-parenteral heroin administration does not have the associated risks of blood borne virus transmission and vascular damage, other potential harms, such as dependence[47] and fatal overdose,[48] should not be underestimated.

4.5 *Treatment history*

Given the long term drug use histories among the sample, it is not surprising that the majority had been in treatment for heroin dependence in the past, with inpatient detoxification and methadone maintenance being the most commonly tried treatment types. In keeping with the higher levels of drug use among the RR group, participants in this modality were more likely to have been in treatment previously, and had tried a wider range of treatments than the MT and DTX groups.

4.6 *Injection-related risk-taking behaviour*

Needle sharing continues to occur, despite the effects of education and harm minimization campaigns. The majority of the sample had injected at least daily in the preceding month, and 37% of injectors had either borrowed or lent used injecting equipment in that time.

4.7 *Heroin overdose*

Heroin overdose was a common event among the sample, with a half having overdosed in their lifetime and a quarter having done so in the preceding 12 months. Participants in RR appear to be a particularly at risk group, being significantly more likely to have overdosed and to have done so in the preceding 12 months, as well as having overdosed on more occasions and more recently than the other modalities.

A recent review of the heroin overdose literature identified a range of cardio-pulmonary, muscular and neurological complications related to non-fatal heroin overdose.[49] Given the high incidence of heroin overdose among the current sample, and the broad range of overdose sequaelae that may arise, it is likely that a notable proportion of ATOS participants would be experiencing some degree of overdose related morbidity.

4.8 *Social support*

A notable proportion of the sample (12%) had no close friends or people that they felt they could rely on, with participants not currently in treatment being more likely to lack social support than the remainder of the sample. Previous research has suggested that patients with more social support do better in treatment.[50,51] These studies found that living with a partner or being married was associated with greater retention in methadone maintenance. Given that a fifth of ATOS participants reported living alone during the month preceding interview, it will be important to consider the effect of social support when assessing outcomes at three and twelve months.

4.9 *Criminal activity*

As in NTORS,[37] a large proportion of the sample had been criminally active in the month prior to interview, with acquisitive property crime being the type of offence most commonly reported. Notably, there was no gender effect, with over a half of males and females having committed a crime in the preceding month.

4.10 *Health*

The overall physical health of the sample was poor, being close to one standard deviation below the norm for the general population. Females reported poorer general and injection-related health than males. This latter finding concords with the results of an earlier study conducted by the authors in which female injectors reported more injection related problems than males, necessitating the use of a greater number of physical injection sites.[52]

4.11 *Mental Health*

The sample exhibited a high degree of psychiatric comorbidity, with a half having scores indicative of severe disability on mental health scale of the SF-12, a quarter meeting criteria for a current DSM-IV diagnosis of Major Depression, a third having ever attempted suicide and 41% meeting DSM-IV criteria for PTSD. Given that over 90% of the sample had experienced at least one of the extremely stressful or upsetting events that may trigger PTSD, it is remarkable that the rate of PTSD was not higher. Personality disorders were also prevalent among the sample, with almost three quarters meeting DSM-IV criteria for ASPD and half screening positive for BPD. Once again, the RR group showed greater impairment than the other modalities, being more likely than the MT and NT groups to have a mental health score on the SF-12 indicative of severe distress, more likely than the DTX and NT groups to receive a diagnosis of PTSD and more likely than all modalities to screen positive for BPD.

4.12 *Conclusion*

All three treatment modalities clearly face many challenges when addressing the needs of people entering treatment for heroin dependence. Comorbid psychiatric and drug problems are prevalent among the ATOS sample and are likely to influence treatment outcomes. As in NTORS,[37] participants in the RR group reported more severe problems on entry to treatment than those in other modalities. Future reports will present data on the impact of treatment at 3 and 12 months, adjusting statistically for any differences in client characteristics noted at baseline.

5.0 REFERENCES

1. Hall, W. & Darke, S. (1997) Trends in opiate overdose deaths in Australia 1979-1995. *Drug & Alcohol Dependence, 52,* 71-77.

2. Darke, S., Ross, J., Zador, D. & Sunjic, S. (2000) Heroin-related deaths in New South Wales, Australia, 1992-1996. *Drug & Alcohol Dependence, 60,* 141-150.

3. Darke, S., Kaye, S. & Topp, L. (2002) New South Wales Drug Trends 2001: Findings from the illicit drug reporting system (IDRS). NDARC Technical Report 125. Sydney, National Drug and Alcohol Research Centre.

4. Darke, S., Topp, L., Kaye, S. & Hall, W. (2002) Heroin in New South Wales, Australia, 1996-2000: 5 year monitoring of trends in price, purity, availability and use from the Illicit Drug Reporting System (IDRS). *Addiction, 97,* 179-186.

5. Hall, W. (1996) Methadone maintenance treatment as a crime control measure. (NSW Bureau of Crime Statistics and Research) Crime and Justice Bulletin, 29.

6. Australian Bureau of Criminal Intelligence. (1997) *Australian Illicit Drug Report 1996-97.* Canberra: Australian Bureau of Criminal Intelligence.

7. Hall, W.D., Ross, J.E., Lynskey, M.T., Law, M.G. & Degenhardt, L.J. (2000) How many dependent heroin users are there in Australia? *Medical Journal of Australia, 173*, 528-531.

8. Degenhardt, L. (2002) Opioid overdose deaths in Australia 2001. Sydney: National drug & alcohol research centre. ISSN: 1445-9833.

9. Mathers, C., Vos, T. & Stevenson, C. (1999) The Burden of Disease and Injury in Australia. Canberra: Australian Institute of Health and Welfare.

10. Davoli, M., Perucci, C., Rapiti, E., Bargagli, A., D'Ippoliti, D., Forastiere, F. & Abeni, D. (1997) A persistent rise in mortality among injection drug users in Rome, 1980 through 1992. *American Journal of Public Health, 87,* 851-853.

11. Hulse, G., English, D., Milne, E. & Holman, C. (1999) The quantification of mortality resulting from the regular use of illicit opiates. *Addiction, 94,* 221-229.

12. Degenhardt, L. (2001) Opioid Overdose Deaths in Australia. Sydney: National Drug and Alcohol Research Centre.

13. Darke, S., Ross, J. & Hall, W. (1996) Overdose among heroin users in Sydney, Australia: I. Prevalence and correlates of non-fatal overdose. *Addiction, 91,* 405-411.

14. McGregor, C., Darke, S., Ali, R. & Christie, P. (1998) Experience of non-fatal overdose among heroin users in Adelaide, Australia: circumstances and risk perceptions. *Addiction, 93,* 701-711.

15. Darke, S. & Ross, J. (2001) The relationship between suicide and heroin overdose among methadone maintenance patients in Sydney, Australia. *Addiction, 96,* 1443-1453.

16. Kaldor, J., Plant, A., Thompson, S., Longbottom, H. & Rowbottom, J. (1996) The incidence of hepatitis B infection in Australia: an epidemiological review. *Medical Journal of Australia, 165,* 322-326.

17. Crofts, N. & Aitken, C. (1997) Incidence of bloodborne virus infection and risk behaviours in a cohort of injecting drug users in Victoria, 1990-1995 *Medical Journal of Australia, 167*, 17-20.

18. Darke, S. & Ross, J. (1997) Polydrug dependence and psychiatric comorbidity among heroin injectors, *Drug and Alcohol Dependence, 48,* 135-141.

19. Darke, S., Swift, W. & Hall, W. (1994) Prevalence, severity and correlates of psychological morbidity among methadone maintenance clients. *Addiction, 89,* 211-217.

20. Swift, W., Williams, G., Neill, O. & Grenyer, B. (1990) The prevalence of minor psychopathology in opioid users seeking treatment. *British Journal of Addiction, 85,* 629-634.

21. Clark, H., Masson, C., Delucchi, K., Hall, W. & Sees, K. (2001) Violent traumatic events and drug abuse severity. *Journal of Substance Abuse Treatment, 20,* 121-127.

22. Trull, T., Sher, K., Minks-Brown, C., Durbin, J., & Burr, R. (2000) Borderline personality disorder and substance use disorders: A review and integration. *Clinical Psychology Review, 20,* 235-253.

23. Villagomez, R., Meyer, T., Lin, M. & Brown, L. (1995) Post-traumatic stress disorder among inner city methadone maintenance patients. *Journal of Substance Abuse Treatment, 12,* 253-257.

24. Australian Bureau of Statistics. (1997) National Survey of Mental Health and Well-Being. Canberra: Commonwealth of Australia.

25. Eland-Goossensen, A., van de Goor, I., Garretsen, H. & Schudel, J. (1997) Screening for psychopathology in the clinical practice. *Journal of Substance Abuse Treatment, 14,* 585-591.

26. Hall, W., Bell, J. & Carless, J. (1993) The history of criminal convictions among applicants for an Australian methadone maintenance program. *Drug and Alcohol Dependence, 31,* 123-129.

27. Gossop, M., Marsden, J., Stewart, D. & Rolfe, A. (2000) Reductions in acquisitive crime and drug use after treatment of addiction problems: 1-year follow-up outcomes. *Drug and Alcohol Dependence, 58,* 165-172.

28. Darke, S. (1994) The use of benzodiazepines among injecting drug users. *Drug & Alcohol Review, 13,* 63-69.

29. Darke, S., Topp, L. & Ross, J. (2002) The injection of methadone and benzodiazepines among Sydney injecting drug users 1996-2000: 5 year monitoring of trends from the Illicit Drug Reporting System. *Drug & Alcohol Review, 21,* 27-32.

30. Ross, J., Darke, S. & Hall, W. (1997) Transitions between routes of benzodiazepine administration among heroin users in Sydney. *Addiction, 92,* 697-705.

31. Darke, S., Ross, J. & Hall, W. (1996) Prevalence and correlates of the injection of methadone syrup in Sydney, Australia. *Drug and Alcohol Dependence, 43,* 191-198.

32. Simpson, D. & Sells, S. (1982) Effectiveness of treatment for drug abuse: An overview of the DARP research program. *Advances in Alcohol and Substance Abuse, 2,* 7-29.

33. Simpson, D. & Sells, S. (1990) Opioid addiction and treatment: A 12 year follow-up. Malabar, FL: R. E. Krieger.

34. Hubbard, R., Marsden, M., Rachal, J., Harwood, H., Cavanaugh, E. & Ginzburg, H. (1989) Drug abuse treatment: A national study of effectiveness. Chapel Hill: University of North Carolina Press.

35. Hubbard, R.L., Craddock, S.G, Flynn, P.M., Anderson, J. & Etheridge, R.M. (1997) Overview of 1-year follow-up outcomes in the Drug Abuse Treatment Outcome Study (DATOS). *Psychology of Addictive Behaviors, 11,* 261-278.

36. Gossop, M., Marsden, J., Stewart, D., Edwards, C., Lehmann, P., Wilson, A. & Segar, G. (1997) The National Treatment Outcome Research Study in the United Kingdom: Six-month follow-up outcomes. *Psychology of Addictive Behaviors, 11,* 324-337.

37. Gossop, M., Marsden, J., Stewart, D., Lehmann, P., Edwards, C., Wilson, A. & Segar, G. (1998) Substance use, health and social problems of service users at 54

drug treatment agencies. Intake data from the National Treatment Outcome Research Study. *British Journal of Psychiatry, 173,* 166-171.

38. Henderson, N., Ross, J, Darke, S., Teesson, M. & Lynskey, M. (2002) Longitudinal studies of dependent heroin users in Australia: Feasibility and benefits. NDARC Monograph No. 49. Sydney: National Drug and Alcohol Research Centre.

39. Strang, J., Ruben, S., Farrell, M. & Gossop, M. (1994) Prescribing heroin and other injectable drugs. In J. Strang and M. Gossop (Eds),Heroin Addiction and Drug Policy. The British System. Oxford: Oxford University Press.

40. Stancliff, S. (2001). Methadone maintenance. *American Family Physician, 63*, 2335-2336.

41. Darke, S., Hall, W., Wodak, A., Heather, N. & Ward, J. (1992) Development and validation of a multi-dimensional instrument for assessing outcome of treatment among opiate users: The Opiate Treatment Index. *British Journal of Addiction, 87,* 733-742.

42. Ware, J., Kosinski, M. & Keller, S. (1996) A 12-Item Short-Form Health Survey: construction of scales and preliminary tests of reliability and validity. *Medical Care, 34,* 220-233.

43. Sanderson, K. & Andrews, G. (2002) Prevalence and severity of mental health related disability and relationship to diagnosis. *Psychiatric Services, 53,* 80-86.

44. Andrews, G., Hall, W., Teesson, M. & Henderson, S. (1999) The mental health of Australians: National Survey of Mental Health and Wellbeing. Canberra: Commonwealth Department of Health and Aged Care

45. Robins, L.N., Helzer, J.E., Croughan, J. & Ratcliff, K.S. (1981) National Institute of Mental Health Diagnostic Interview Schedule: its history, characteristics, and validity. *Archives of General Psychiatry, 38,* 381-389.

46. Topp, L., Kaye, S., Bruno, R., Longo, M., Williams, P., O'Reilly, B., Fry, C., Rose, G. & Darke, S. (2002) Australian Drug Trends 2001: Findings of the Illicit Drug Reporting System (IDRS). NDARC Monograph No. 48. Sydney: National Drug and Alcohol Research Centre.

47. Swift, W., Maher, L. & Sunjic, S. (1999) Transitions between routes if heroin administration: a study of Caucasian and Indochinese heroin users in south-western Sydney, Australia. *Addiction, 94,* 71-82.

48. Darke, S. & Ross, J. (2000) Fatal heroin overdoses resulting from non-injecting routes of administration, NSW, Australia, 1992-1996. *Addiction, 95,* 569-73.

49. Warner-Smith, M., Darke, S., Lynskey, M. & Hall, W. (2001) Heroin overdose: causes and consequences. *Addiction, 96,* 1113-1125.

50. McLellan, A.T. (1983) Patient characteristics associated with outcome. In J.R. Cooper, F. Altman, B.S. Brown & D. Czechowicz (Eds.), Research on the treatment of narcotic addiction: State of the art (pp. 500-529). Rockville, MD: National Institute on Drug Abuse.

51. Hubbard, R.L., Marsden, M.E., Rachal, J.V., Harwood, H.J., Cavanaugh, E.R. & Ginzburgh, H.M. (1989) Drug abuse treatment: a national study of effectiveness. Chapel Hill, NC: University of North Carolina Press.

52. Darke, S., Ross, J. & Kaye, S. (2001) Physical injecting sites among injecting drug users in Sydney, Australia. *Drug & Alcohol Dependence, 62*, 77-82.

APPENDIX A: ATOS Bulletin

APPENDIX B: DSM-IV criteria for Major Depressive Episode

CRITERION A - Five (or more) of the following symptoms have been present during the same two week period and represent a change from previous functioning; at least one of the symptoms is either (1) depressed mood or (2) loss of interest or pleasure.

(1) depressed mood most of the day, nearly every day, as indicated by either subjective report or observation made by others.
(2) markedly diminished interest or pleasure in all, or almost all, activities most of the day, nearly every day.
(3) significant weight loss when not dieting or weight gain, or decrease or increase in appetite nearly every day.
(4) insomnia or hypersomnia nearly every day.
(5) psychomotor agitation or retardation nearly everyday. (observable by others, not merely subjective feelings of restlessness or being slowed down).
(6) fatigue or loss of energy nearly every day.
(7) feelings of worthlessness or excessive or inappropriate guilt nearly every day (not merely self-reproach or guilt about being sick).
(8) diminished ability to think or concentrate, or indecisiveness nearly every day.
(9) recurrent thoughts of death (not just fear of dying), recurrent suicidal ideation without a specific plan, or a suicide attempt or a specific plan for committing suicide.

CRITERION B - The symptoms do not meet criteria for a mixed episode (not assessed in ATOS).

CRITERION C - The symptoms cause clinically significant distress or impairment in social, occupational, or other important areas of functioning.

CRITERION D - The symptoms are not due to the direct physiological effects of a substance or a general medical condition.

CRITERION E - The symptoms are not better accounted for by bereavement or are characterised by marked functional impairment, morbid preoccupation with worthlessness, suicidal ideation, psychotic symptoms, or psychomotor retardation.

APPENDIX C: DSM-IV criteria for Post Traumatic Stress Disorder

CRITERION A - The person has been exposed to a traumatic event in which both of the following were present:

(1) the person experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or threat to the physical integrity of self or others;
(2) the person's response involved intense fear, helplessness, or horror.

CRITERION B - The traumatic event is persistently re-experienced in one or more of the following ways:

(1) recurrent and intrusive distressing recollections of the event including images, thoughts, or perceptions;
(2) recurrent distressing dreams of the event;
(3) acting or feeling as if the traumatic event were recurring (includes a sense of reliving the experience, illusions, hallucinations, dissociative, flashback episodes);
(4) intense psychological distress at exposure to internal or external cues that symbolise or resemble an aspect of the traumatic event;
(5) physiological reactivity on exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event.

CRITERION C - Persistent avoidance of stimuli associated with the trauma and numbing of general responsiveness, as indicated by three or more of the following:

(1) efforts to avoid thoughts, feelings, or conversations associated with the trauma;
(2) efforts to avoid activities, places, or people that arouse recollections of the trauma;
(3) inability to recall some important aspect of the trauma;
(4) markedly diminished interest or participation in significant events;
(5) feeling of detachment or estrangement from others;
(6) restricted range of affect (e.g. unable to have loving feelings);
(7) sense of a foreshortened future.

CRITERION D – Persistent symptoms of increased arousal, as indicated by two or more of the following:

(1) difficulty falling or staying asleep;
(2) irritability or outbursts of anger;
(3) difficulty concentrating;
(4) hypervigilance;
(5) exaggerated startle response.

CRITERION E – Duration of the disturbance is more than one month.

CRITERION F – The disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.