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**Cocaine use among the ATOS NSW sample:
Prevalence and related harms**

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COCAINE USE AMONG THE ATOS NSW SAMPLE: PREVALENCE AND RELATED HARMS

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EXECUTIVE SUMMARY

Introduction

In recent years cocaine use has become prevalent among heroin users in NSW. This is a cause for concern, as research suggests that the associated harms of cocaine use are over and above those generated by heroin use alone. Despite this, the impact of concurrent heroin and cocaine use on existing heroin users in NSW is yet to be thoroughly investigated. Moreover, the effect of this pattern of drug use on treatment outcome for heroin dependence has yet to be examined in an Australian context.

The current study was conducted as part of the Australian Treatment Outcome Study (ATOS). ATOS is the first large scale longitudinal study of treatment outcome for heroin dependence to be conducted in Australia. The aims of the current study were: to determine the prevalence of cocaine use among individuals presenting for treatment for heroin dependence across the Sydney region; to compare the clinical profile of heroin users who also use cocaine to that of those who do not.

Results

Prevalence

Cocaine use was common amongst the ATOS sample with 91% having a lifetime history of cocaine use and 40% reporting cocaine use in the month preceding interview (CU). A quarter of CU had used cocaine more than once per day in the past month.

Social functioning

CU presented for treatment as a more dysfunctional group. They were more likely to report being homeless, unemployed and involved in criminal activity in the past month than were non-cocaine users (NCU).

Drug use

While the drug use histories of CU and NCU did not differ, their recent drug use patterns indicated CU to be more heavily entrenched in the drug scene. CU reported

higher levels of current heroin use and dependence, as well as more extensive recent polydrug use.

Risk-taking

CU emerged as a particularly 'at risk' group. They were more likely to report both borrowing and lending needles in the month prior to interview than NCU, placing them at a particularly high risk of contracting and spreading blood-borne viruses. CU were also more likely to report having experienced a heroin overdose in the past month.

Physical and mental health

Poor physical and mental health was found throughout the sample. Three quarters of the sample has experienced an injection-related health problem in the last month and the mean SF-12 physical health score of ATOS participants was below average. Comorbid psychological conditions were common and high levels of psychological distress likewise. CU and NCU did not differ in relation to mental or physical health.

Conclusion

Cocaine use is common among heroin users in NSW. CU have a different clinical profile to NCU and appear to be a more 'at risk' group, displaying greater psychosocial dysfunction and higher levels of heroin use and dependence. It is currently unknown what effect these differences will have on treatment outcome. These baseline findings will be taken into account when assessing the 3 and 12-month follow-up data.

1.0 INTRODUCTION

In the United States opiate dependent individuals have commonly used cocaine since the 1930s (Grinspoon & Bakalar, 1976). This phenomenon was first investigated in a systematic way when methadone maintenance treatment was introduced in the 1960's. In a national study of individuals admitted to American methadone programs from 1968-69, previous cocaine use was reported by 73% of the sample (Chambers, Taylor, & Moffett, 1972). The problems associated with cocaine use alone, and in combination with heroin, became increasingly evident as the prevalence and frequency of cocaine use in the United States surged in the late 1970's, before peaking in the mid 1980's and stabilising at high rates in the 1990's (Platt, 1997).

The cocaine situation in Australia is vastly different to that of America. Despite fears in the 1980's that a cocaine 'epidemic' would occur in Australia (as it had in the United States), this did not eventuate (Hall & Hando, 1993). Instead, cocaine appeared to be used primarily by recreational polydrug users, generally at low frequencies (Hall, Carless, Homel, Flaherty, & Reilly, 1991). Moreover, it seemed that even if the availability of cocaine were to increase there would not be a large market for it (Homel, Flaherty, Reilly, Hall, & Carless, 1990).

Cocaine remains difficult to obtain across most of Australia (Roxburgh, Degenhardt, Breen, & Barker, 2003) with only 4.4% of the population having a lifetime history of cocaine use (Andrews, Hall, Teesson, & Henderson, 1999). The largest cocaine market in Australia is located in Sydney, where two distinct groups of cocaine users have been identified (Hando, Flaherty, & Rutter, 1997). The first group is comprised of high socio-economic status (SES) individuals. This group primarily use cocaine intranasally and reportedly experience few serious problems associated with this use. The other group consists of low SES individuals who are typically primary heroin users. This group inject cocaine, heroin and other drugs, are often unemployed and are commonly involved in criminal activity. These low SES heroin injectors were found to have a far greater likelihood of experiencing a range of serious physical and psychological problems associated with their cocaine use (Hando et al., 1997).

While the prevalence of cocaine use among the general Australian population is low (Roxburgh et al., 2003), among the low SES heroin injectors identified in Sydney, cocaine use is now widespread (Darke, Kaye, & Topp, 2002). Indeed, the recent expansion of Sydney's cocaine market occurred almost exclusively among existing heroin users. The first major increase in both the prevalence and frequency of cocaine use amongst heroin injectors occurred in 1998 when cocaine became available to this group in smaller and thus more affordable quantities (Darke et al., 2002). The second major surge in cocaine use occurred in 2001. At this time a marked reduction in the supply of heroin in Sydney was observed, while the availability of cocaine increased. These shifts in the drug market led to huge increases in cocaine use among heroin users, such that 84% reported having used cocaine in the preceding six months and 29% reported daily usage. In 2002, as heroin became easier to obtain and cocaine less so, cocaine use among heroin users decreased somewhat, but remains at high levels (Roxburgh et al., 2003).

The recent surge in the concurrent use of heroin and cocaine amongst Sydney IDU (injecting drug users) is of major importance. Many adverse health effects are associated with cocaine use. For example, unlike heroin, cocaine is highly cardiotoxic, inducing a range of physical health problems such as myocardial ischemia and infarction not associated with heroin use (Lange & Hillis, 2001). Cocaine use has also been demonstrated to have adverse effects on many bodily systems including; venous, musculoskeletal, dermatological, gastrointestinal, pulmonary and obstetric (Platt, 1997). Indeed, cocaine is responsible for the largest proportion of drug-related deaths reported by medical examiners in America (Lange & Hillis, 2001).

Overseas research suggests that the associated harms of heroin and cocaine co-use are over and above those caused by heroin use alone. The comparatively short duration of cocaine's subjective effects (less than 30 minutes) means that it must be injected more frequently than other drugs in order to maintain the desired effects (Platt, 1997). Thus, heroin users who also use cocaine (CU) have been found to inject significantly more often than other heroin users (NCU) ((Bux, Lamb, & Iguchi, 1995); (Meandzija, O'Connor, Fitzgerald, B.J., & Kosten, 1994) and to be both more likely to borrow and lend needles (Grella, Anglin, & Wugalter, 1995; Hudgins, McCusker, & Stoddard, 1995; Joe & Simpson, 1995; Meandzija et al., 1994).

An association between cocaine injection and higher HIV seroprevalence has been repeatedly demonstrated (Chaisson et al., 1989; Des Jarlais et al., 1989; Haberman & French, 1993; Torrens, San, Peri, & Olle, 1991) It has also been suggested that taking cocaine in conjunction with heroin may increase the likelihood of heroin overdose (Platt, 1997; Kerfoot, Sakoulas & Hyman, 1996).

International research suggests that CU also display greater levels of psychosocial dysfunction (Kosten, Rousanville, & Kleber, 1988). Studies have found CU to be more criminally active than NCU (Grella et al., 1995) and to have a higher incidence of mental health problems such as depression (Torrens et al, 1991). Research also indicates that heroin users who also use cocaine have poorer treatment outcome (eg continued heroin use and crime) than those who do not (Bux et al., 1995; Condelli, Fairbank, Dennis, & Rachal, 1991; Perez de los Cobos, Trujols, Ribalta, & Casas, 1997)

Only a small number of studies have been conducted into cocaine use among IDU in Sydney and none have been conducted elsewhere in Australia. These studies, like those conducted overseas, found IDU who use cocaine to exhibit high levels of drug-related harm. Sydney studies found cocaine use to be associated with more frequent injection (Kaye, Darke, & McKetin, 2000; Kaye, Darke, & Topp, 2001; Ross et al., 2002; Van Beek, Dwyer, & Malcom, 2001) and more frequent needle sharing behaviour (Darke, Baker, Dixon, Wodak, & Heather, 1992). Cocaine users were also more likely than other IDU to experience injection-related health problems, such as abscesses and difficulty injecting (Kaye et al., 2000; Van Beek et al., 2001) and to be criminally active (Kaye et al., 2000). Mental health problems such as depression and anxiety (Hando et al., 1997) as well as psychosis (Hando et al., 1997; Van Beek et al., 2001) have also been found to occur at higher levels amongst Sydney's cocaine injectors.

While these Sydney studies highlight the associated harms of cocaine injection, their primary focus is cocaine use, not cocaine use amongst heroin users. As such, they do not include control groups of heroin users who were not also recent cocaine users (with the exception of Kaye et al (2000) which compared cocaine injectors with other IDU the majority of whom were heroin injectors). This makes the additive effect of cocaine-related harms on heroin-related harms difficult to establish. Further, no Australian research has been conducted into the effect of cocaine use on treatment outcome for

heroin dependence. Less than 1% of individuals entering substance abuse treatment in Australia in 2001 cited cocaine as their main drug of concern (Shand & Mattick, 2002). However, it is currently unknown what proportion of those entering treatment for heroin dependence also use cocaine, or what effect this concurrent use has on treatment outcome.

The current study was conducted as a part of The Australian Treatment Outcome Study (ATOS). 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. ATOS aims to; describe the characteristics of people seeking treatment for problems associated with heroin use in Australia; describe the treatment received; and examine treatment outcomes (drug use, health and criminal behaviour) and costs at 3 and 12 months after commencement of treatment.

The current study was designed as a first step in investigating the effect of concurrent cocaine use on treatment outcome for heroin dependence in NSW. The prevalence of cocaine use amongst individuals presenting for treatment for heroin dependence (Methadone/buprenorphine maintenance, detoxification and Residential Rehabilitation/Therapeutic Communities), and among a control group of individuals not currently enrolled in or seeking treatment, will be determined. In addition, the correlates of cocaine use among heroin users will be established.

1.1 Study aims

The specific aims of the present study were as follows:

1. To determine the prevalence of cocaine use among individuals presenting for treatment for heroin dependence across the Sydney region, and among heroin dependent individuals not currently seeking treatment;
2. To compare the clinical profile of heroin users who also use cocaine to that of those who do not.

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 was 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 facilities (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 (NSPs) in the regional health areas from which treatment entrants were recruited.

2.2 Procedure

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, 97 (6%) were passive refusals (i.e. failed to attend the interview) and 62 (4%) were direct refusals. Of the 836 clients who did not meet eligibility criteria for ATOS, the majority were excluded because they had been in treatment (65%), or had been in prison (17%) in the preceding month. A further 9% of clients were excluded because they had already participated in ATOS, and the remaining 9% for other reasons (unwilling to give contact details, under 18, or non-English speaking).

Similarly, in order to obtain the NT group, 434 clients of needle exchange programs were approached, of whom 80 (18%) were enrolled in the study: 213 (49% were ineligible, 129 (30%) refused to be screened and 11 (3%) refused to participate. Of the 213 clients who did not meet eligibility criteria for ATOS, the overwhelming majority were excluded because they had been in treatment (82%) in the preceding month. The next most common reasons for exclusion were that the person had not used heroin in the preceding month (13%), or had been in prison during that period (4%). The remaining 2% were excluded for other reasons (unwilling to give contact details, under 18, or non-English speaking).

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, 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) (Darke, Hall, Wodak, Heather, & Ward, 1992). 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

Standardised questions regarding non-fatal heroin overdose were used (Darke, Ross, & Hall, 1996b). 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 (Darke et al, 1992). 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 (Darke et al, 1992). Scores range from 0-5, with higher scores indicative of a greater number of current injection-related health problems.

2.5.7 General health

The Short Form-12 (SF-12) is a standardised, internationally used instrument that provides a global measure of physical and psychological health status (Ware, Kosinski, & Keller, 1996). 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. Each scale has a mean of 50 and a standard deviation of 10. Cut-offs have been established for the mental health score to determine degree of disability (Sanderson & Andrews, 2002). 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 (Darke et al, 1992), 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.

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) (Andrews et al., 1999) was modified to provide DSM-IV diagnoses of current Major Depression based on the month preceding interview.

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 (Andrews et al, 1999).

2.5.11 Anti-Social Personality Disorder

Diagnoses of antisocial personality disorder (ASPD) were obtained from the Diagnostic Interview Schedule (Robbins, Helzer, Croughan, & Ratcliff, 1981) modified to obtain DSM IV diagnoses. This instrument has been used previously by the authors (Darke & Ross, 2001)

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 (Andrews et al, 1999).

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*

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.

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. 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, $t_{613}=-3.34$, $p<0.01$). The majority of the sample (79%) was born in Australia, and 5% identified themselves as being of Aboriginal origin. The sample had completed a mean number 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 primary sources of income for the preceding month were; a 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. Significantly more men (48%) than women (27%) had a prison history ($\chi^2_{1df}=25.10$, $p<.01$). At the time of interview 7% had no fixed address and 5% were living in a boarding house or hostel. Full details of the sample are reported elsewhere (Ross et al., 2002).

3.2 Prevalence of cocaine use

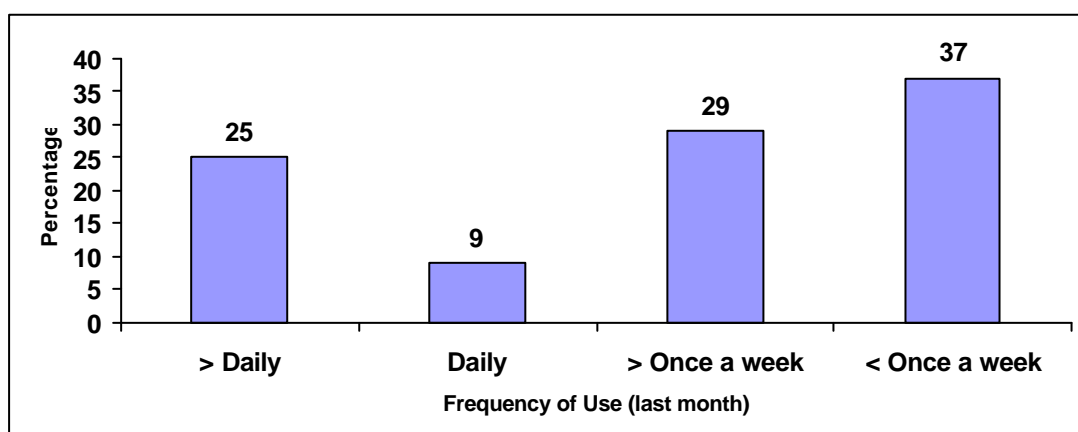
Almost all subjects (91%) had a lifetime history of cocaine use (Table 1). The majority of subjects reported using cocaine in the six months preceding interview (61%), with almost the same proportion reporting having injected cocaine within this period (56%). Forty percent of the sample had used cocaine in the month prior to interview.

Table 1. Cocaine use patterns among the ATOS NSW sample

	Males (n=407) %	Females (n=208) %	Total (n=615) %	Comparisons
Used (ever)	92	89	91	Not significant
Used (6 months)	62	59	61	Not significant
Injected (6 months)	57	55	56	Not significant
Used (1 month)	42	36	40	Not significant

Of those who had used cocaine in the month prior to interview, 34% reported at least daily usage (Figure 1). Amongst these daily users, 74% had used more than once per day on average. High frequency cocaine use was common in the sample, with 15% having used cocaine at least five times on a given use day in the last month. No sex differences were observed in frequency of cocaine use.

Figure 1. Frequency of cocaine use among current cocaine users in the ATOS NSW sample (n=246)



3.3 Comparisons of CU and NCU

3.3.1 Comparative demographic characteristics

For analytic purposes, those subjects who had used cocaine in the month preceding interview (n=246) were classified as cocaine users (CU), while those who had not used cocaine during this period (n=369) were classified as non-cocaine users (NCU). The demographic characteristics of the CU and NCU groups are presented in Table 2.

Table 2. Comparative demographic characteristics of CU and NCU

	CU (n=246)	NCU (n=369)	Comparisons
Age	29.43	29.18	Not significant
Male (%)	70	64	Not significant
Education (Yrs)	10.02	9.94	Not significant
<i>Main source of income (%)</i>			
Wage	12	21	χ^2 1df=8.03, p<.01
Criminal activity	33	18	χ^2 1df=18.62, p<.001
Homeless (%)	14	5	χ^2 1df=13.01, p<.001
<i>Prison history (%)</i>			
Lifetime	46	37	χ^2 1df=5.19, p<.05
12 month	22	13	χ^2 1df=9.88, p<.01
Previous Treatment (%)	93	89	Not significant
<i>Treatment being entered (%)</i>			
Methadone/Buprenorphine	23	39	χ^2 1df=18.07, p<.001
Detoxification	36	30	Not significant
Residential Rehabilitation	21	22	Not significant
Non Treatment	20	8	χ^2 1df=18.50, p<.001

No significant differences existed between CU and NCU in age, sex or education level achieved (Table 2). More CU than NCU were homeless in the month prior to interview (14% vs 5%). CU were significantly less likely than the NCU to have obtained the majority of their income from paid employment in the month prior to interview and more likely to have generated most of their income from criminal activity. In keeping with this, the CU group were more likely to have ever been imprisoned and to have been imprisoned in the preceding 12 months.

CU and NCU were equally likely to have previously enrolled in a drug treatment program (93% vs 89%), but differences were found in relation to current treatment type. CU were less likely to be enrolled in a maintenance pharmacotherapy (23% vs 39%) and significantly more likely to be not currently enrolled in, or seeking, treatment (20% vs 8%) at the time of interview.

3.3.2 Drug use history

CU and NCU did not differ in terms of mean age of first intoxication on any drug (13 vs 14 years). Age of first heroin use was 18 years across the sample. Both groups had used a mean of 9 drug classes over the course of their lives. In the month prior to interview, however, CU had used significantly more drug classes than NCU (5 vs 4 when cocaine was excluded from the analysis).

CU were significantly more likely to nominate injection as their usual route of heroin administration than NCU and displayed higher levels of heroin dependence. Consistent with this, CU also reported using heroin significantly more times per day (3 vs 2) (Table 3).

Table 3. Drug use histories of CU and NCU

	CU (n=246)	NCU (n=369)	Comparisons
Age 1 st intoxicated (yrs)	13.57	13.83	Not significant
Age 1 st heroin (yrs)	19.52	19.74	Not significant
<i>Polydrug use</i>			
Drug classes (ever)	9.12	8.96	Not significant
Drug classes (month)	4.75	4.30	$t_{613}=-3.56, p<.01$
Number of heroin dependence symptoms	5.67	5.43	$t_{597}=-2.60, p<.05$
Heroin shots per day (med)	3	2	$U=38863, p<.01$
Primary use of heroin by non-injecting methods (%)	4	13	$\chi^2 1df=15.59, p<.01$

CU were significantly more likely to have used amphetamines and hallucinogens in the month prior to interview than NCU (Table 4). CU were also significantly more likely to have used inhalants during this period, however, inhalants were used at extremely low rates across the sample (3% vs 0.5%). Rates of other drug use did not differ between groups.

Table 4. Prevalence of drug use (last month)

Drug Class	CU (n=246) %	NCU (n=369) %	Comparisons
Heroin	99	99	Not significant
Other Opiates	34	27	Not significant
Amphetamines	38	24	χ^2 1df=14.61, p<.01
Hallucinogens	15	6	χ^2 1df=14.03, p<.01
Benzodiazepines	49	47	Not significant
Antidepressants	11	16	Not significant
Alcohol	57	51	Not significant
Cannabis	72	65	Not significant
Inhalants	3	0.5	χ^2 1df=6.78, p<.05
Tobacco	97	95	Not significant

3.3.3 Risk-taking behaviour

CU reported injecting significantly more often than NCU in the month prior to interview (Table 5). Ninety one percent of CU injected at least once per day, as compared to 71% of NCU. Similarly, 44% of CU reported injecting more than three times per day, as compared to 20% of NCU.

CU engaged in significantly more needle risk-taking behaviour, being both more likely to have borrowed, and lent, a needle in the last month. Amongst both groups needles were overwhelmingly borrowed from one other person only.

Table 5. Risk-taking behaviour

	CU (n=246) %	NCU (n=369) %	Comparisons
<i>Injection frequency</i>			
< once per day	9	29	χ^2 1df=33.18, p<.001
once a day	12	11	Not significant
2-3 times per day	35	40	Not significant
>3 times per day	44	20	χ^2 1df=39.72, p<.001
Borrowed needle (mth)	24	15	χ^2 1df=9.30, p<.05
<i>Number of people borrowed from (mth)</i>			$t_{564}=-2.02$, p<.05
None	76	85	
One	21	13	
Two or more	3	2	
Lent needle (mth)	33	25	χ^2 1df= 4.54, p<.05

3.3.4 Criminal activity

CU were significantly more likely than NCU to report criminal involvement in the month prior to interview (Table 6). More CU than NCU had recently engaged in property crime, drug dealing and fraud. The only type of crime CU did not report a greater frequency of involvement in was violent crime.

Table 6. Criminal involvement in month preceding interview

	CU (n=246) %	NCU (n=369) %	Comparisons
Property Crime	48	33	χ^2 1df=15.61, p<.01
Dealing	30	21	χ^2 1df=5.90, p<.05
Fraud	21	12	χ^2 1df=7.59, p<.01
Violent Crime	12	7	Not significant
Any Crime	65	48	χ^2 1df=18.78, p<.01

3.3.5 Physical health

CU were more likely than NCU to report a lifetime history of heroin overdose and to have overdosed in the month prior to interview (Table 7). CU were also more likely to have ever received Narcan.

Poor general physical, and injection-related, health was found across groups. The mean SF-12 physical scores did not differ between groups. Both sets of scores fell half a standard deviation below the mean indicating poor overall health, and 9% of the sample met criteria for severe disability. The majority of subjects in both groups had experienced at least one injection related health problem in the last month (77% vs 72%). The most common injection-related health problem reported was prominent scarring/bruising.

Table 7. Physical health

	CU (n=246) %	NCU (n=369) %	Comparisons
Overdosed (ever)	59	51	χ^2 1df=4.20, p<.05
<i>Narcan</i>			
Ever	47	37	χ^2 1df=5.80, p<.05
12 month	20	17	Not significant
SF 12 physical health score	44	44	Not significant
<i>Injection related health problems (mth)</i>			
Overdose	13	7	χ^2 1df=6.05, p<.05
Abscesses/infections	9	11	Not significant
Dirty hit	16	22	Not significant
Prominent scarring/Bruising	64	59	Not significant
Difficulty Injecting	40	40	Not significant

3.3.6 Mental health

Levels of psychological distress were uniformly high across groups (Table 8). The overwhelming majority of subjects met criteria for ASPD, while BPD and PTSD were indicated in 41% of both NCU and CU. Extremely poor general psychological health and high rates of current major depression (22% vs 27%) were reported throughout the sample. In keeping with this, a lifetime (37% vs 32%) or 12-month (15% vs 12%) history of suicide attempts was also reported by a large number of subjects.

Table 8. Mental health

	CU (n=246) %	NCU (n=369) %	Comparisons
PTSD	41	41	Not significant
Borderline PD	41	41	Not significant
ASPD	74	70	Not significant
SF 12 psychological health score	32	31	Not significant
Major Depression	22	27	Not significant
<i>Suicide</i>			Not significant
Ever	37	32	
12 months	15	12	
1 month	5	5	
<i>Current suicidal ideation</i>			Not significant
Recurrent thoughts of death	30	29	
Recurrent thoughts of suicide	22	24	
Suicide Plan	9	14	

4.0 DISCUSSION

4.1 Major findings

Cocaine was widely used among heroin dependent individuals in NSW, with almost all having a lifetime history of cocaine use. The majority of subjects had used cocaine in the preceding six months and almost half reported use in the month prior to interview. Cocaine was used overwhelmingly by injection and a quarter of those who had used cocaine in the past month reported doing so more than once per day.

Consistent with international research, CU emerged as a more dysfunctional group than NCU. Some of this dysfunction appears attributable to the greater financial pressures associated with using cocaine in addition to heroin. CU were thus both more likely to have engaged in criminal activity in the month prior to interview and to report having gained the majority of their income through such activity. In concordance with this, CU were more likely to have ever been imprisoned and to have been imprisoned in the last year. Significantly, a substantial minority of CU reported being homeless in the month preceding interview. Unemployment was also more common amongst this group.

While the drug use histories of CU and NCU did not differ, CU's current drug use patterns were indicative of heavier involvement in the drug scene. CU had used heroin more frequently than NCU in the month prior to interview and displayed higher levels of heroin dependence. Moreover, CU had engaged in more frequent injection and more extensive recent polydrug use, being more likely to have used amphetamines, hallucinogens and inhalants.

Not surprisingly, CU were also found to be a more 'at risk' group. While heroin overdose was common throughout the sample, more CU than NCU had overdosed over the course of their lives, and in the last month. Injection related risk-taking behaviour also occurred at particularly high levels amongst CU, with both needle borrowing and lending being more prevalent amongst this group.

Poor physical and mental health characterised this sample. Extremely high levels of psychological distress and psychopathology were found amongst both CU and NCU and

a history of suicide attempts was common. Self-reported physical health was also substandard throughout the sample and the overwhelming majority of subjects had experienced an injection-related health problem in the past month.

4.2 Cocaine use patterns

In keeping with the findings of recent IDRS reports (eg Roxburgh, 2003) cocaine use was found to be widespread amongst heroin users in NSW: 91% of subjects had used cocaine at some time and 56% reported cocaine use in the past six months. This is an important finding, indicating that cocaine use among heroin dependent individuals is a problem now commonly faced by treatment agencies in NSW. No sex differences were found in either prevalence or frequency of cocaine use.

Forty one percent of participants had used cocaine in the month prior to interview (CU) and a quarter of this group had used daily during that time. Amongst daily users, nearly three quarters had used cocaine more than once a day on average. In keeping with other research (Van Beek et al, 2001), binge-like use of cocaine was found to be common, with 15% of CU reporting five or more cocaine use episodes on a given use day. Such high frequency cocaine use is a cause for concern as it increases the incidence of both injection-related and dose-related problems (Van Beek et al, 2001). No Australian studies have examined the incidence of cocaine overdose, but cocaine overdose related deaths are known to be a major problem in countries such as the United States. Indeed, in a study of medical examiner cases in New Jersey, cocaine (without heroin) was present in 49% of drug overdose deaths (Haberman et al, 1993).

4.3 Demographics

While CU and NCU did not differ in terms of mean age (29 years), gender breakdown (66% male) and mean length of school education (10 years), important differences were noted between the groups in regards to their level of social functioning. Nearly one in six CU were homeless in the month prior to interview (with a very conservative measure of homelessness being used). This finding suggests CU to constitute a particularly chaotic subset of heroin users and is especially worrying given the increased incidence of overdose that has been noted amongst homeless heroin users (Darke et al, 1996a). Higher levels of dysfunction were also evident in that CU were less likely than NCU to

have earned the majority of their income through paid employment in the month prior to interview, and more likely to have generated it through criminal activity. In keeping with this, almost half of all CU had a prison history and nearly a quarter had been incarcerated in the previous year.

Virtually all subjects had formerly enrolled in treatment for their heroin dependence, but CU and NCU differed in relation to current treatment type. The largest proportion of CU were enrolled in detoxification programs, while maintenance pharmacotherapies attracted the largest proportion of NCU. CU were also significantly more likely to be not currently enrolled in, or seeking, treatment.

4.4 Drug use

While CU and NCU did not differ in relation to drug use history, their current use patterns suggest CU to be more heavily entrenched in the drug scene. CU had engaged in a greater range of polydrug use in the month preceding interview (even when cocaine was excluded from the analysis), being more likely to have used amphetamines, hallucinogens and inhalants than NCU. CU also reported higher levels of heroin use and a correspondingly elevated level of heroin dependence. This pattern of drug use among Sydney CU was also noted by Kaye et al (2000) and is a cause for concern given that overdose risk increases with increasing levels of heroin use (Darke, Ross, & Hall, 1996a). Higher levels of heroin dependence and polydrug use suggest CU may be a more challenging group to treat. Interestingly, CU were also less likely to be primary heroin smokers than NCU.

4.5 Risk-taking behaviour

Amongst the ATOS sample, as in other studies (eg Kaye et al, 2000), CU were found to inject significantly more often than NCU. Forty four percent of CU reported injecting more than 3 times per day compared to 20% of NCU. Previous studies have repeatedly demonstrated an association between increased injection frequency and increased incidence of needle sharing (Bux et al, 1995; Meandzija et al, 1994). This pattern was also evident within the ATOS sample, where needle sharing and borrowing occurred at extremely high rates throughout, particularly among the CU group. Indeed, a quarter of

CU reported having borrowed a needle in the past month, while a third had lent a needle to somebody else.

Overseas research has found a strong link between high frequency injecting, needle risk taking behaviour and blood borne virus infection (Grella et al, 1995, Joe et al, 1995; Hudgins et al, 1995). The findings of the current study suggest that Sydney CU are a particularly 'at risk' group in relation to blood borne virus transmission.

4.6 Criminal activity

More than half of the sample had engaged in criminal activity in the month prior to interview. CU had engaged in property crime, drug dealing and fraud at significantly higher rates than NCU and were more likely to report some type of criminal activity during this period. This finding is consistent with that of other studies (Grella et al, 1995) and is indicative of the greater amount of money needed to support the more extensive drug use that characterises the CU group (ie greater levels of heroin and other drug use). This finding is also consistent with CU being more likely than NCU to report criminal activity as their primary source of income, and to report a history of incarceration. It is worthy of note that despite reports of high levels of violence and aggression among cocaine users in Sydney (Van Beek et al, 2001), CU were not more likely than NCU to report involvement in violent crime. However, while not significant, there was a trend towards CU reporting more violent crime than NCU.

4.7 Physical health

The majority of the ATOS sample had experienced a heroin overdose. Amongst CU, heroin overdose was even more common, with CU being more likely to have ever overdosed, and to have done so in the past month. CU were also more likely to have ever received Narcan, the administration of which is often deemed to be indicative of a 'serious' overdose.

An association between heroin and cocaine co-administration and an increased likelihood of heroin overdose has been suggested previously (Platt, 1997; Kerfoot et al, 1996), but is yet to be investigated thoroughly. Studies of fatal overdose rates do prove however, that the combination of heroin and cocaine is a common cause of overdose death. For

example, a recent study on accidental drug overdose deaths in New York City found that where more than one drug was detected post mortem (as it was in 57.8% of cases), opiates and cocaine were the most common combination (Coffin et al., 2003). A limitation of the current study is that information on the circumstances surrounding overdose (ie what drugs had been consumed immediately prior) was not collected. This renders it difficult to determine whether or not the combination of heroin and cocaine increased the likelihood of heroin overdose among CU, or whether it was the result of their greater heroin use and more chaotic lifestyle.

Across the ATOS sample poor physical health was the norm, with the average SF-12 score falling half a standard deviation below the mean and 9% meeting criteria for severe disability. These findings suggest that, as a group, heroin users are characterised by low levels of physical well being. Despite their heavier drug use and greater levels of homelessness, CU did not report worse physical health than NCU.

As would be expected due to the high rates of injecting in the sample, injection-related health problems were common and had been experienced by approximately three quarters of all subjects in the month prior to interview. While CU engaged in significantly higher frequency injecting than NCU, they were not more likely than NCU to have experienced an injection-related health problem in the last month. This is a surprising finding, and is in contrast to the results of other Sydney studies (Van Beek et al, 2001; Kaye et al, 2000). It is possible that CU were not distinguishable from NCU in regards to either injection related health problems, or general physical health, because the overall levels of these were so poor throughout the sample that a ceiling effect was created. The sample predominantly consists of entrants to treatment for heroin dependence, and it is possible that poor physical health was one of the factors driving people into treatment.

4.9 Psychological health

High levels of psychological distress and dysfunction were found throughout the ATOS sample. A quarter of subjects met criteria for current major depression and a third had attempted suicide at some time. These rates are far in excess of that of the general population (Australian Bureau of Statistics, 1997) and are of major clinical significance. Personality disorders were also extremely common. Almost three quarters of the sample

met criteria for ASPD and over a third for BPD. PTSD was also prevalent, with over a third meeting the DSM-IV criteria for this diagnosis.

CU were not found to display higher levels of psychological distress than NCU in relation to the measures used in this study. That CU did not exhibit a greater level of psychological distress is surprising both given this group's greater levels of dysfunction, and that other studies have found higher levels of problems such as depression among CU (Hando et al, 1997; Torrens et al, 1991). Indeed, cocaine has been associated with suicidal ideation to a greater extent than any other substances of abuse (Garlow, Purselle, & D'Orion, 2003). As with physical health, this lack of difference is most likely due to a ceiling effect. A limitation of the current study is that no information regarding psychosis was collected. This is unfortunate given that psychosis is perhaps the mental health problem most often associated with cocaine use in the popular imagination (Platt, 1997).

4.10 Conclusion

Cocaine use among heroin dependent individuals is now an issue commonly faced by treatment agencies in NSW. CU in Sydney display similar patterns of behaviour to their overseas counterparts, being more heavily involved in the drug scene and engaging in more criminal and injection related risk-taking behaviour. CU present for treatment as a more 'at risk' and dysfunctional group. As such, they present unique challenges to treatment providers. The effect of concurrent heroin and cocaine use on treatment outcome has yet to be investigated in an Australian setting. ATOS provides a unique opportunity to examine this issue. Future reports will compare CU and NCU on a range of outcome variables at 3 and 12 months post treatment entry.

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