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# Psycho-stimulant use, health and criminal activity among injecting heroin users

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# Psycho-stimulant use, health and criminal activity among injecting heroin users

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# Executive Summary

The present research sought to address three questions of relevance to illicit drug policy:

(1) What effect do the perceived price, purity and availability of heroin have on (a) heroin use and (b) heroin expenditure?

(2) What effect does the perceived risk of 'scoring', perceived 'hassle' associated with scoring and amount of contact with police have on (a) heroin use and (b) heroin expenditure?

(3) What differences are there in terms of adverse health and behavioural outcomes between intravenous drug users (IDUs) who use heroin only and IDUs who use a combination of heroin and psycho-stimulant drugs, such as cocaine and methamphetamine?

To address these questions a sample of 296 IDUs were recruited from needle and syringe program outlets in Sydney and from two metropolitan gaols. The first two questions were addressed by measuring indicators of supply-side drug law enforcement (price, purity, availability) and demand-side drug law enforcement (perceived risk of purchasing, hassle involved with purchasing, contact with police), and correlating these indicators with measures of heroin use and expenditure. The third question was addressed by comparing measures of physical and psychological health, risk behaviour and levels of criminal activity between opiate users who had only used opiates recently with opiate users who had also used psycho-stimulants recently.

Respondents for whom heroin was more difficult to procure spent less on heroin and used less heroin than IDUs who were able to purchase heroin more quickly. There was also a significant relationship between the amount of contact with police and heroin expenditure but it was in the opposite direction to that expected if police contact acted to directly reduce heroin expenditure. IDUs who had been stopped by police on a daily or near daily basis recently spent more on heroin each week than IDUs who had relatively infrequent contact with police. None of the other measures of law enforcement activity (price, purity, risk of buying or hassle involved with buying heroin) were predictive of either heroin use or expenditure.

Opiate users who had also used psycho-stimulants were more likely to have suffered a range of physical and psychological health problems, and were more likely to have committed a variety of types of crime than opiate users who had not used any psycho-stimulants recently. These findings counsel the need for great care in the intense application of street-level and supply-side drug law enforcement policy. Should efforts to reduce heroin use and expenditure result in any sustained increases in the use of other drugs such as psycho-stimulants, the result may be more rather than less harm to IDUs and to the wider community. Results are discussed in terms of their practical application for police and drug policy analysts.

# Introduction

The overarching goal of Australian drug policy is harm minimisation, which is underpinned by three strategies: supply reduction, demand reduction and harm reduction (Ministerial Council on Drug Strategy 1998). It is axiomatic that supply control policies are the responsibility of law enforcement agencies but in theory at least, law enforcement agencies can also make a contribution to demand reduction and harm reduction as well. The most significant contribution drug law enforcement might play in these areas is to reduce drug consumption, whether through limiting initiation into drug use, forcing current users to leave the drug market or by limiting the frequency of use among current users. At present, though, the contribution of drug law enforcement to these areas is both poorly understood and, in some quarters, hotly contested (Caulkins 2002).

## Supply reduction

The conventional economic rationale underpinning supply control is that the threat of arrest, imprisonment, drug seizures and asset seizures forces drug sellers and importers to charge higher prices for the drugs they sell to compensate themselves for the risks they take and the costs they incur (Reuter & Kleiman 1986). Conventional economic theory suggests that higher prices should lead to lower drug consumption and expenditure and, *ceteris paribus*, to a reduction in overall drug-related harm. This 'risks and prices' model of supply control has been criticised, however, on the grounds that demand for drugs such as heroin and cocaine is price-inelastic. Demand for any product is price-inelastic if a one per cent change in the price of that product produces a less than one per cent change in consumption. If the elasticity is less than one, pushing up the price of drugs such as heroin will only increase overall expenditure on them, leading to more crime and higher profits for drug sellers.[1]

Illicit drugs like heroin and cocaine are often thought to be price-inelastic because of their addictive properties. Early estimates from researchers in the USA tended to confirm this hypothesis. For example, an often-cited paper by Silverman and Spruill (1977) indicated that a 50 per cent increase in the price of heroin would bring a 14 per cent increase in property crime. On the weight of more recent research, however, there is growing consensus that demand is relatively elastic (e.g. Becker, Grossman & Murphy 1991; Caulkins 2001; Caulkins & Reuter 1998; Grossman & Chaloupka 1998; Manski, Pepper & Petrie 2001; Saffer & Chaloupka 1999; Stolzenberg & D'Alessio 2003; van Ours 1995). This finding might seem to contradict commonsense but many injecting drug users (IDU) use more of their drug of choice each day than they would need just to hold off withdrawal symptoms. This suggests that they might easily be able to adjust their daily intake in response to sudden price changes (Moore 1977). Research on the price elasticity of tobacco also suggests that cigarette smokers curb their consumption in response to increases in price (see Liang et al. 2003 for a review).

[1] Take for example the median price of $300 per gram paid by NSW heroin users in the 2002 Illicit Drug Reporting System (IDRS) survey (Roxburgh et al. 2003). Ten injecting drug users who each purchased 1 gram per day would spend $3000 on heroin per day. If the price were to increase by 10 per cent to $330 per gram, but consumption only decreased by 5 per cent, overall expenditure on heroin would increase by $135 per day among those 10 heroin users (9.5gm x $330 = $3135).

Striking confirmation of the price-elasticity of demand for heroin has emerged in Australia over the last few years. Early in 2001 the median price paid per gram increased from $220 to $320 (Roxburgh et al. 2003). This sudden increase in the cost of heroin was followed by greatly reduced heroin use frequency, expenditure on heroin and, potentially, a large reduction in the number of heroin users active in the heroin market (Day et al. 2004; Day et al. 2003; Weatherburn et al. 2003). The benefits of this reduction in heroin use have been substantial. Weatherburn et al. (2003) found a 74 per cent decrease in opioid-related overdose in one major Sydney heroin market (Cabramatta) following the onset of the shortage, and a 53 per cent reduction in overdose across NSW. The drop in heroin use also appears to have produced a significant fall in the incidence of robbery (Weatherburn, Donnelly & Chilvers 2003). Prima facie, these outcomes vindicate the assumption underpinning national drug policy that supply control policy has a role to play in harm reduction.

The shortage of heroin that appeared in 2001, however, also had an undesirable side effect. Many heroin users who were still in the market following the peak of the heroin shortage appear to have responded by increasing their consumption of other drugs, most notably cocaine[2] and methamphetamine (Day et al. 2003; Degenhardt, Gascoigne & Howard 2002; Topp, Day & Degenhardt 2003; Weatherburn et al. 2003). This switch to psycho-stimulants is a matter of some concern. The available evidence suggests that regular cocaine use is associated with a number of adverse health outcomes including: increased risk of overdose (Coffin et al. 2003), risky injection and unsafe sexual practices (Bux, Lamb & Iguchi 1995; Compton, Lamb & Fletcher 1995; Grella, Anglin & Wugalter 1995; Hudgins, McCusker & Stoddard 1995; Leri, Bruneau & Stewart 2003; van Beek, Dwyer & Malcolm 2001), increased risk of HIV infection (Chaisson et al. 1989), higher rates of psychiatric co-morbidity (Grella, Anglin & Wugalter 1995; Leri, Bruneau & Stewart 2003; van Beek et al. 2001) and poorer physical health (Chaisson et al. 1989; Darke, Kaye & Topp 2002a; 2002b; van Beek et al. 2001). Regular methamphetamine use is also known to be associated with poor physical health (Hando, Topp & Hall 1997; Vincent et al. 1998) and higher rates of psychiatric co-morbidity (Bartu et al. 2003; Hando, Topp & Hall 1997; Vincent et al. 1998).

The effect of psycho-stimulant use on crime is much less clear. Cocaine users appear to be no less likely to commit property crime to fund their addiction than heroin users (Best et al. 2001; Darke, Kaye & Topp 2002b; Grella, Anglin & Wugalter 1995; Leri, Bruneau & Stewart 2003). But, in the wake of the Australian heroin shortage, it has also been suggested that heroin users who increased their consumption of cocaine and methamphetamine in response to the heroin shortage were more likely to engage in acts of non-instrumental aggression and violence (e.g. McKinnon 2002). At present, evidence for the increase in violence and aggression associated with the transition from heroin to psycho-stimulant use is fairly limited because most studies have either focussed on the health and behavioural effects of psycho-stimulant drugs themselves (Baker, Boggs & Lewin 2001; Giannini et al. 1993; Hando, Flaherty & Rutter 1997; Hando, Topp & Hall 1997; Platt 1997; van Beek et al. 2001; Vincent et al. 1998), or compared primary heroin users with primary psycho-stimulant users (Kaye & Darke 2000). Only two Australian studies, have examined the additional impact of psycho-stimulant use on the health and behaviour of primary heroin users. Both of these studies focussed on cocaine use among heroin users.

[2] While substituting a central nervous system depressant with psycho-stimulant drugs may seem unusual at first blush, there is a body of evidence suggesting that cocaine can reduce the impact of heroin withdrawal (see Leri, Bruneau & Stewart 2003 for a review).

Darke, Kaye and Topp (2002a) found that IDUs who had used cocaine had injected more frequently, had more injection-related health problems and committed more criminal acts than non-cocaine users. On the other hand, cocaine users were found to borrow used needles less often than other IDUs. Williamson and colleagues (2003) surveyed a sample of 615 heroin users entering treatment and found that those who had also recently used cocaine injected at a higher rate, shared injecting equipment more frequently, were more frequently involved in property crime, drug dealing and fraud and were more likely to have overdosed than IDUs who had not used cocaine recently. However, cocaine and non-cocaine users were found to be equally likely to have committed any violent crime in the month preceding interview.

Given the evident tendency among some groups of heroin users to respond to a shortage of heroin by increasing their consumption of psycho-stimulants, the limited evidence available on the health and criminogenic effects of psycho-stimulant use is unfortunate. Psycho-stimulants may not have replaced heroin as the drug class of choice amongst primarily opiate-using drug users, but this could easily change if supply control policies continue to drive up the real price of heroin or if, for some reason, the price of cocaine and other psycho-stimulants begins to fall. To gauge the risks associated with any prolonged restriction in the supply of heroin we need to know more about how increased psycho-stimulant use amongst heroin users affects their health and their risk of involvement in antisocial behaviour and aggression.

## Demand reduction

While law enforcement and interdiction agencies are solely responsible for supply reduction efforts, demand reduction is often thought of as the prerogative of those involved in drug abuse prevention and treatment programs. Street-level drug law enforcement, however, has also sometimes been thought to have a role to play in demand reduction. Moore (1977) argued that, because street-level drug law enforcement makes buying heroin more time-consuming and dangerous, it increases the non-monetary risks and costs associated with the drug. These non-monetary risks and costs force users to curtail their drug consumption (e.g., by entering treatment) and, to the extent that they do, street-level drug law enforcement can be thought of as reducing the demand for illicit drugs.

There is some evidence to support this view. The most encouraging results come from a much-cited police crackdown in Lynn, Massachusetts (Kleiman 1988). That crackdown appeared to have produced an 85 per cent increase in demand for treatment and substantial reductions in crime. Several studies have found temporary reductions in crime following police crackdowns on open-air drug markets (see Weatherburn et al. 2000 for a review). Falcato and colleagues (2001) also found an increase in methadone maintenance admissions in Zurich following the forced closure of a major open drug market in that city. The bulk of the evidence, though, suggests that drug law enforcement exerts an indirect effect on treatment entry - with most drug users entering treatment after prolonged contact with police or when they are diverted there as a result of being convicted of a drug-related offence (Weatherburn et al. 2000). Weatherburn and Lind (2001), for example, found that heroin users who had greater contact with the police and/or the criminal justice system were more likely to have had treatment experience. In their study, most of those entering treatment also cited 'trouble with police/courts' as their principal reason for entering treatment.

One of the major objections to demand-side drug law enforcement is that it encourages some drug users to inject hastily and discard needles immediately after using, encouraging the spread of blood-borne viruses (BBVs) such as Hepatitis C and HIV/AIDS. The oral and nasal storage of drugs by drug sellers in order to avoid detection by police also puts these dealers at increased risk of overdose if the drugs are swallowed, and at increased risk of exchanging bodily fluids if drugs are passed from mouth-to-mouth (Maher & Dixon 2001; Maher et al. 1998). Whether the benefits of

demand-side drug law enforcement, in terms of use reduction, outweigh the costs in terms of health concerns therefore remains a hotly contested issue. If street-level drug law enforcement only tempts drug users into treatment through a prolonged process of attrition, there would seem little to gain and much to lose from police operations that seek to greatly increase the risks associated with illicit drug use. If, on the other hand, street-level drug law enforcement does act to directly limit drug use, arguments in favour of such enforcement activity would be more compelling.

Australian drug law enforcement policy is therefore at a critical juncture. Supply controls appear to have great potential to reduce heroin consumption and expenditure but may increase the use of cocaine and methamphetamine, drugs that are potentially more harmful than heroin both for drug users and for the wider community. Street-level drug law enforcement may have a significant role to play in demand reduction but as yet we have only limited evidence that drug users restrict their consumption of, and expenditure on, different illicit drugs according to the perceived risks and costs police impose on those seeking to purchase or use illicit drugs. Our ignorance of the effects of psycho-stimulants, particularly on violent crime, limits our capacity to judge the value of supply controls or determine what measures need to be taken to ameliorate the unintended consequences of successfully interrupting the supply of heroin. Our ignorance of the effects of street-level drug law enforcement, on the other hand, prevents us determining how much weight should be assigned to demand reduction measures carried out by police and what forms those measures should take to be maximally effective.

The present research therefore sought to provide information on three general questions of relevance to drug law enforcement policy:

(1) What effect do the perceived price, purity and availability of heroin have on (a) heroin use and (b) heroin expenditure?

(2) What effect does the perceived risk of scoring, perceived hassle associated with scoring and amount of contact with police have on (a) heroin use and (b) heroin expenditure?

(3) What differences are there in terms of adverse health and behavioural outcomes between those who use heroin only and those who use a combination of heroin and psycho-stimulant drugs, such as cocaine and methamphetamine?

To address these issues a self-report survey of 296 IDUs was carried out in Sydney, NSW. Two-hundred respondents were recruited from NSP outlets and 96 were recruited from two metropolitan gaols. The first two questions were addressed by measuring indicators of supply-side drug law enforcement (price, purity, availability) and demand-side drug law enforcement (perceived risk of purchasing, hassle involved with purchasing, contact with police), and correlating these indicators with measures of heroin use and expenditure. The second question was addressed by comparing opiate users who had only used opiates recently with opiate users who had also used psycho-stimulants recently on measures of physical and psychological health, risk behaviours and levels of criminal activity.

# Method

## Participants

Participants were 200 IDU recruited from NSP services in 4 Sydney suburbs known to have high rates of illicit drug use (Bankstown, Cabramatta, Kings Cross and Redfern) and 96 inmates from two metropolitan prisons (Mulawa and the Metropolitan Remand and Reception Centre [MRRC]). The MRRC is a maximum-security institution for male inmates who are on remand, or who have been sentenced and are awaiting relocation to another prison in Sydney. Mulawa Correctional Centre is the primary centre where both remanded and sentenced female inmates are located in NSW and has minimum, medium and maximum-security divisions. NSP respondents were paid $20 for their participation while prison entry respondents were unpaid. To be considered a 'valid' interview, all respondents had to be aged 17 years or older, have injected any drug in the previous 30 days, be completing the interview for the first time, be capable of giving true and informed consent and be judged by the interviewer as being honest in their responses. Inmates, in order to improve recall accuracy, were also ineligible if they had spent more than 5 days in continuous custody at the time of interview, or more than 5 days out of the previous 30 in custody.

Forty-four valid interviewees were recruited from Bankstown, 49 from Cabramatta, 57 from Kings Cross and 50 from the NSP at Redfern. All inmates were recruited at the reception stage of their incarceration; 69 males were recruited from the MRRC and 27 females were recruited from Mulawa. Refusals were counted as the number of incidents where the interviewer approached a potential participant and they declined to take part, or where a participant approached an interviewer who was too busy to conduct the interview. When the interviewer was too busy an appointment was made to conduct the interview later and this was not counted as a refusal if the respondent kept the appointment. While refusals were not counted at the prison locations, 43 people from the NSP sample refused to take part, over half of whom had been approached at Redfern. The primary interviewer at this location suggested that most of the people who refused to take part looked 'less disadvantaged' than respondents who did take part. These people were often in a hurry and were possibly more likely to be employed and therefore less attracted to the $20 compensation.

Overall, the NSP and prison entry samples were very similar and Table 1 shows the demographic and drug use characteristics of the two samples. The only significant differences were in the proportion identifying as European/Caucasian (72% for the prison entry sample versus 52% for the NSP sample; $\chi^2$=9.8, df=1, $p$<0.01) and the mean age at which respondents had first used methamphetamine (17.1 and 18.4 years for prison entry and NSP respondents respectively; t=2.1, $p$<0.05). The difference in the proportion reporting having at least one dependent child living with them (prior to arrest for prison entry respondents) approached statistical significance (23% for prison entry respondents versus 15% for NSP respondents; $\chi^2$=3.5, df=1, $p$=0.06).

**Table 1.** Demographic characteristics of Needle and Syringe Program (NSP) and prison entry samples.

| Variable | NSP (n=200) | Prison entry (n=96) |
|---|---|---|
| Gender (% male) | 65 | 72 |
| Ethnicity (% European/Caucasian)** | 52 | 72 |
| Marital status (% married/de facto) | 27 | 32 |
| Parental status (% with children) | 15 | 23 |
| Employment status (% employed) | 15 | 22 |
| Mean age first used heroin (years) | 19 | 19 |
| Mean age first used cocaine (years) | 22 | 21 |
| Mean age first used methamphetamine (years)* | 18 | 17 |
| Mean age (years) | 31 | 30 |

* Difference significant at 5% level.

** Difference significant at 1% level.

## Design

The design of the project was a questionnaire-only, purposive sample of IDUs utilising NSP services in Sydney and IDUs entering NSW Department of Corrective Services custody. In order to assess the relationship between law enforcement indicators and heroin consumption and expenditure, it was necessary to measure a broad range of heroin expenditure and use patterns to allow comparison between those who, for whatever reason, buy and use heroin frequently and those who buy and use heroin relatively infrequently.[3] To maximise the number of casual users, sampling was carried out at NSP services and 'drop-in' clients were targeted because they were more likely to be infrequent users. The sample of inmates, on the other hand, was likely to consist of IDUs who were more heavily entrenched in drug use and criminal activity. However, the final NSP sample tended to consist primarily of very heavy drug users. The pattern of refusals from the NSP sample reported above, whereby 'less disadvantaged' people tended to refuse at a higher rate than 'more disadvantaged' people, reflected the difficulty in attracting 'casual' IDUs to take part in the survey. Recent findings from the Drug Use Monitoring in Australia (DUMA) project may explain this trend. McGregor and Makkai (2003) found that arrestees interviewed in police lock-ups who were in more stable home situations and who were less involved in criminal activity and drug use tended to under-report their actual drug use. It might be that these more stable IDUs are reluctant to take part in studies of this kind and report their drug use altogether.

To assess the potential adverse effects associated with psycho-stimulant use among opiate-users it was necessary to recruit a high proportion of IDUs who had used psycho-stimulants frequently in the 30-day reference period. For the NSP sample, the recruitment of psycho-stimulant users was conducted both by word-of-mouth and by recruiting participants from locations where the use of psycho-stimulants was thought to be more common. Areas of Sydney where sex work is common, such as Kings Cross and Bankstown, are known to have relatively high rates of cocaine use

[3] Previous IDUs surveys have tended to attract samples of IDUs who use very frequently. For example, 75 per cent of respondents to the 2002 IDRS survey had injected heroin at least daily in the previous month (Roxburgh et al. 2003).

(Hando, Flaherty & Rutter 1997) and were thus selected as areas for recruitment. Recruitment of female psycho-stimulant users from Mulawa was undertaken by word-of-mouth, while at the MRRC the inmates' health files were checked to see if they had a history of psycho-stimulant use. Interviewers endeavoured to gain an even number of psycho-stimulant (PS) and non-psycho-stimulant (NON-PS) using opiate users.

## Procedure

Prior to commencing the fieldwork, approval was obtained from relevant ethics review committees. Approval was also obtained from the management of each health service where participant recruitment took place and from the Governors of both correctional centres. The fieldwork for the NSP part of the study was carried out by Forsythe Consultants Pty Ltd. All NSP interviews were conducted on the Area Health Service premises, with the exception of Kings Cross where, due to a lack of space on the NSP premises, all interviews were conducted on the street. One Corrections Health Service nurse who regularly worked at the MRRC conducted the interviewing for the prison entry part of the study. Because the MRRC is a remand and reception centre and most new receptions are only in custody for a short time before being moved to another prison, the interviewer had no ongoing input into the direct care of the inmates. Most interviews among males remanded in custody at the MRRC were conducted in a wing where inmates were free to move around but efforts were also made to include inmates who were in protected custody or in strict protection. Interviews at the MRRC could be carried out at any time of day depending on the volume of receptions. IDUs were recruited at the MRRC by accessing their medical files and identifying those with a history of drug use. These prisoners were then approached and asked whether they would like to participate in the research. Because Mulawa has a much smaller remand population than the MRRC, respondents were recruited by direct approach. There were time constraints on interviewing at Mulawa and the interviewer could only access inmates between 3pm and 5pm.

Participants from all NSP locations were recruited by word-of-mouth through the respective local services. A small pilot sample of 10 IDUs was conducted in Cabramatta to ensure that the instrument was practicable. All NSP interviews were completed before the fieldwork began in the prison setting. In total, five different interviewers conducted the NSP interviews while one interviewer conducted all prison surveys. NSP interviews were mainly conducted during the day although, in order to interview sex workers in the Bankstown area, a few were carried out at night by travelling with the Bankstown mobile NSP unit. In each location, potential participants were approached and asked if they would like to take part in a survey. If they showed any interest in taking part, the purpose of the study was explained and they were informed of their rights and entitlements. Each respondent was also given a copy of the document explaining these matters. Verbal rather than written consent was sought from NSP participants but written consent was sought from prison entry participants to satisfy the requirements of the NSW Department of Corrective Services. Once participants had consented to take part, the 100-item questionnaire was administered. Interviewers asked each question aloud and coded the respondents' answers on the survey form. Laminated response cards were used for questions which had multiple response options. Each questionnaire took approximately 30 minutes to administer.

Procedures were undertaken when checking the data to ensure that respondents had not been interviewed more than once. The data were first sorted by the respondents' initials and any cases where the initials were the same or similar (e.g., 'tb' and 'tcb') were examined more closely. The respondents were first matched on gender, age and ethnicity. If any or all of these were the same or similar the rest of their responses were compared to determine whether they were likely to be the same person. There were no examples of any respondents being interviewed more than once.

## Measures

The 100-item questionnaire was essentially the same for both samples; except the frame of reference for many of the items was 'the last 30 days' for NSP respondents and 'the 30 days prior to entering custody' for the prison entry sample.

*Heroin and other drug use*. The Opiate Treatment Index (OTI) scale was used to measure heroin, cocaine and methamphetamine powder use (see Darke et al. 1991 for an example). The OTI scale, which calculates drug use based on the last two occasions of use and the frequency of use on each of those 'use-days', has been shown to have good psychometric properties (Darke et al. 1992). A less extensive method was employed to measure recent use of tobacco, alcohol, cannabis, benzodiazepines, crystalline methamphetamine, methamphetamine 'base', ecstasy and other opiates. For these drug types, respondents were asked to nominate the number of days on which they had used each drug in the last 30 days. All drugs were later post-coded '0' if they had not used that drug in the prior 30 days and '1' if they had used that drug.

IDU were defined as psycho-stimulant users if they had used any (or all) of cocaine, methamphetamine powder, methamphetamine base (also known as paste, wax, point or pure), crystalline methamphetamine (also known as ice, shabu or crystal meth) or ecstasy in the 30-day reference period.

*Heroin expenditure*. To measure expenditure on heroin, respondents were asked how much they spent for themselves each week 'at the moment' (NSP respondents) or 'before [they] were arrested' (prison entry sample). Because stolen goods are often swapped for drugs (Stevenson & Forsythe 1998), respondents were prompted to estimate the amount spent per week taking into account both cash and 'in-kind' payments. If respondents had only bought heroin once in that 30-day period, their weekly expenditure was calculated by dividing the amount paid for the one-off use by 4 (weeks). Such cases were relatively uncommon.

*Street-level and supply-side law enforcement*. The measures of supply-side law enforcement were price, availability and purity of heroin. Price was measured as the gram price of heroin if respondents were to purchase one on the day prior to interview (NSP sample) or on the day prior to entering custody (prison entry sample). While many respondents do not purchase heroin in gram quantities, this unit was intentionally selected because the variability was expected to be quite large, whereas the variability in the price of the most popular unit of purchase (a 'cap') was expected to be quite small. It was anticipated that respondents who did not purchase gram quantities would still be capable of estimating the gram cost of each drug. Availability was measured as estimated time to 'score' (or buy) heroin in minutes on the day prior to interview (NSP) or on the day prior to entering custody (prison entry). As heroin becomes more scarce, heroin takes longer to score (Day et al. 2003; Weatherburn et al. 2003). Purity was measured on a 5-point scale ranging from 'very low' to 'very high', but respondents also had the option of nominating that the purity of heroin 'varies'. Ideally, the purity of heroin would be estimated using the same timeframe as price (i.e., on the day prior to interview). Because many respondents had not used heroin on the day prior to interview, and would not be able to estimate the purity on that day, drug purity 'at the moment' (NSP) or 'in the 30 days before [respondents] were arrested' (prison entry) was measured.

To measure street-level law enforcement activity, respondents were asked to estimate how risky they thought buying heroin was, how much hassle was involved in buying heroin and the amount of contact they had with police in the 30-day reference period. The risk and hassle questions were measured on 5-item scales ranging from 'very low' to 'very high' for the risk question and 'no hassle at all' to 'major hassle' for the hassle question. The amount of contact with police was measured as the number of times respondents had been stopped by police in the previous 30 days, coded 1-5 with 1 being 'never' and 5 being 'everyday or almost everyday'.

*Health.* Measures of the number of medical presentations made by IDUs were obtained as well as indicators of physical and mental health, risky sexual and injecting behaviours. Questions about medical presentations measured the number of recent visits to General Practitioners for genuine illness, number of recent visits to specialists, number of recent hospital/casualty admissions, number of recent ambulance attendances and the number of recent attendances to other practitioners for medical reasons. Measures of physical health included an item relating to self-reported general health ranging from 1-5 ('poor' to 'excellent'), number of recent blackouts or prolonged periods of lost consciousness, number of overdoses in the past 12 months, vein trouble, Hepatitis C status, HIV status and 'other' physical health problems.

Questions relating to the psychological health of respondents included measures of recent drug-related anxiety, paranoia and history of treatment for mental illness. Risk behaviours for the spread of BBVs were measured as the length of time between interview and the respondents' last test for Hepatitis C or HIV, the frequency of using a needle before and after other people in the prior 30 days, the frequency of sharing other injecting equipment in the previous 30 days (e.g., swabs, water, spoons), and the frequency of having had unprotected sex in the 30-day reference period.

*Criminal activity.* To measure the association between psycho-stimulant use and criminal activity, respondents were asked whether they had sold drugs in the prior 30 days, whether they had committed four types of acquisitive crime and whether they had committed two types of violent crime in the 30-day reference period. Acquisitive crimes were measured as the daily frequency of committing a break, enter and steal (BES) offence, a motor vehicle theft (MVT) offence, forging cheques or using someone else's credit card (fraud) or doing another type of theft offence. For the 'other theft' category, respondents were prompted with the examples of ''stealing from someone, stealing from a motor vehicle, shoplifting, bag snatch, pickpocket, theft from family/partner and pawning other people's belongings''. Violent crimes were measured as the daily frequency of assaulting someone or gaining cash, goods or drugs by threatening them either with or without a weapon (robbery/standover). These last two measures were designed to assess the frequency of committing violent offences that might not necessarily be recorded in official police statistics. Three further variables were created from these measures to assess the likelihood of having committed (a) any of these crime types, (b) any of the 'acquisitive' crime types (BES, MVT, fraud, other type of theft offence), and (c) either of the 'violent' crime types (assault, robbery/standover) in the preceding 30 days.

*Potential confounder variables.* Measures of demographic characteristics, other drug use (described above), treatment experience and prior criminal activity were taken to control for the potentially confounding influence of these factors. The demographic characteristics were age, gender, marital status, parental status, ethnicity and employment status. The use of drugs other than heroin and psycho-stimulants was measured (as described above) and the drug types assessed were alcohol, tobacco, cannabis and benzodiazepine use. In addition, the age at which respondents had first used any of heroin, cocaine or methamphetamine was recorded, as was the frequency with which they had used heroin in the previous 30 days (as measured by the OTI scale). Treatment experience was measured as enrolment in MMT, buprenorphine treatment or having received drug counselling in the previous 30 days. In addition, a variable was created and coded '0' if respondents had not received any of these three treatment types in the preceding 30 days and '1' if they had received one or more of these types of treatment.

Because prior criminal activity is one of the strongest predictors of future criminal behaviour (e.g., Copas & Marshall 1998; Copas, Marshall & Tarling 1996; Lloyd, Mair & Hough 1994; May 1999), the respondents' prior prison histories and the frequency with which they had ever been arrested for theft and violent offences were also measured. A 'history of theft/violence' variable was created and coded '0' if respondents reported never having been arrested for theft or violence, '1' if they had ever been arrested for *either* theft or violence and '2' if they had been arrested for *both* theft and violence.

## Analyses

The first two aims of the study (bearing on the factors influencing drug use and expenditure) were pursued by conducting separate one-way analyses of variance (ANOVA) between the six key law enforcement predictor variables (price, purity, availability, risk, hassle and contact with police) and the two dependent variables (use and expenditure). ANOVAs were also conducted with the potential confounder variables (sample [NSP or prison], age, gender, ethnicity, marital status, parental status, employment status and treatment experience) and the two dependent variables. Because the distributions of both dependent variables were highly skewed, non-parametric Kruskal-Wallis tests were also carried out to ensure that the skewness was not inflating the variance estimates and biasing the outcome of the statistical significance tests. Where the distributions were skewed and biasing the outcome of the ANOVAs, log-transformations were undertaken to normalise the distribution of the outcome variable. Where there were any significant univariate relationships between law enforcement variables and use or expenditure, Ordinary Least Squares (OLS) regression models were fitted controlling for potential confounder variables that were predictive of the outcome variables.

The third aim was to identify the extent to which psycho-stimulant use among a sample of primary opiate-users was associated with higher levels of adverse health and behavioural outcomes. To address this question, a variable was created and coded '0' if respondents had used opiates (i.e., heroin and other illicitly sourced opiates such as morphine) but not psycho-stimulants (NON-PS) in the 30-day reference period and '1' if respondents had used opiates and one or more psycho-stimulants (PS) in the 30-day period (i.e., cocaine, methamphetamine powder, crystalline methamphetamine, methamphetamine 'base' or ecstasy). Respondents who had not used opiates in the previous 30 days were excluded from the analysis because the emphasis was on determining the additive risk associated with using psycho-stimulants to compensate for a reduction in supply of heroin. Unfortunately, this eliminated one-quarter of the respondents from the prison entry sample and, because the sample of prison entry respondents was quite small, the analysis was restricted to the NSP sample only. Bi-variate analyses were carried out to examine whether there were any differences between the proportion of NON-PS users and PS users who had presented for medical treatment and any differences between NON-PS and PS users on the measures of physical health, mental health, risk-taking behaviour and criminal activity.

Due to space restrictions, it was not possible to control for the potentially confounding influence of demographic and other factors for each significant bi-variate association between PS use and the respective indicator of harm. As such, four critical measures of harm were selected and more rigorous statistical controls were applied to assess the independent contribution of PS use to that particular indicator of harm. Separate logistic regression models controlling for potential confounder variables were fitted with psycho-stimulant use as the predictor of interest and likelihood of experiencing paranoid reactions in the prior 30 days, the likelihood of passing on unclean needles in the prior 30 days and the likelihood of committing either acquisitive or violent crime in the prior 30 days as the outcome variables of interest. The relationship between PS use and paranoia was more closely explored due to a previously suggested association between psycho-stimulant use, paranoia and violence (Wright & Klee 2001) while needle sharing was examined to assess the potential serious public health harms posed by sharing injecting equipment in terms of spreading BBVs. Control variables were identified by cross-tabulating potential confounders with each of the outcome variables. Each significant predictor variable was initially entered in the model and then a backward elimination approach was taken whereby non-significant terms were removed from the models.

# Results

## Patterns of drug use and treatment experience

Of the ten drug classes asked about in the questionnaire (heroin, cocaine, methamphetamine powder, tobacco, alcohol, cannabis, benzodiazepines, ecstasy, methamphetamine 'base' and/or crystalline methamphetamine, and other opiates), NSP respondents had used 4.4 different types on average (median = 4.0, range = 2-9), while prison entry respondents had used 5.1 on average (median = 5.0, range = 2-9). A Mann-Whitney U test indicated that this difference was statistically significant (Z=4.0, p<0.01).

### Drug of choice

Table 2 illustrates the drug of choice of respondents from both the NSP and prison entry samples. Overall, 76.5 per cent of the NSP sample nominated heroin as their drug of choice, which was significantly higher than the proportion of the prison entry sample that nominated heroin (60.4%, $\chi^2$=8.2, df=1, $p$<0.01). The proportion of the NSP sample that nominated cocaine as their drug of choice was also higher than the prison entry sample (8.5% versus 2.1% respectively; $\chi^2$=4.4, df=1, $p$<0.05). The prison entry sample, on the other hand, consisted of a higher proportion of respondents who nominated methamphetamine powder as their drug of choice (5.5% versus 19.8% for the NSP and prison entry sample respectively; $\chi^2$=14.5, df=1, $p$<0.01). There were no significant differences in the proportion of each sample nominating the other drugs of choice.

**Table 2.** Nominated drug of choice for NSP and prison entry samples.

| | NSP | | Prison Entry | |
|---|---|---|---|---|
| **Drug of choice** | **Freq** | **Per cent (95% CI)** | **Freq** | **Per cent (95% CI)** |
| Heroin** | 153 | 76.5 (69.9 - 82.1) | 58 | 60.4 (49.9 - 70.1) |
| Cocaine* | 17 | 8.5 (5.2 - 13.5) | 2 | 2.1 (0.4 - 8.0) |
| Methamphetamine powder** | 11 | 5.5 (2.9 - 9.9) | 19 | 19.8 (12.6 - 29.4) |
| Cannabis | 10 | 5.0 (2.6 - 9.3) | 9 | 9.4 (4.6 - 17.5) |
| Benzodiazepines | 3 | 1.5 (0.4 - 4.7) | 3 | 3.1 (0.8 - 9.5) |
| Alcohol | 3 | 1.5 (0.4 - 4.7) | 2 | 2.1 (0.4 - 8.0) |
| Other+ | 3 | 1.5 (0.4 - 4.7) | 3 | 3.1 (0.8 - 9.5) |
| Total | 200 | 100 | 96 | 100 |

+ The 'other' category included methamphetamine 'base', crystalline methamphetamine and ecstasy.

* Difference significant at 5% level.

** Difference significant at 1% level.

## Frequency of heroin use

Among the sample of 200 NSP respondents, 93.5 per cent had used heroin in the preceding 30 days (Table 3). This was significantly higher than the proportion of prison entry respondents reporting heroin use in the previous 30 days (75%; $\chi^2$=20.3, df=1, $p$<0.01). It is apparent from Table 3 that, when respondents had used heroin in the 30-day reference period, they reported doing so very frequently. Almost two-thirds of all NSP respondents (63%) and more than half of prison entry respondents (57%) had used heroin at least daily during the 30-day reference period.

**Table 3.** Frequency of heroin use in the 30-day reference period among NSP and prison entry samples*.

| | NSP (n = 200) | | Prison Entry (n = 96) | |
|---|---|---|---|---|
| **Drug** | **% (95% CI)** | **Frequency** | **% (95% CI)** | **Frequency** |
| Never used | 1.0 (0.2-3.9) | 2 | 6.3 (2.6-13.6) | 6 |
| Abstinence last 30 days | 5.5 (2.9-9.9) | 11 | 18.8 (11.8-28.3) | 18 |
| Once a week or less | 9.0 (5.6-14.1) | 18 | 5.2 (1.9-12.3) | 5 |
| More than once per week | 20.0 (14.8-26.4) | 40 | 9.4 (4.6-17.5) | 9 |
| Daily | 16.5 (11.8-22.5) | 33 | 5.2 (1.9-12.3) | 5 |
| More than once per day | 46.0 (39.0-53.1) | 92 | 52.1 (41.7-62.3) | 50 |

* Percentages do not sum to 100% because some respondents were unable to accurately recall their heroin use in the 30-day reference period.

## Other drug use

Table 4 shows the proportion of respondents indicating that they had used tobacco, cannabis, alcohol, benzodiazepines, methamphetamine powder, cocaine, methamphetamine base and/or crystalline methamphetamine, ecstasy, and other opiates in the 30-day reference period. Most respondents from both samples had used tobacco in the previous 30 days (the difference between samples was not significant: $\chi^2$=0.6, df=1, $p$=0.45) and about two-thirds of respondents from both groups had used cannabis in the 30-day reference period ($\chi^2$=2.1, df=1, $p$=0.15). Prison entry respondents (60%) were more likely than NSP respondents (43%) to have used alcohol ($\chi^2$=7.3, df=1, $p$<0.01) and benzodiazepines during the 30-day reference period (56% and 37% for the prison entry and NSP samples respectively, $\chi^2$=9.2, df=1, $p$<0.01). The proportion of prison entry respondents reporting methamphetamine powder use was twice that of the NSP sample (60% versus 30%; $\chi^2$=25, df=1, $p$<0.01). The proportion reporting cocaine use was slightly lower for the prison entry sample (22%) than it was for the NSP sample (31%), although this difference was not significant ($\chi^2$=2.4, df=1, $p$=0.12). Prison entry respondents (40%) were more likely to have used crystalline methamphetamine and/or methamphetamine base than NSP respondents (22%; $\chi^2$=9.5, df=1, $p$<0.01). Use of ecstasy was less common among members of both groups (9.4% and 7% of prison entry and NSP groups had used in the previous 30 days respectively, $\chi^2$=0.5, df=1, $p$=0.50). The difference between the proportion of prison entry (23%) and NSP respondents (15%) who had used other opiates in the prior 30 days also approached the conventional 5 per cent level of significance ($\chi^2$=3.2, df=1, $p$=0.08).

**Table 4.** Prevalence of 'other' drug use among NSP and prison entry samples.

| Drug | NSP (n=200) | | Prison Entry (n=96) | |
|---|---|---|---|---|
| | % used (95% CI) | Frequency | % used (95% CI) | Frequency |
| Tobacco | 96.0 (92.0-98.1) | 192 | 95.8 (89.1-98.7) | 92 |
| Cannabis | 62.0 (54.9-68.7) | 124 | 70.8 (60.5-79.4) | 68 |
| Alcohol** | 43.0 (36.1-50.2) | 86 | 60.4 (49.9-70.1) | 58 |
| Benzodiazepines** | 37.0 (30.4-44.1) | 74 | 56.3 (45.8-66.2) | 54 |
| Methamphetamine powder** | 30.0 (23.8-36.9) | 60 | 60.4 (49.9-70.1) | 58 |
| Cocaine | 30.5 (24.3-37.5) | 61 | 21.9 (14.3-31.7) | 21 |
| 'Ice'/'base'** | 22.0 (16.6-28.5) | 44 | 39.6 (29.9-50.1) | 38 |
| Ecstasy | 7.0 (4.0-11.7) | 14 | 9.4 (4.6-17.5) | 9 |
| Other opiates | 14.5 (10.1-20.3) | 29 | 22.9 (15.2-32.8) | 22 |

* Difference between proportion of NSP and prison entry samples using each drug significant at 5% level.

** Difference between proportion of NSP and prison entry samples using each drug significant at 1% level.

## Treatment experience

Respondents who had used heroin at least once in their lifetime were asked about their treatment experience in the 30 days prior to interview. Over half of the NSP respondents (55.1%; 95% CI = 47.8 – 62.1) had received some form of treatment for heroin dependence in the prior 30 days while only one-third of prison entry respondents had received treatment in the 30 days before entering custody (33.3%; 95% CI = 24.0 – 44.1). The difference in proportions receiving any treatment for heroin dependence was significant ($\chi^2$=11.7, df=1, $p$<0.01). Methadone maintenance treatment (MMT) was the most common form of treatment for both samples, followed by drug counselling and buprenorphine maintenance. There was no difference in the proportion of NSP and prison entry respondents who were enrolled in MMT (29.8% and 24.4% respectively, $\chi^2$=0.9, df=1, $p$=0.35). NSP respondents were slightly more likely than prison entry respondents to be enrolled in buprenorphine treatment although the difference was not statistically significant at the 5 per cent level (10.6% and 4.4% respectively, $\chi^2$=3.0, df=1, $p$=0.09). NSP respondents were significantly more likely to have received drug counselling in the previous 30 days than prison entry respondents (15.2% and 6.7% respectively, $\chi^2$=4.1, df=1, $p$<0.05). Other established treatment options were less widely used and only 3 % of NSP respondents had been to a detoxification clinic, 3 % had been to rehabilitation or therapeutic community and one respondent had received naltrexone treatment.

## Research questions

### Do indicators of drug law enforcement predict expenditure on heroin?

One-way ANOVAs measuring the association between each of the independent variables and the heroin expenditure outcome variable were conducted on the total sample of respondents who had bought heroin in the 30-day reference period (n=244).[4] One respondent from the prison population reported spending $12,500 each week prior to entering prison, which was $5,500 more than the next highest expenditure score. Based on this respondent's estimate of the gram price of heroin and their estimated frequency of injection, they claimed to have been using five grams of heroin per day, injecting almost half a gram in each shot. While this may be possible, the interviewer retrospectively expressed some doubt about whether this respondent was answering the questions truthfully. Because this outlier could inflate the variance estimates and bias the outcome of the significance testing they were removed from the following analysis.

The results of the one-way ANOVAs for law enforcement and potential confounder variables are presented in Tables 5a and 5b respectively. Kruskal-Wallis tests revealed that the skewed expenditure distribution was biasing the outcome of some of the ANOVAs and so the expenditure variable was log-transformed to normalise the distribution of expenditure scores. The F-statistics and *p*-values reported in Tables 5a and 5b were calculated on the basis of the log-transformed expenditure variable, while the means and medians are based on the raw (untransformed) data. Table 5a indicates that there were no significant relationships between log expenditure and heroin price, self-reported heroin purity, risk of scoring heroin or hassle involved with scoring heroin. Of the six law enforcement predictor variables, only time to score heroin ($F=10.09$, $df=1$, $p<0.01$) and the amount of contact with the police ($F=5.22$, $df=4$, $p<0.01$) showed any significant interaction with heroin expenditure. The relationship between contact with police and expenditure on heroin, however, was in the opposite direction to that which would have been expected if contact with police acted to limit heroin consumption. Respondents who reported being in contact with police every day or almost every day tended to have much higher weekly heroin expenditure than respondents who had been in contact with police less often. In fact, respondents who had been in contact with police on a daily or near-daily basis spent approximately $1,200 more per week than IDUs who were in contact with police on a weekly basis. Only the outcome for time to buy heroin was in the expected direction, with IDUs who took longer to buy heroin (11 minutes or more) spending less on average than respondents who were able to score heroin in 10 minutes or less (median expenditure = $350 and $700 respectively).

[4] A number of respondents had not purchased heroin for their own consumption and were excluded from this analysis. Several respondents, for example, had only used heroin for free on a one-off basis in the 30-day reference period.

**Table 5a.** Univariate relationships between law enforcement variables and log expenditure on heroin*.

| Variable | N | Mean exp. ($) | Median exp. ($) | F | Sig. |
|---|---|---|---|---|---|
| **Price ($)** | **187** | **1126** | **700** | **0.16** | **0.69** |
| 300 or less | 103 | 1077 | 700 | | |
| 301+ | 84 | 1185 | 700 | | |
| **Time to score (min)** | **235** | **909** | **500** | **10.09** | **<0.01** |
| 10 or less | 124 | 1123 | 700 | | |
| 11+ | 111 | 669 | 350 | | |
| **Purity** | **219** | **945** | **500** | **1.07** | **0.36** |
| Very low | 57 | 737 | 450 | | |
| Low | 39 | 924 | 600 | | |
| Medium | 92 | 973 | 500 | | |
| High/very high | 31 | 1269 | 500 | | |
| **Risk** | **240** | **958** | **500** | **0.53** | **0.71** |
| Very low | 96 | 1031 | 500 | | |
| Low | 42 | 892 | 625 | | |
| Medium | 50 | 911 | 363 | | |
| High | 29 | 749 | 500 | | |
| Very high | 23 | 1136 | 600 | | |
| **Hassle** | **239** | **949** | **500** | **0.69** | **0.60** |
| No hassle at all | 86 | 1093 | 700 | | |
| Not much hassle | 54 | 699 | 400 | | |
| Moderate hassle | 52 | 1019 | 375 | | |
| Quite a hassle | 24 | 849 | 700 | | |
| Major hassle | 23 | 942 | 500 | | |
| **Police contact** | **242** | **949** | **500** | **5.22** | **<0.01** |
| Never | 94 | 776 | 400 | | |
| Less than every week | 58 | 796 | 400 | | |
| Every week/almost every week | 26 | 945 | 470 | | |
| Several times a week | 32 | 767 | 450 | | |
| Every day/almost every day | 32 | 1922 | 1000 | | |

* F-statistics and *p*-values were calculated from log expenditure while means and medians reflect raw scores.

Table 5b shows the relationship between the potential confounder variables and the log-transformed expenditure outcome variable. Overall, NSP respondents who had bought heroin in the 30-day reference period reported spending less than prison entry respondents (median expenditure=$400 and $1000 for NSP and prison entry respondents respectively; F=27.20, df=1, $p<0.01$). Respondents not in treatment had significantly higher weekly expenditure than IDUs who had received treatment in the 30-day reference period (medians=$700 and $400 respectively; F=6.11, df=1, $p<0.05$). Older IDUs (36+) tended to have lower expenditure than younger IDUs (F=2.48, df=3, $p=0.06$) and respondents identifying as Asian tended to have lower weekly expenditure than other respondents, although the difference was not statistically significant (F=2.21, df=3, $p=0.09$).[5] IDUs in paid employment (median=$625) tended to spend more on heroin each week than respondents who were not in paid employment (median=$500) although, again, the difference was not significant at the conventional 5 per cent level (F=3.16, df=1, $p=0.08$). None of the measures of gender, marital status or parental status were significantly related to expenditure.

**Table 5b.** Univariate relationships between potential confounder variables and log expenditure on heroin*.

| Variable | N | Mean exp. ($) | Median exp. ($) | F | Sig. |
|---|---|---|---|---|---|
| **Sample** | **243** | **948** | **500** | **27.20** | **<0.01** |
| Prison | 65 | 1667 | 1000 | | |
| NSP | 178 | 685 | 400 | | |
| **Gender** | **242** | **951** | **500** | **2.51** | **0.11** |
| Male | 160 | 914 | 450 | | |
| Female | 82 | 1022 | 700 | | |
| **Age (years)** | **241** | **954** | **500** | **2.48** | **0.06** |
| 17-24 | 62 | 1221 | 700 | | |
| 25-29 | 57 | 1110 | 700 | | |
| 30-35 | 62 | 821 | 450 | | |
| 36+ | 60 | 667 | 350 | | |
| **Ethnicity (Redfern removed)** | **196** | **1078** | **650** | **2.21** | **0.09** |
| European | 113 | 1174 | 700 | | |
| Asian | 29 | 490 | 350 | | |
| ATSI | 33 | 1232 | 700 | | |
| Other | 21 | 1169 | 700 | | |

[5] Caution should be used in interpreting this finding. Due to ethics committee objections we were not able to record the ATSI status of respondents at Redfern.

**Table 5b** continued.

| Variable | N | Mean exp. ($) | Median exp. ($) | F | Sig. |
|---|---|---|---|---|---|
| **Marital status** | **243** | **948** | **500** | **1.05** | **0.37** |
| Single, never married | 114 | 857 | 450 | | |
| Married/de facto | 69 | 1010 | 500 | | |
| Partner | 36 | 1239 | 700 | | |
| Divorced/separated/widowed | 24 | 767 | 475 | | |
| **Parental status** | **242** | **951** | **500** | **1.05** | **0.31** |
| No children | 201 | 994 | 500 | | |
| Children | 41 | 742 | 400 | | |
| **Employment** | **243** | **948** | **500** | **3.16** | **0.08** |
| Unpaid | 197 | 870 | 500 | | |
| Paid | 46 | 1283 | 625 | | |
| **In treatment?** | **243** | **948** | **500** | **6.11** | **<0.01** |
| No | 128 | 1076 | 700 | | |
| Yes | 115 | 806 | 400 | | |

* F-statistics and *p*-values are calculated on log expenditure while the means and medians reflect raw scores.

The significant variables from the one-way ANOVAs presented in Tables 5a and 5b were entered into an OLS regression model (Table 6). The age group variable, which was marginally significant in the univariate analysis, was not significant when controlling for other factors and was dropped from the final model. The negative value of the coefficient for 'time to score' indicates that, controlling for sample, treatment experience, and contact with police, longer times to score (11 minutes or more) were predictive of lower weekly expenditure on heroin than faster times to score heroin (10 minutes or less). Table 6 shows that the relationship between police contact and expenditure was also significant. IDUs who were in contact with police on a daily or near-daily basis had higher expenditure than those who had not had any contact with police in the prior 30 days. There was no significant difference in expenditure among respondents who had been stopped by the police on a less than daily basis and IDUs who had not had any contact with police in the 30-day reference period. The predictive relationships between sample (prison entry versus NSP) and expenditure, and between treatment and expenditure, were also maintained. NSP respondents and IDUs in treatment tended to spend less per week on heroin than prison entry respondents and IDUs who were not in treatment.

**Table 6.** Ordinary Least Squares regression model for factors predicting log expenditure on heroin (n=234).

| IV | B* | SE | t | Sig. |
|---|---|---|---|---|
| Time to score (ref: 10min or less) | -0.46 | 0.15 | -3.04 | <0.01 |
| Sample (ref: prison entry) | -0.87 | 0.18 | -4.91 | <0.01 |
| Received treatment (ref: no) | -0.30 | 0.18 | -1.93 | 0.06 |
| Police contact (ref: never) | | | | |
| less than every week | 0.30 | 0.20 | 1.55 | 0.12 |
| every week/almost every week | 0.35 | 0.25 | 1.39 | 0.17 |
| several times a week | 0.41 | 0.24 | 1.71 | 0.09 |
| every day/almost every day | 0.95 | 0.25 | 3.87 | <0.01 |
| Constant | 6.87 | 0.19 | 35.98 | <0.01 |

R Square = 0.21.

* Note that the outcome variable was log expenditure so the absolute value of the predictor variable coefficients are not immediately interpretable.

## Do indicators of drug law enforcement predict heroin use?

The relationship between indicators of law enforcement activity and heroin use was examined among those respondents who had used heroin in the 30-day reference period (n=252).[6] One outlier from the prison entry sample estimated that they had 20 hits per day (almost two times as many as the next heaviest user). Again, because there was some doubt as to whether this respondent was answering truthfully, and because the outlying case could bias the outcomes of the significance testing, they were excluded from the following analyses.

The results of the one-way ANOVAs between the law enforcement variables and number of daily heroin 'hits' are presented in Table 7a. The concordance between the ANOVAs and the Kruskal-Wallis tests suggested that the slightly skewed 'use' distribution was not biasing the outcome of the significance tests and so no transformations were performed on the outcome variable. Unlike the analysis of heroin expenditure reported above, then, the means, medians, F-statistics and *p*-values reported in Tables 7a and 7b refer to analyses carried out with the raw use scores. Of the law enforcement variables, only time to score was significantly related to frequency of heroin use. IDUs who took 11 or more minutes to buy heroin used less than respondents who were able to score in 10 minutes or less (1.9 versus 2.7 hits per day respectively; F=8.86, df=1, $p<0.01$). There were no significant relationships between heroin use and heroin cost, purity, perceived risk of apprehension, perceived hassle involved with purchasing heroin or amount of contact with police.

[6] This figure excludes IDUs who had used heroin in the 30-day reference period but who could not estimate their frequency of use.

**Table 7a.** Univariate relationships between law enforcement variables and heroin use.

| Variable | N | Mean daily hits | Median daily hits | F | Sig. |
|---|---|---|---|---|---|
| **Price ($)** | **189** | **2.53** | **2.00** | **0.49** | **0.48** |
| 300 or less | 102 | 2.44 | 2.00 | | |
| 301+ | 87 | 2.65 | 2.00 | | |
| **Time to score (min.)** | **241** | **2.32** | **2.00** | **8.86** | **<0.01** |
| 10 or less | 125 | 2.69 | 2.50 | | |
| 11+ | 116 | 1.93 | 1.67 | | |
| **Purity** | **225** | **2.40** | **2.00** | **1.02** | **0.38** |
| Very low | 57 | 2.34 | 2.00 | | |
| Low | 42 | 2.52 | 2.00 | | |
| Medium | 95 | 2.22 | 2.00 | | |
| High/very high | 31 | 2.92 | 2.50 | | |
| **Risk** | **247** | **2.32** | **2.00** | **0.35** | **0.85** |
| Very low | 98 | 2.37 | 2.00 | | |
| Low | 43 | 2.30 | 2.00 | | |
| Medium | 52 | 2.39 | 2.00 | | |
| High | 30 | 1.94 | 1.00 | | |
| Very high | 24 | 2.46 | 2.00 | | |
| **Hassle** | **247** | **2.32** | **2.00** | **1.70** | **0.15** |
| No hassle at all | 90 | 2.70 | 2.50 | | |
| Not much hassle | 58 | 1.96 | 1.90 | | |
| Moderate hassle | 50 | 2.11 | 1.63 | | |
| Quite a hassle | 25 | 2.55 | 2.00 | | |
| Major hassle | 24 | 2.00 | 2.00 | | |
| **Police contact** | **250** | **2.31** | **2.00** | **0.97** | **0.42** |
| Never | 99 | 2.33 | 2.00 | | |
| Less than every week | 61 | 2.18 | 2.00 | | |
| Every week/almost every week | 26 | 2.10 | 2.00 | | |
| Several times a week | 31 | 2.03 | 1.50 | | |
| Every day/almost every day | 33 | 2.88 | 3.00 | | |

Table 7b shows the relationship between the number of daily heroin 'hits' and the potential confounder variables. Only the sample population and current enrolment in treatment were related to frequency of heroin use. Prison entry respondents used heroin more frequently prior to entering custody than did NSP respondents in the 30 days prior to interview (2.5 verus 2.0 hits per day; F=10.04, df=1, $p<0.01$) while IDUs in treatment used heroin much less frequently than IDUs who were not enrolled in any treatment during the 30-day reference period (1.9 versus 2.7 hits per day; F=12.28, df=1, $p<0.01$). There were no significant relationships between heroin use and gender of respondents, age of respondents, ethnicity, marital status, parental status or employment status.

**Table 7b.** Univariate relationships between potential confounder variables and heroin use.

| Variable | N | Mean daily hits | Median daily hits | F | Sig. |
|---|---|---|---|---|---|
| **Sample** | **251** | **2.31** | **2.00** | **10.04** | **<0.01** |
| Prison | 68 | 2.95 | 2.50 | | |
| NSP | 183 | 2.08 | 2.00 | | |
| **Gender** | **249** | **2.32** | **2.00** | **1.79** | **0.18** |
| Female | 84 | 2.55 | 2.50 | | |
| Male | 165 | 2.20 | 2.00 | | |
| **Age (years)** | **249** | **2.33** | **2.00** | **1.23** | **0.30** |
| 17-24 | 63 | 2.60 | 2.50 | | |
| 25-29 | 60 | 2.24 | 2.00 | | |
| 30-35 | 64 | 2.48 | 2.00 | | |
| 36+ | 62 | 1.97 | 2.00 | | |
| **Ethnicity (Redfern removed)** | **203** | **2.36** | **2.00** | **2.14** | **0.10** |
| European | 121 | 2.22 | 2.00 | | |
| Asian | 28 | 1.99 | 1.83 | | |
| ATSI | 33 | 3.13 | 2.50 | | |
| Other | 21 | 2.44 | 3.00 | | |
| **Marital status** | **251** | **2.31** | **2.00** | **1.84** | **0.14** |
| Single, never married | 119 | 2.24 | 2.00 | | |
| Married/de facto | 71 | 2.20 | 2.00 | | |
| Partner | 36 | 3.00 | 2.75 | | |
| Divorced/separated/widowed | 25 | 1.97 | 2.00 | | |
| **Parental status** | **250** | **2.31** | **2.00** | **0.38** | **0.54** |
| No children | 209 | 2.35 | 2.00 | | |
| Children | 41 | 2.14 | 2.00 | | |

**Table 7b** continued.

| Variable | N | Mean daily hits | Median daily hits | F | Sig. |
|---|---|---|---|---|---|
| **Employment** | **251** | **2.31** | **2.00** | **0.91** | **0.34** |
| Unpaid | 205 | 2.26 | 2.00 | | |
| Paid | 46 | 2.56 | 2.00 | | |
| **In treatment?** | **251** | **2.31** | **2.00** | **2.28** | **<0.01** |
| No | 132 | 2.72 | 2.50 | | |
| Yes | 119 | 1.86 | 1.00 | | |

An OLS regression model was fitted with daily heroin hits as the dependent variable and time to score, sample and treatment experience as predictor variables (Table 8). After controlling for treatment experience and sample, increased time to score was predictive of lower heroin use. The model presented in Table 8 indicated that respondents who took longer to score heroin used approximately 0.7 hits per day less than IDUs who could score heroin more quickly. The significant univariate relationships between the potential confounder variables and heroin use were maintained in the regression model, whereby IDUs from the NSP sample and IDUs in treatment used less frequently than IDUs from the prison entry sample or IDUs who were not in treatment.

**Table 8.** OLS regression model for factors predicting heroin use (n=241).

| IV | B | SE | t | Sig. |
|---|---|---|---|---|
| Time to score (ref: <11min.) | -0.68 | 0.25 | -2.8 | 0.01 |
| Sample (ref: prison entry) | -0.87 | 0.29 | -3.0 | <0.01 |
| Received treatment (ref: no) | -0.68 | 0.25 | -2.7 | 0.01 |
| Constant | 3.64 | 0.28 | 12.9 | <0.01 |

R Square = 0.11.

## What adverse outcomes are associated with psycho-stimulant use among opiate users?

The demographic characteristics, drug use histories and current treatment experience of the psycho-stimulant (PS) users and non-psycho-stimulant using opiate users (NON-PS) are presented in Table 9. It is apparent from this table that the two groups were largely similar but for a few noteworthy differences. PS users (19%) were more likely than NON-PS users (8%) to have been arrested for violence six or more times ($\chi^2$=4.7, df=1, $p$<0.05) and more likely to have been imprisoned 5 or more times (28% versus 15%; $\chi^2$=4.4, df=1, $p$<0.05). PS users were more likely to have first used any of methamphetamine, heroin or cocaine before they were 15 years old than were NON-PS users (31% versus 19%; $\chi^2$=8.4, df=3, $p$<0.05) and were much more likely to have used 6 or more drug types than NON-PS users (46% versus 1%; $\chi^2$=76.3, df=3, $p$<0.01). PS users (68%) were also more likely to have used cannabis in the previous 30 days than were NON-PS users (54%; $\chi^2$=3.9, df=1, $p$=0.05). PS users were more likely to have received drug counselling for their heroin dependence in the prior 30 days (21% versus 10%; $\chi^2$=4.1, df=1, $p$<0.05) but were less likely than NON-PS users to be enrolled in a buprenorphine maintenance program (3% versus 17% for PS and NON-PS users respectively; $\chi^2$=9.8, df=1, $p$<0.01).

**Table 9.** Relationship between Psycho-Stimulant and Non-Psycho-Stimulant users and demographic characteristics, drug use and treatment history (NSP sample only).

| Variable | NON-PS (n=98) | PS (n=91) | Sig. |
|---|---|---|---|
| **Demographic variables** | | | |
| Gender (% male) | 66 | 64 | ns |
| Ethnicity (% European) | 46 | 56 | ns |
| In paid employment (%) | 14 | 18 | ns |
| Marital status (% single) | 49 | 56 | ns |
| Any dependent children (%) | 13 | 17 | ns |
| Mean income ($) | 1600 | 1480 | ns |
| Ever arrested for theft (% yes) | 75 | 81 | ns |
| % arrested 6+ times | 39 | 46 | ns |
| Ever arrested for violence (% yes) | 41 | 44 | ns |
| % arrested 6+ times | 8 | 19 | *p*=0.03 |
| Ever been to prison (% yes) | 67 | 72 | ns |
| % imprisoned 5+ times | 15 | 28 | *p*=0.04 |
| Age (mean years) | 31.2 | 31.1 | ns |
| **Drug use history** | | | |
| Age first used h/c/m (% <15yrs) | 19 | 31 | *p*=0.04 |
| Number drug types used (%6+) | 1 | 46 | *p*=<0.01 |
| Tobacco last 30 days (%) | 94 | 98 | ns |
| Alcohol last 30 days (%) | 37 | 48 | ns |
| Cannabis last 30 days (%) | 54 | 68 | *p*=0.05 |
| Benzodiazepines (%) | 33 | 42 | ns |
| **Treatment last 30 days** | | | |
| Any treatment (%) | 53 | 56 | ns |
| MMT (%) | 25 | 34 | ns |
| Buprenorphine (%) | 17 | 3 | *p*=<0.01 |
| Drug counselling (%) | 10 | 21 | *p*=0.04 |

Table 10 compares the number of recent medical presentations reported by PS users to the number of medical presentations reported by NON-PS users. It is immediately apparent from the data that almost half of all respondents had presented at a GP because they said they were genuinely ill in the 30-day reference period and between one-quarter and one-third had visited a GP on two or more occasions in the previous month. Furthermore, between eight and nine per cent of all respondents had presented at a hospital or casualty unit and between six and nine per cent had been attended by an ambulance in the 30-day period. This serves to highlight the very poor health of this population of IDUs. Table 10 also shows that PS users were more likely than NON-PS users to have attended a doctor to 'score pills' (benzodiazepines) in the previous 30 days (29% versus 15%; $\chi^2$=4.9, df=1, $p$<0.05) and were also significantly more likely to have engaged in this behaviour on two or more occasions in the last 30 days (18% versus 6%; $\chi^2$=6.5, df=2, $p$<0.05). Psycho-stimulant users were also more likely to have visited another (unspecified) type of medical practitioner than non-psycho-stimulant using opiate users in the preceding 30 days (7% versus 1%; $\chi^2$=4.1, df=1, $p$<0.05).

**Table 10.** Relationship between PS and NON-PS users and number of recent medical presentations.

| Variable | NON-PS % 'yes' (n=98) | PS % 'yes' (n=91) | Sig. |
|---|---|---|---|
| Last 30 days: | | | |
| Attend GP for illness | 45 | 48 | ns |
| % 2+ GP visits | 24 | 31 | ns |
| Attend specialist | 8 | 4 | ns |
| Attend hospital/casualty | 9 | 8 | ns |
| Attended by ambulance | 6 | 9 | ns |
| Attend other practitioner | 1 | 7 | $p$=0.04 |
| Attend GP to 'score' pills | 15 | 29 | $p$=0.03 |
| % 2+ visits for pills | 6 | 18 | $p$=0.04 |

Table 11 compares the physical health of PS and NON-PS users. Again, the most striking feature of Table 11 is the poor physical health of the sample in general. Very few respondents (between 11% and 13%) rated their health as 'very good' or 'excellent'. About one in eight NON-PS users had blacked out in the prior 30 days compared with one in four PS users and this difference was statistically significant ($\chi^2$=6.1, df=1, $p$<0.05). PS users (19%) were also more likely than NON-PS users (5%) to have blacked out on two or more occasions in the preceding 30 days ($\chi^2$=8.7, df=2, $p$=0.01). There were no significant differences between the two groups in terms of overdose, trouble finding veins, Hepatitis C status and HIV status but, with few exceptions, the PS group rated more poorly than the NON-PS group on most measures.

**Table 11.** Relationship between PS and NON-PS users and measures of physical health problems.

| Variable | NON-PS % 'yes' (n=98) | PS % 'yes' (n=91) | Sig. |
|---|---|---|---|
| Good/excellent general health? | 13 | 11 | ns |
| Blackouts last 30 days? | 12 | 26 | $p$=0.01 |
| % 2+ blackouts | 5 | 19 | $p$=0.01 |
| Overdose (OD) last 12 months? | 24 | 24 | ns |
| % 2+ ODs | 13 | 10 | ns |
| Trouble finding veins? | 38 | 48 | ns |
| % often/always have trouble | 15 | 23 | ns |
| Hep. C positive? | 66 | 76 | ns |
| HIV positive? | 1 | 3 | ns |
| Other health problems last 30 days? | 16 | 14 | ns |

Inspection of Table 12 indicates that PS users were more likely than NON-PS users to have experienced a range of psychological difficulties in the prior 30 days and in their lifetime. Consistent with the behavioural characteristics associated with psycho-stimulant use, almost three-quarters of PS users reported experiencing anxious reactions shortly after using drugs in the prior 30 days. This was significantly higher than the proportion of NON-PS users reporting having experienced drug-induced anxiety over this time period (47%; $\chi^2$=12.8, df=1, $p$<0.01). Moreover, twice as many PS users (24%) than NON-PS users (12%) reported feeling anxious after taking drugs often or every time that they had used drugs in the preceding 30 days ($\chi^2$=4.6, df=1, $p$<0.05). Almost one in three PS users reported feeling extremely paranoid in the prior 30 days, while about one in five NON-PS users experienced the same feelings and this difference approached statistical significance ($\chi^2$=3.4, df=1, $p$=0.06). A very high proportion of PS users had been treated for a mental illness at some point in their lifetime (31%) and this was significantly higher than the proportion of NON-PS users reporting such treatment (15%; $\chi^2$=6.5, df=1, $p$<0.05). The most common form of mental illness for which IDUs had been treated was for a mood disorder (primarily depression) followed by a psychotic disorder (e.g., schizophrenia) and this did not vary as a function of whether respondents were currently using psycho-stimulants.

**Table 12.** Relationship between PS and NON-PS users and measures of psychological health problems.

| Variable | NON-PS % 'yes' (n=98) | PS % 'yes' (n=91) | Sig. |
|---|---|---|---|
| Drug-induced anxiety last 30 days ? | 47 | 73 | $p$=<0.01 |
| % often/always anxious | 12 | 24 | $p$=0.03 |
| Paranoia last 30 days? | 19 | 31 | $p$=0.06 |
| Ever treated for mental illness? | 15 | 31 | $p$=0.01 |
| Anxiety disorder? | 1 | 1 | ns |

**Table 12** continued.

| Variable | NON-PS % 'yes' (n=98) | PS % 'yes' (n=91) | Sig. |
|---|---|---|---|
| Childhood disorder? | 1 | 1 | ns |
| Mood disorder? | 8 | 15 | ns |
| Personality disorder? | 0 | 1 | ns |
| Psychotic disorder? | 7 | 13 | ns |

Table 13 shows the difference between PS and NON-PS users on measures of risky sexual and injecting behaviour. PS users were more likely than NON-PS users to have passed on a needle after they had used it in the prior 30 days (26% versus 11%; $\chi^2$=6.5, df=1, $p$<0.05) and were more likely to have passed on a used needle on two or more occasions in that time period (18% versus 8%; $\chi^2$=6.5, df=2, $p$<0.05). There were no other significant differences between the two groups. The proportion of the sample reporting sharing other injecting equipment was very high at 41 per cent, as was the proportion of the sample reporting recent unsafe sexual practices (between 39% and 49%). Perhaps unsurprisingly, subsequent analyses revealed that participants with regular partners were over-represented among those reporting unprotected sex. Slightly less than three-quarters of respondents with spouses or regular partners reported having unprotected sex in the previous 30 days while 27 per cent of respondents without regular partners had done so ($\chi^2$=35.1, df=1, $p$<0.01). Even so, the prevalence of unprotected sex among IDU without regular partners was very high. An additional measure of injection-related risk was to measure the time since participants' most recent blood test for HIV or Hepatitis C. While the majority of respondents reported having a blood test for Hepatitis C or HIV within 6 months of interview, Table 13 shows that more than one-quarter of respondents had not had a blood test in the preceding 6 months. Only about 20 per cent of IDU who had used a needle before or after someone else within the previous month reported having a blood test for HIV or Hepatitis C in that same month. It should be noted, though, that these estimates of risk are necessarily quite crude without taking into consideration *who* participants' were sharing injecting equipment with.

**Table 13.** Relationship between PS and NON-PS users and measures of risk-taking behaviour.

| Variable | NON-PS % 'yes' (n=98) | PS % 'yes' (n=91) | Sig. |
|---|---|---|---|
| Last 30 days: | | | |
| Borrowed needle? | 9 | 7 | ns |
| Borrowed needle 2+ times? | 6 | 4 | ns |
| Loaned needle? | 11 | 26 | $p$=0.01 |
| Loaned needle 2+ times? | 8 | 18 | $p$=0.04 |
| Shared other equipment? | 41 | 41 | ns |
| Shared other equipment daily or more? | 9 | 12 | ns |
| Had unprotected sex? | 39 | 49 | ns |
| Seven or more months since last HEP. C/HIV test? | 26 | 33 | ns |

Table 14 shows the relationship between PS use and the likelihood of having committed any crime in the preceding 30 days, the likelihood of having sold drugs during the reference period and the likelihood of committing acquisitive and violent crimes in the preceding month. Three-quarters of PS users reported committing at least one crime in the previous 30 days while approximately half of NON-PS users reported the same ($\chi^2$=14.0, df=1, $p$<0.01). PS users were also more likely than NON-PS users to have sold drugs (52% versus 21%; $\chi^2$=19.2, df=1, $p$<0.01) to commit an acquisitive crime (54% versus 33%; $\chi^2$=9.1, df=1, $p$<0.01) and to commit a violent crime in the preceding 30 days (23% versus 11%; $\chi^2$=4.9, df=1, $p$<0.05). The only crime types for which there was no significant difference between groups were break, enter and steal, assault, and robbery/ standover, although this last offence was significant at the more liberal 10 per cent level.

**Table 14.** Relationship between NON-PS and PS users and measures of criminal activity.

| Variable | NON-PS % 'yes' (n=98) | PS % 'yes' (n=90) | Sig. |
|---|---|---|---|
| Last 30 days: | | | |
| Any crime? | 49 | 76 | $p$=<0.01 |
| Sold drugs? | 21 | 52 | $p$=<0.01 |
| Acquisitive crime? | 33 | 54 | $p$=<0.01 |
| Break, enter & steal? | 8 | 8 | ns |
| Motor vehicle theft? | 2 | 9 | $p$=0.04 |
| Other theft? | 29 | 49 | $p$=<0.01 |
| Fraud last? | 4 | 12 | $p$=0.04 |
| Violent crime? | 11 | 23 | $p$=0.03 |
| Assault? | 8 | 16 | ns |
| Robbery/standover? | 6 | 13 | $p$=0.09 |

Four of the above outcomes were singled out as particularly important from a policy and law enforcement perspective: paranoia, likelihood of passing on unclean injecting equipment, acquisitive crime and violent crime. These outcomes were subjected to more rigorous statistical controls to assess the independent contribution of PS use to the respective harms. Chi-square analyses were first carried out between each of the four critical measures of harm and potential confounders of the relationship between PS use and those harms. Where there was a significant relationship between potential confounders and the outcome variables, logistic regression models were fitted and the final models, with odds ratio (OR) estimates and the associated $p$-values, are presented in Table 15.

Chi-square comparisons revealed that none of the potential confounders measured in the current study (age, gender, marital status, parental status, ethnicity, employment status, recent cannabis use, age of first drug use) were related to the likelihood of having experienced a paranoid reaction in the prior 30 days. As such, there was no need to adjust for any potential confounders of the relationship between PS use and paranoia.

Model (a) in Table 15 shows the final model for the analysis with needle sharing as the outcome variable of interest. Of the potential confounders measured here (age, gender, marital status, parental status, ethnicity, employment status, age of first drug use), only gender and marital status were related to the likelihood of passing on unclean needles. Females (26%) were more likely than males (14%) to have passed on unclean needles in the previous 30 days ($\chi^2$=4.0, df=1, $p$<0.05). IDUs who were not in a relationship (23%) were more likely to pass on unclean needles than IDUs who were in a relationship (10%; $\chi^2$=4.0, df=1, $p$<0.05). Table 15 shows that, controlling for relationship status and gender, the odds of PS users passing on an unclean needle in the last 30 days were 2.5 times that of NON-PS users.

Bi-variate analyses revealed that, of the potential confounders measured, age and history of arrest were associated with the likelihood of committing an acquisitive crime in the previous 30 days. Older respondents (36+ years) were less likely than were younger respondents to report committing acquisitive crime ($\chi^2$=7.9, df=3, $p$<0.05) and IDUs who had a prior history of arrest for theft or violence were more likely than IDUs who had no history of arrest to report acquisitive crime ($\chi^2$=7.9, df=2, $p$<0.05). None of the other potential confounders (gender, marital status, parental status, ethnicity, employment status, treatment history) were related to the likelihood of committing acquisitive crime. Model (b) in Table 15 shows that, controlling for age and arrest history, PS users were about 2.7 times more likely to report committing acquisitive crime than NON-PS users.

Chi-square analyses revealed that cannabis users were more likely than IDUs who had not used cannabis ($\chi^2$=6.9, df=1, $p$<0.01) to report having committed a violent crime in the preceding 30 days. None of the other predictors (age, gender, marital status, parental status, ethnicity, employment status, treatment history, arrest history) were related to violent criminal activity. Model (c) in Table 15 shows that, after controlling for cannabis use, the effect of psycho-stimulant use on violent crime is no longer significant at the 5 per cent level ($p$=0.06). There are two likely explanations for this result. Firstly, our capacity to detect an effect of psycho-stimulant use is relatively weak, due to the small number of IDUs reporting involvement in violent crime (n=32). Secondly, psycho-stimulant users often use cannabis to moderate the effects of withdrawal from psycho-stimulant drugs (White, Breen & Degenhardt 2004). The inclusion of a variable measuring cannabis use in an equation linking psycho-stimulant use to violent crime therefore probably masks the effects of psycho-stimulant use on violent crime.

**Table 15.** Logistic regression models controlling for factors predicting (a) likelihood of passing on an unclean needle in the 30 days prior to interview (b) committing an acquisitive crime in the 30 days prior to interview and (c) committing a violent crime in the 30 days prior to interview.

| Model | B | SE | Sig. | OR | 95% CI |
|---|---|---|---|---|---|
| **(a) Passing on unclean needle** | | | | | |
| Used psycho-stimulants | 0.93 | 0.41 | 0.02 | 2.5 | 1.1-5.7 |
| Male | -0.93 | 0.41 | 0.02 | 0.4 | 0.2-0.9 |
| In a relationship | -1.12 | 0.47 | 0.02 | 0.3 | 0.1-0.8 |
| Constant | -1.14 | 0.43 | 0.01 | | |
| **(b) Acquisitive crime** | | | | | |
| Used psycho-stimulants | 0.98 | 0.32 | <0.01 | 2.7 | 1.4-5.0 |
| Age group | | | | | |
| 25-29 v 17-24 | 0.23 | 0.46 | 0.61 | 1.3 | 0.5-3.1 |
| 30-35 v 17-24 | -0.11 | 0.44 | 0.80 | 0.9 | 0.4-2.1 |
| 36+ v 17-24 | -0.96 | 0.46 | 0.04 | 0.4 | 0.2-1.0 |
| History of arrest | | | | | |
| Either theft or violence v never | 1.14 | 0.52 | 0.03 | 3.1 | 1.1-8.7 |
| Both theft and violence v never | 1.47 | 0.54 | 0.01 | 4.4 | 1.5-12.5 |
| Constant | -1.66 | 0.56 | <0.01 | | |
| **(c) Violent crime** | | | | | |
| Used psycho-stimulants | 0.77 | 0.41 | 0.06 | 2.2 | 1.0-4.8 |
| Used cannabis | 1.12 | 0.49 | 0.02 | 3.1 | 1.2-7.9 |
| Constant | -2.79 | 0.48 | <0.01 | | |

# Discussion

The present research sought to inform three questions of relevance to illicit drug policy:

1. What effect do the perceived price, purity and availability of heroin have on (a) heroin use and (b) heroin expenditure?
2. What effect does the perceived risk of scoring, perceived hassle associated with scoring and amount of contact with police have on (a) heroin use and (b) heroin expenditure?
3. What differences are there in terms of adverse health and behavioural outcomes between IDUs who use heroin only and IDUs who use a combination of heroin and psycho-stimulant drugs, such as cocaine and methamphetamine?

For this sample of IDUs, most of the law enforcement-related variables exerted no significant effect on heroin use and expenditure. Neither the cost of heroin, nor its purity, nor the perceived risk and hassle associated with purchasing heroin were related to either drug expenditure or use. There was a significant relationship between the amount of contact with police and heroin expenditure but it was in the opposite direction to that which would be expected if police contact directly reduces heroin expenditure. IDUs who had more contact with police spent more on heroin each week than IDUs who had relatively infrequent contact with police. The only law enforcement-related variable that appeared to be related to heroin use and expenditure in the manner expected was time to score. IDUs who took longer to score spent significantly less on the drug, and used significantly less of it.

On the face of it, these findings suggest that the only direct and immediate source of leverage street-level police can exert on heroin expenditure and consumption is by increasing the 'buy time' for heroin. This is not an unimportant finding because it suggests that street-level law enforcement efforts to reduce the availability of heroin can have a positive impact on heroin use and expenditure. The lack of any statistically significant association between the other law enforcement variables and heroin use/expenditure should be treated with a degree of caution. It is important to bear in mind that the present sample of heroin users is somewhat atypical. Participants for the study were recruited after a major change to the supply of heroin that saw dramatic increases in its price and dramatic reductions in its purity (Day et al. 2003; Topp, Day & Degenhardt 2003; Weatherburn et al. 2003). There are convincing indications that many heroin users left the heroin market altogether (Day et al. 2004) and it is likely that most of these users had previously only used heroin recreationally. This would have left the heroin market in Sydney dominated by a group of heroin users who were much less likely to curtail their consumption of, or expenditure on, heroin in the face of higher heroin prices and lower heroin purity. They may also have been less likely to curtail their heroin expenditure and use in the face of higher levels of risk and hassle. There is now unambiguous evidence from other research into the heroin shortage suggesting that heroin use and expenditure are very responsive to changes in heroin price and purity (Degenhardt, Day & Hall 2004; Weatherburn et al. 2003)

The seemingly aberrant result in relation to frequency of contact is probably a consequence of the fact that the present study used a cross-sectional rather than a longitudinal research design. Every purchase or use of heroin carries some degree of risk. Those who buy more heroin will, at least over the short run, probably have more contact with police. Heavier users will therefore tend to come into contact with police more frequently even if, over the longer term, this frequent contact prompts them to reduce their heroin consumption or leave the market altogether. Long-run effects would obviously be easier to detect in a longitudinal design than in a cross-sectional one, but tracking heroin users over long periods of time is extremely difficult to do. We endeavoured to

overcome the problems inherent in a cross-sectional design by making a determined effort to interview heroin users with light to moderate consumption habits. As it turned out, most of the heroin users we interviewed had substantial heroin habits, probably because, as noted earlier, many less committed and more risk-averse heroin users already appear to have left the market.

Our comparison of heroin users who use psycho-stimulants with those who do not revealed a number of important differences between the two groups. Psycho-stimulant users placed a substantially larger burden on the health system than heroin users who were not using psycho-stimulants. They attended general practitioners more frequently, were more likely to use benzodiazepines and were more likely to have 'blacked out' on two or more occasions. They were more likely to report feelings of anxiety and paranoia and to share needles. They were also more likely to self-report involvement in property and violent crime. With the exception of violent crime, these effects held up in the presence of controls for other extraneous variables associated with the relevant outcomes. The relationship between psycho-stimulant use and involvement in violent crime was significant at a bi-variate level but became marginal when adjusted for the association between cannabis use and violent crime. However this is probably due to the small sample size and the fact that cannabis is often employed by psycho-stimulant users to moderate the effects of psycho-stimulant withdrawal (White, Breen & Degenhardt 2004).

These findings have important implications for both public health and law enforcement policy. Any significant migration of heroin users into psycho-stimulant use would probably increase the demand on general medical and psychiatric services. Such a migration could also increase the spread of diseases, such as Hepatitis C and HIV-AIDS, through more frequent sharing of injecting equipment. The fact that no significant or sustained migration seems to have occurred is probably due to the fact that, soon after the heroin shortage, cocaine became difficult to obtain (Breen et al. 2003). This limited the ease with which heroin users could switch to cocaine. It follows that any resurgence in the supply of cocaine could see an increase in psycho-stimulant use, an increase in demand for health services and an increase in morbidity and mortality associated with psycho-stimulant use. Health authorities therefore need to be alert to any signs of an upsurge in cocaine or methamphetamine use and to any evidence of an increase in the diversion of legitimate pharmaceutical products for the purpose of producing psycho-stimulants.

The present findings also have important implications for drug law enforcement policy. Firstly, officers working at street-level need to be mindful of the occupational health and safety risks associated with psycho-stimulant users. Compared with heroin using IDU who do not use psycho-stimulants, this is a group that is likely to prove more difficult and dangerous to deal with. Secondly, given the ongoing existence of a heroin shortage (Breen et al. 2003), and the propensity of heroin users to switch to psycho-stimulants, every effort needs to be made to prevent drugs such as methamphetamine and cocaine becoming substitutes for heroin. Thirdly, although the present results only provided limited evidence that street-level law enforcement activity influences illicit drug use and expenditure (although see caveats listed above), we did find that, the longer it took a respondent to score, the less they spent on heroin and the less heroin they consumed. This finding provides useful confirmation of the widely held assumption amongst police that increasing the non-monetary costs associated with heroin use is one important means by which police at street-level can limit heroin consumption and expenditure. Of course, as with our analysis of contact with police and expenditure on heroin, the fact that our sample consisted of long-term heavy users leaves open the direction of causation between 'buy time' and expenditure/use. In other words, rather than street-level law enforcement leading to reduced use, it is equally possible that people who use heroin very frequently are simply more likely to have access to steady heroin supply and be able to purchase heroin more quickly.

Finally, it is perhaps worth concluding by pointing out that the present study, like so many before it, shows clear evidence of the benefits of treatment for heroin dependence. Enrolment in one or more forms of treatment for heroin dependence was predictive of lower heroin use in the present study. IDUs who had received any treatment for heroin dependence in the 30-day reference period had used almost one hit less per day, on average, than did IDUs who had not received any treatment for heroin dependence. IDUs who had been in treatment also tended to spend about $270 less on heroin each week as well. It is true that this effect weakened and became only marginally significant in the regression model when controls were introduced for the sample from which the IDUs were drawn. However this effect could just be due to the fact that those who do not enter treatment are more likely to find themselves convicted and in prison.

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