

Abstract

Background: The relationship between age and criminal activity among drug-using populations is poorly understood.

Methods: Data from 10 years of repeat cross-sectional surveys of sentinel samples of regular people who inject drugs (PWID) across Australia (n = 5844) were used to explore the relationship between age and past-month drug dealing, property crime and violent crime, and past-year arrest. Descriptive statistics were used to explore the prevalence and frequency of each outcome. The relationship between age and each outcome was measured using multivariable Poisson regression with robust error variance.

Results: After adjusting for confounding factors, each 5-year increase in age was associated with significant reductions in drug dealing (adjusted incidence rate ratio [AIRR]: 0.90, 95% confidence interval [CI]: 0.87–0.94), property crime (AIRR: 0.85, 95% CI: 0.82–0.89) and violent crime (AIRR: 0.77, 95% CI: 0.70–0.85). Older participants were also significantly less likely to report being arrested in the past 12 months (AIRR: 0.91, 95% CI: 0.88–0.93).

Conclusions: Younger PWID are more heavily involved in criminal activity compared with their older counterparts. This study highlights the need for early intervention programmes to prevent offending behaviour becoming entrenched, as well as continued efforts to redirect young PWID away from the criminal justice system and into treatment and education programmes.

Keywords

Age, Australia, crime, injecting drug use, violence

Background

There has been significant debate in the criminology literature about the nature of the relationship between age and crime and its importance in the prevention of offending behaviour (Farrington, 1990; Hirschi & Gottfredson, 1983). Recent longitudinal studies examining criminal trajectories have however demonstrated that offending activity peaks during adolescence and young adulthood and decreases with age (Bersani et al., 2009; Sampson & Laub, 2003; van der Geest et al., 2009). Australian crime statistics also support this relationship, with young people aged 15–19 years more likely to be processed by police in relation to crime than any other age group (Australian Institute of Criminology, 2012). Additionally, data suggest that patterns of criminal activity differ across age groups, with theft and related offences, public order offences, and acts intended to cause injury the most common offences among young people, while illicit drug offences are more common among older groups (Australian Institute of Criminology, 2012; Sweeney & Payne, 2012).

The association between drug use and crime has been well-documented (Bennett & Holloway, 2006; Bennett et al., 2008; Boles & Miotto, 2003; McBride & McCoy, 1993; Seddon, 2000; White & Gorman, 2000). Empirical research exploring this relationship has focused predominantly on drug use among offending populations, with studies showing that substantial proportions of incarcerated populations (Abiona et al., 2009; Butler et al., 2003; Conklin et al., 2000; Kinlock et al., 2003; Kinner et al., 2012) and police detainees (Boreham et al., 2007; Makkai, 2001; Sweeney & Payne, 2012) report a history of drug use or injection. Less is known about patterns of crime among community-based drug-using populations. A recent meta-analysis found that among samples of community-based drug users the odds of offending were three to four times higher among drug users compared with non-users, however the mean effect size for the relationship between drug use and crime was lower among samples of community-recruited drug users compared with samples of offenders (Bennett et al., 2008). This suggests that there are differences in the drug–crime relationship between community and prison settings.

People who inject drugs (PWID) have been characterised as a population who engage in high rates of criminal activity (Elliott & Chapman, 2000; Fraser & Moore, 2008). However, the nature and extent of criminal activity reported by PWID varies substantially between studies (e.g. Farabee et al., 2001; Kerr

et al., 2008; Kinner et al., 2009). Previous research has identified a range of socio-demographic and drug use factors which are associated with engagement in criminal activity among PWID, including homelessness (Werb et al., 2008), types of substances used (including licit substances such as alcohol and benzodiazepines; Darke et al., 2010a, 2010b; Dietze et al., 2012; Klee & Morris, 1994), frequency of drug use (Kerr et al., 2008; Kinner et al., 2009) and engagement in drug treatment (Bukten et al., 2011; Gossop et al., 2005; Teesson et al., 2008). Given the importance of drug use factors, it is possible that the relationship between age and criminal offending may be less salient or even non-existent among PWID. However, research shows that young PWID engage in higher levels of sexual and drug-taking risk behaviours compared with their older counterparts (Cassin et al., 1998; Degenhardt et al., 2008; Horyniak et al., 2013; Kral et al., 2000; Miller et al., 2007), and it may be surmised that this risk-taking behaviour may also extend to criminal activity.

The relationship between age and offending among drug-using populations, and PWID in particular, has not been explored in detail. Few studies examining the drug-crime relationship have conducted age-specific analyses (Bennett et al., 2008) and among those studies which have examined age, varying findings have been reported. For example, one study found that although PWID who reported past-month criminal activity were significantly younger than those who did not, age was not a significant independent correlate of recent offending (Kinner et al., 2009). However, this study examined only one measure of criminal activity. More recently, an examination of rates of criminal charges among clients entering opioid substitution treatment (OST) found that offending rates were highest among younger participants (Degenhardt et al., 2013). This study shows important findings but examined only finalised court appearances, and only examined the effects of age in the context of a limited range of predictor variables (e.g. the study was unable to adjust for patterns of drug use). Importantly, studies have also suggested that the relationship between age and crime may differ across different types of offending or drug-using populations (Hayhurst et al., 2013; Klee & Morris, 1994; Werb et al., 2008).

In this article we used data from 10 years of repeat cross-sectional surveys conducted among sentinel samples of regular PWID across Australia to examine the age-crime relationship. We extend previous work by examining four different measures of self-reported criminogenic activity, adjusting for the influence of differing patterns of drug use and a range of other characteristics. We hypothesised that recent criminal activity would be more commonly reported by younger study participants, but that this relationship would vary across different types of criminal activity and patterns of drug use.

Methods

Survey methods

Data for this analysis were taken from the illicit drug reporting system (IDRS; Hando et al., 1998). This annual cross-sectional survey recruits participants using purposive sampling through needle and syringe programmes, treatment agencies, advertisements in street press and peer referral, in all Australian capital cities. Eligibility criteria were: aged 16 years or older, injected drugs at least monthly in the 6 months preceding interview, and residence in the recruitment city for at least 12 months. After providing written informed consent participants completed a structured interviewer-administered questionnaire and were reimbursed up to \$40 (depending on survey year). The study received approval from ethics committees in each jurisdiction, and the University of New South Wales Human Research Ethics Committee.

Measures

The outcomes of interest were self-reported past-month drug dealing (defined as having sold drugs for profit, including cash, drugs or other goods), property crime and violent crime, and past-year arrest (all yes/no). The primary exposure of interest was participant age, which was treated as a continuous variable, and re-scored so that each one-unit change represented 5 years.

Secondary socio-demographic variables included state of residence, sex, indigenous status (yes/no), language spoken at home (English/other), educational attainment (completed high school/did not

complete high school), employment status (unemployed/employed), accommodation type (stable/unstable), lifetime incarceration (yes/no) and duration of injecting (55 years/5–9 years/10–14 years/2':15 years); tests of collinearity between age and duration of injecting indicated variance inflation factors were within acceptable limits (VIF \leq 2.42). Measures of substance use (all yes/no) included heroin injection, amphetamine powder injection, crystal methamphetamine injection, illicit pharmaceutical opioid use (methadone, phyllophylone, morphine), benzodiazepine use, daily alcohol consumption, last drug injection in a public place, and current OST status. All drug use variables referred to the 6 months preceding interview. Amphetamine powder and crystal methamphetamine injection were examined as separate factors because, compared with users of other forms of methamphetamine, crystal methamphetamine users exhibit higher levels of dependence and drug-related harms, including criminal offending (Kinner & Degenhardt, 2008; McKetin et al., 2006). Cocaine injection was not examined as cocaine use is rare among Australian PWID (Stafford & Burns, 2013). As there was some correlation across the four measures of criminal activity (Phi coefficients ranged from 0.125 to 0.218), these measures of criminal activity were also included as potential secondary variables.

Data analysis

As it was not possible to track repeat participants over time analysis was limited to first-time participants (i.e. those who self-reported that they had never previously completed an IDRS survey). We compared the median age of the total sample and the sample restricted to first-time participants across each study year and found that limiting our analysis did not bias the included sample towards younger participants.

Data were available for the period 2001–2011, however recent crystal methamphetamine injection was first collected in 2002. Given the evidence supporting a relationship between crystal methamphetamine use and criminogenic outcomes (Bennett et al., 2008; Darke et al., 2010b; Kinner & Degenhardt, 2008; Milloy et al., 2009) it was important to adjust for this variable separately in the analysis. A sensitivity analysis comparing findings based on analysis of the complete dataset without the crystal methamphetamine injection variable (2001–2011) and the dataset including crystal methamphetamine (2002–2011) found that key findings did not change significantly. Therefore, the analysis presented here includes only 2002–2011 data.

Prevalence and frequency of criminal activity were analysed descriptively, and chi-square tests were used to explore differences in socio-demographic and drug use characteristics across age groups. To measure the magnitude of association between age and each measure of criminal activity, we used Poisson regression with robust variance estimates (Zou, 2004), as prevalence of criminal activity in the sample was generally high (420% for three of the four outcomes), meaning that odds ratios from logistic regression analyses would not provide accurate estimates of the risk differences between groups (Zhang & Yu, 1998). It should be noted that Poisson regression with robust variance estimates provide a more conservative measure than other techniques.

Multivariable regression was used to adjust for confounding and to calculate the best effect estimate of each relationship. All secondary variables were included in the analysis, with full models reported. We also assessed two-way interactions between age and recent drug use variables by introducing interaction terms into the regression models. Interaction was deemed as present if the interaction term was associated with the dependent variable at $p \leq 0.05$.

Adjusted incidence rate ratios (AIRR) for each final model were obtained by exponentiating the Poisson regression coefficient; AIRRs can be interpreted in the same way as an odds ratio obtained through logistic regression, representing the relative change in the incidence rate for a one-unit change in any given variable. To account for multiple comparison testing and to reduce the likelihood of Type I error, a conservative p value cut-off of $p \leq 0.01$ was used in determining significant

associations in the final multivariable models. Analyses were conducted using Stata Version 11.1 (Statacorp LP, College Station, TX).

Results

Socio-demographic and drug use characteristics

Analysis was limited to 5844 first-time study participants (64% of the total 9173 study participants). Due to an increasing number of repeat participants over time, the number of included participants decreased from 684 in 2002 to 491 in 2011. Participants were predominantly male (65%), spoke English as their main language (96%) and had injected drugs for a median of 13 years (IQR: 8–21). Almost half of all participants were daily injectors (46%), with heroin (66%), amphetamine powder (52%) and crystal methamphetamine (46%) the drugs most commonly injected during the 6 months preceding interview.

The median age of participants was 33 years (IQR: 27–40). Compared with older participants, greater proportions of younger participants were female, had completed high school and were currently employed (Table 1).

Table 1. Socio-demographic and drug use characteristics by age group^a.

Variable	Age group					χ^2 statistic (df), <i>p</i> Value
	<20 years <i>N</i> = 162 %	20–24 years <i>N</i> = 640 %	25–29 years <i>N</i> = 1037 %	30–34 years <i>N</i> = 1104 %	≥35 years <i>N</i> = 2481 %	
Sex						
Male	48	56	62	66	70	
Female	52	44	38	34	30	76.2 (4), <0.001
Indigenous						
Yes	16	14	12	13	13	
No	84	86	88	87	87	2.2 (4), 0.700
Completed high school						
Yes	7	17	23	25	21	
No	93	83	77	75	79	34.0 (4), <0.001
Speak English at home						
Yes	93	95	95	95	97	
No	7	5	5	5	3	23.0 (4), <0.001
Currently employed						
Yes	29	25	26	24	19	
No	71	75	74	76	81	37.1 (4), <0.001
Accommodation type						
Stable	87	91	90	89	87	
Unstable	13	9	6	11	13	11.1 (4), 0.025
Duration of injecting (median, IQR)	3 (2–4)	6 (4–8)	10 (7–12)	14 (10–16)	21 (16–27)	2486.5 (46), <0.001
Heroin injection (past 6 months) ^b						
Daily	8	15	14	16	14	
Less than daily	30	39	51	48	50	
Did not inject	62	46	34	36	36	69.5 (8), <0.001
Amphetamine powder injection (past 6 months) ^c						
Weekly or more	19	15	18	17	18	
Less than weekly	32	35	28	33	31	
Did not inject	49	50	54	50	51	12.1 (8), 0.145
Crystal meth. injection (past 6 months) ^d						
Weekly or more	25	16	15	15	14	
Less than weekly	23	33	31	29	27	
Did not inject	52	51	54	56	59	26.8 (8), 0.001
Used benzodiazepines (past 6 months)	65	62	65	69	63	13.6 (4), 0.009
Daily alcohol consumption (past 6 months)	6	7	9	8	10	11.2 (4), 0.025
Currently on OST	9	32	37	39	38	60.2 (4), <0.001
Ever been in prison	27	31	47	54	57	188.0 (4), <0.001

Bold value indicates statistically significant values ($p < 0.05$).

OST, opioid substitution therapy.

^a*N* = 5424 valid participants only (four participants did not report their age and 420 participants provided incomplete socio-demographic or drug use information).

^bQuestion first asked in 2003 (*n* not asked = 412).

^cQuestion first asked in 2003 (*n* not asked = 342).

^dQuestion first asked in 2003 (*n* not asked = 229).

Table 2. Prevalence and bivariate risk of recent criminal activity, by age group.

	Drug dealing (past month) <i>N</i> = 5786 <i>n</i> (%)	Property crime (past month) <i>N</i> = 5789 <i>n</i> (%)	Violent crime (past month) <i>N</i> = 5789 <i>n</i> (%)	Arrest (past year) <i>N</i> = 5815 <i>n</i> (%)
Age group (years)				
<20 (<i>n</i> = 173)	91 (53)	80 (47)	39 (23)	104 (60)
20–24 (<i>n</i> = 687)	255 (37)	222 (32)	85 (12)	349 (51)
25–29 (<i>n</i> = 1116)	346 (32)	311 (28)	86 (8)	530 (48)
30–34 (<i>n</i> = 1195)	342 (29)	284 (24)	85 (7)	543 (46)
≥35 (<i>n</i> = 2669)	710 (27)	470 (18)	109 (4)	949 (36)
IRR ^a (95% CI)	0.91 (0.89–0.93)*	0.84 (0.82–0.86)*	0.73 (0.69–0.78)*	0.90 (0.88–0.91)*
IRR ^a adjusted for interview year (95% CI)	0.92 (0.90–0.94)*	0.83 (0.81–0.86)*	0.74 (0.70–0.79)*	0.90 (0.88–0.91)*

IRR, incidence rate ratio; CI, confidence interval.

^aPer one-unit increase in age, where one unit represents 5 years.

**p* < 0.01.

Table 3. Multivariable Poisson regression of past-month drug dealing, property crime, violent crime and past-year arrest.

Variable	Drug dealing (past month) AIRR (95% CI)	Property crime (past month) AIRR (95% CI)	Violent crime (past month) AIRR (95% CI)	Arrest (past year) AIRR (95% CI)
<i>Primary variable of interest</i>				
Age ^a	0.90 (0.87–0.94)*	0.85 (0.82–0.89)*	0.77 (0.70–0.85)*	0.91 (0.88–0.93)*
<i>Secondary variables</i>				
Year of interview ^b	–*	–*	–	–
Interview state ^c	–*	–*	–*	–*
<i>Sex</i>				
Female	1	1	1	1
Male	1.16 (1.06–1.27)*	0.92 (0.83–1.02)	1.17 (0.94–1.47)	1.14 (1.06–1.22)*
<i>Indigenous</i>				
No	1	1	1	1
Yes	0.92 (0.81–1.04)	1.03 (0.90–1.17)	1.41 (1.12–1.78)*	1.09 (1.01–1.19)
<i>Main language: English</i>				
No	1	1	1	1
Yes	1.05 (0.85–1.31)	1.27 (0.98–1.65)	1.04 (0.65–1.65)	1.02 (0.88–1.18)
<i>Completed high school</i>				
No	1	1	1	1
Yes	1.07 (0.97–1.18)	0.94 (0.82–1.07)	0.97 (0.74–1.28)	0.87 (0.79–0.95)*
<i>Employment status</i>				
Unemployed	1	1	1	1
Employed	1.04 (0.94–1.15)	0.84 (0.74–0.96)*	0.73 (0.54–0.97)	0.84 (0.77–0.91)*
<i>Accommodation status</i>				
Stable accommodation	1	1	1	1
Unstable/homeless	0.92 (0.81–1.05)	1.04 (0.90–1.20)	0.97 (0.72–1.31)	1.10 (1.00–1.20)
<i>Duration of injecting</i>				
<5 years	0.82 (0.70–0.97)	0.86 (0.71–1.04)	1.07 (0.71–1.60)	0.97 (0.86–1.10)
5–9 years	0.75 (0.65–0.86)*	0.93 (0.79–1.09)	0.80 (0.56–1.13)	0.98 (0.89–1.08)
10–14 years	0.83 (0.74–0.93)*	0.94 (0.82–1.08)	0.79 (0.58–1.07)	0.96 (0.88–1.05)
≥14 years	1	1	1	1
<i>Injected heroin^d</i>				
No	1	1	1	1
Yes	1.06 (0.95–1.17)	1.22 (1.07–1.40)*	0.90 (0.69–1.16)	1.06 (0.98–1.15)
<i>Injected amphetamine powder^d</i>				
No	1	1	1	1
Yes	1.09 (1.00–1.18)	1.10 (1.00–1.22)	1.29 (1.05–1.59)	1.06 (1.00–1.14)
<i>Injected crystal methamphetamine^d</i>				
No	1	1	1	1
Yes	1.29 (1.18–1.41)*	1.08 (0.97–1.19)	1.17 (0.94–1.44)	1.15 (1.08–1.23)*
<i>Used illicit methadone^d</i>				
No	1	1	1	1
Yes	1.10 (1.00–1.21)	1.09 (0.97–1.22)	1.18 (0.93–1.50)	1.04 (0.97–1.12)
<i>Used illicit physseptone^d</i>				
No	1	1	1	1
Yes	1.32 (1.17–1.50)*	1.05 (0.89–1.23)	0.82 (0.58–1.17)	1.06 (0.95–1.18)
<i>Used illicit morphine^d</i>				
No	1	1	1	1
Yes	1.24 (1.13–1.35)*	1.13 (1.02–1.25)	1.24 (1.00–1.54)	1.07 (1.00–1.14)
<i>Used benzodiazepines^d</i>				
No	1	1	1	1
Yes	1.14 (1.03–1.25)*	1.36 (1.21–1.53)*	1.05 (0.84–1.31)	1.11 (1.04–1.19)*
<i>Daily alcohol consumption^d</i>				
No	1	1	1	1
Yes	1.06 (0.93–1.21)	0.84 (0.71–1.00)	1.60 (1.22–2.09)*	1.19 (1.08–1.30)*
<i>Currently on OST</i>				
No	1	1	1	1
Yes	0.94 (0.86–1.03)	1.01 (0.92–1.12)	1.04 (0.85–1.29)	1.04 (0.98–1.11)
<i>Last injection in public^d</i>				
No	1	1	1	1
Yes	0.93 (0.85–1.02)	1.35 (1.22–1.49)*	1.18 (0.97–1.44)	1.17 (1.10–1.24)*
<i>Ever in prison</i>				
No	1	1	1	1
Yes	1.11 (1.02–1.22)	1.08 (0.98–1.20)	1.64 (1.32–2.04)*	1.40 (1.31–1.50)*

Variable	Drug dealing (past month) AIRR (95% CI)	Property crime (past month) AIRR (95% CI)	Violent crime (past month) AIRR (95% CI)	Arrest (past year) AIRR (95% CI)
Recent drug dealing ^d				
No	–	1	1	1
Yes	–	1.39 (1.26–1.53)*	1.94 (1.59–2.36)*	1.10 (1.03–1.17)*
Recent property crime ^d				
No	1	–	1	1
Yes	1.35 (1.24–1.47)*	–	1.77 (1.44–2.16)*	1.33 (1.25–1.42)*
Recent violent crime ^d				
No	1	1	–	1
Yes	1.47 (1.32–1.64)*	1.38 (1.22–1.57)*	–	1.19 (1.09–1.29)*
Recent arrest ^e				
No	1	1	1	–
Yes	1.14 (1.05–1.25)*	1.60 (1.44–1.79)*	1.75 (1.38–2.21)*	–

AIRR, adjusted incidence rate ratio; CI, confidence interval.

^aOne unit represents 5 years.

^bYear modelled as a categorical variable with 2002 as the reference category, however only the overall effect is shown.

^cInterview state modelled as a categorical variable with New South Wales as the reference category, however only the overall effect is shown.

^dIn the last 6 months.

^eIn the past 12 months; * $p < 0.01$.

Patterns of drug use also differed across age groups, with recent crystal metham- phetamine injection more common among younger partici- pants, and recent heroin injection more common among older participants (Table 1). Younger participants were also less likely to report being prescribed OST at the time of interview.

Prevalence and frequency of criminal activity

Almost half of all participants reported engaging in any past-month property crime, violent crime or drug dealing (45%, $n = 2632$). The majority (71%) reported engaging in only one type of crime. Among those who reported any past-month criminal offending, drug dealing was the most common and frequent type of criminal activity (66%), with 46% of those doing so at least once a week in the past month, and 23% reporting doing so on a daily basis. Perpetration of property crime was also common, reported by 52% of those who had engaged in any offending in the past month, however engaged in less frequently than drug dealing (45% of those had committed a property crime in the past month had done so less than once a week). Violent crime was reported by fewer participants (15% of those reporting past-month offending).

Relationship between age and crime

All types of criminal activity were more commonly reported by younger participants compared to older participants (Table 2). Bivariate analyses indicated a strong relationship between increasing age and reductions in the risk of reporting recent criminal activity (Table 2).

Table 3 shows the final multivariable models for each of the outcomes of interest. For each 5-year increase in age among study participants, there was an average 10% reduction in drug dealing, 15% reduction in property crime and 23% reduction in violent crime. There were no significant inter- actions between age and drug use in the models for drug dealing, property crime or violent crime.

The overall effect of age on recent arrest was that each 5-year increase in age was associated with a 9% reduction in the rate of recent arrest. There was a significant interaction between age and crystal methamphetamine injection with respect to this outcome ($p = 0.008$); A stratified analysis showed that the protective effect of age on recent arrest was slightly attenuated among participants who reported recent crystal methamphetamine injection compared with those who did not (Table S1).

Discussion

Our study found that each 5-year increase in age among study participants was associated with statistically significant reductions in the risk of recent criminal activity: risk was reduced by 10% for past-month drug dealing, 15% for past- month property crime, and 23% for past-month violent crime.

Younger age was also significantly associated with having been arrested in the 12 months preceding interview (although small differences in effects were observed between those who reported recent crystal methamphetamine injection and those who did not), confirming that the relationship between age and criminal activity remains significant over a longer recall period and using a broad indicator of criminal activity. These findings show that the relationship between younger age and criminal offending which has been shown to exist among non-drug-using populations (Bersani et al., 2009; Sampson & Laub, 2003; van der Geest et al., 2009) is also evident among regular PWID. Furthermore, the negative association between age and offending was significant across the four domains of criminal activity measured, and these associations were independent of other factors which have been shown to influence the relationship between drug use and crime, including types of drugs used (Bennett et al., 2008; Boles & Miotto, 2003; Darke et al., 2010b; Klee & Morris, 1994), accommodation status (Werb et al., 2008), sex (Bennett et al., 2008), drug treatment status (Bukten et al., 2011; Gossop et al., 2005; Teesson et al., 2008), benzodiazepine use (Darke et al., 2010a; Lundholm et al., 2013) and alcohol consumption (Boles & Miotto, 2003; Dietze et al., 2012; Hoaken & Stewart, 2003; Payne & Gaffney, 2012).

Our analysis detected few consistent patterns of association between drug use and criminal activity. For example, alcohol was the only type of substance use which was significantly associated with violent crime perpetration, which fits with the findings from previous research among both PWID and the general population showing a strong association between alcohol use and violence (Boden et al., 2012; Dietze et al., 2012). Alcohol use however was not significantly associated with property crime or drug dealing. In contrast, recent benzodiazepine use was significantly associated with drug dealing, property crime and arrest but not violent crime, and recent heroin injection was significantly associated with property crime perpetration but not with other types of crime. These findings suggest that the relationships between illicit drug use and criminal offending vary across different types of crime, highlighting the strength of this study in examining different types of crime separately, compared with previous studies (e.g. Kinner et al., 2009) which have pooled different types of crime in aggregate measures. Additionally, as indicated above, we detected only one significant interaction between age and different types of drug use on recent criminal activity, and even in this instance the pattern of age effects was only slightly attenuated. This suggests that age is an important correlate of criminal activity among PWID irrespective of drug use patterns.

A recent study of marginalised youth identified several motivations for engagement in crime which may be specific to younger populations and may help to explain the higher prevalence of crime among younger participants in our study (Brunelle et al., 2000). These included discourses of pleasure and sensation-seeking associated with criminal activity, use of drugs both to acquire the courage to commit crime, as well as to distance themselves from negative emotions associated with committing crime, and peer pressure. Further qualitative studies as well as quantitative studies involving event-level analyses may be useful in better understanding the context of criminal activities among young PWID.

Although our study found that older PWID were less likely to self-report engaging in criminal activity, it is unclear whether these older PWID had a history of criminal offending in their younger years and had moved away from engagement in these activities, although other studies (Degenhardt et al., 2013; Hanlon et al., 1990) suggest that this may be the case. For example, a recent study found that the rate of criminal charges among an opioid-dependent population peaked in late adolescence and young adulthood, and continued to decline over the adult years (Degenhardt et al., 2013). However, as this study only captured finalised court appearances, the true rate of offending may have been underestimated as most crime goes unreported/undetected (Scottish Government Social Research, 2011). There is a need for further studies to examine transitions into (and out of) criminal activity among PWID; this will be best achieved through longitudinal studies which can examine patterns of criminal activity as participants progress through different phases in their drug use as they age.

Evidence suggests that the PWID population in Australia is ageing, with younger PWID making up a relatively small proportion of the current injecting population (Iversen et al., 2011; Stafford & Burns, 2011). Nevertheless, our findings show that criminal offending is not entrenched among all PWID, and

is more likely to occur among younger PWID, suggesting that targeting crime prevention and reduction efforts to young PWID may be warranted, especially in light of recent findings around the trajectories of offending across age groups (Degenhardt et al., 2013). Early intervention programmes aimed at improving young peoples' risk management strategies may help to reduce engagement in criminal activity. In addition, there is evidence to suggest that incarceration alone is ineffective in addressing both drug use and offending behaviour, with many ex-prisoners returning to drug use and criminal offending following release into the community, resulting in re-incarceration (Holland et al., 2007; Kinner, 2006; Merrall et al., 2010). To prevent young PWID from entering this cycle, efforts should be made to divert drug-using offenders into treatment and education programmes and away from the criminal justice system. In Australia, as in many other countries, drug diversion programmes have been established with this specific aim (Hughes & Ritter, 2008; Loxley, 2009). Although evaluations of these programmes are typically methodologically weak, available evidence suggests that these programmes can be successful in reducing re-offending among both illicit drug users and drug-related offenders (Harvey et al., 2007; Loxley, 2009; Passey et al., 2007; Wundersitz, 2007). Despite this, programme access for young people could be improved; a significant proportion of programmes Australia-wide target adult offenders only (Hughes & Ritter, 2008), with the mean age of diverted people as high as 27 years in some jurisdictions (Payne et al., 2008). Additionally, given the small number of younger study participants reporting being on OST, efforts to engage young PWID in pharmacotherapy treatment, which has been shown to be effective in reducing criminal offending, should be increased (Bukten et al., 2011; Gossop et al., 2005; Mattick et al., 2009; Teesson et al., 2008).

This study has some limitations. First, as the IDRS specifically recruits regular injectors, our findings should only be generalised to the total PWID population with caution. Second, prevalence of crime may be under-reported due to social desirability bias. As peer pressure has been associated with engagement in crime among young people, it is possible that younger participants may be more likely to self-report criminal activity, potentially inflating our findings around the effects of age. Finally, limited information was collected about the nature of criminal activity. It is possible that the relationship between age and crime may be influenced by more specific factors which we were unable to measure (e.g. for drug dealing: the types of drugs sold, the individual's specific role within the selling operation).

Conclusion

Younger PWID are more heavily involved in current criminal activity compared with their older counterparts. Although other research suggests that PWID may transition away from engagement in criminal activity as they age, this study reinforces the need for early intervention, including education and treatment programmes, to prevent offending behaviour becoming entrenched among younger PWID, and to help facilitate an earlier transition away from criminal activity.

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Declaration of interest

The authors declare no conflicts of interests. The authors alone are responsible for the content and writing of this article.

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