Drug and Alcohol Dependence 179 (2017) 309–316

Contents lists available at ScienceDirect

Drug and Alcohol Dependence

journal homepage: www.elsevier.com/locate/drugalcdep

Full length article

Insights into the link between drug use and criminality: Lifetime offending of criminally-active opiate users

Matthias Pierce[a,*], Karen Hayhurst[a], Sheila M. Bird[b], Matthew Hickman[c], Toby Seddon[d], Graham Dunn[e], Tim Millar[a]

[a] Centre for Mental Health and Safety, University of Manchester, 4th Floor, Ellen Wilkinson Building, Oxford Road, M13 9PL, UK
[b] MRC Biostatistics Unit, Institute of Public Health, University Forvie Site, Robinson Way, Cambridge, CB2 0SR, UK
[c] School of Social and Community Medicine, University of Bristol, Canynge Hall, 39 Whatley Road, Bristol, BS8 2PS, UK
[d] School of Law, University of Manchester, 4.46A Williamson Building, Oxford Road, M13 9PL, UK
[e] Centre for Biostatistics, University of Manchester, Jean McFarlane Building (First Floor), Oxford Road, M13 9PL, UK

ARTICLE INFO

Keywords:
Offending
Opiate use
Life-course offending

ABSTRACT

Background: We test whether the offending trajectory of those who test positive for opiates is greater than test-negative controls and whether the relationship is constant both prior to, and post, opiate initiation. We consider whether these relationships differ according to gender and offence type.
Methods: The study provides an analysis of historical offending records in adults linked to test results for opiate and cocaine metabolites. Those testing positive for opiates were linked to treatment records to retrieve data on age of opiate initiation. Rate ratios (RR) were calculated to compare opiate positive testers to opiate and cocaine negative controls, separately by gender and adjusting for age and birth cohort. Age of opiate initiation was included in a second model as a time-dependent variable. Within-subject clustering was accounted for using generalised estimating equations.
Results: Opiate-positive cases had higher rates of offending than test-negative controls, both prior to, and post, opiate initiation. Initiation of opiate use increased the RR by 16% for males but doubled it for females. The RR increase in non-serious acquisitive crime was greater than that seen in serious crime. For males only, opiate initiation narrowed the difference in violent offending rate between cases and controls. A larger offending increase was associated with opiate initiation in female, compared to male, users.
Conclusions: For most crime categories, the difference between groups is exacerbated by opiate initiation. The findings indicate that opiate prevention initiatives might be effective in reducing offending, particularly among females.

1. Introduction

Those dependent on heroin, and other opiates, are disproportionately involved in criminal activity (Bennett et al., 2008); in particular, acquisitive offending (crimes committed for financial gain) (Bukten et al., 2011; Pierce et al., 2015). The drugs-crime association is an important driver of UK policy, reflected in its prominence in the drug strategies of successive governments (HM Government, 2008; Home Office, 2010). Explanations of this association fall into three groups:

1. Forward causation – drug use causes crime either through the need to: (a) fund drug use through economic necessity (Bennett et al., 2008); or (b) because of psychopharmacological changes precipitated by drug ingestion (Boyum and Kleiman, 2002; Brownstein, 2016; White and Gorman, 2000).
2. Reverse causation – involvement with crime leads to drug use: opportunities for drug use increase with involvement in criminal behaviour (Hammersley et al., 1989).
3. Confounding – crime and drug use share a common (set of) cause(s): there is no direct causal relationship; rather drug use and crime co-occur because of a common cause or set of causes (Seddon, 2006, 2000).

The underlying causal mechanism(s) is likely to be more complex than these explanations suggest (Bennett and Holloway, 2009; Seddon, 2000). Our previous work has highlighted the need for longitudinal

* Corresponding author.
E-mail addresses: matthias.pierce@manchester.ac.uk (M. Pierce), karen.hayhurst@manchester.ac.uk (K. Hayhurst), sheila.bird@mrc-bsu.cam.ac.uk (S.M. Bird), matthew.hickman@bristol.ac.uk (M. Hickman), toby.seddon@manchester.ac.uk (T. Seddon), graham.dunn@manchester.ac.uk (G. Dunn), tim.millar@manchester.ac.uk (T. Millar).

http://dx.doi.org/10.1016/j.drugalcdep.2017.07.024
Received 12 May 2017; Received in revised form 20 July 2017; Accepted 22 July 2017
Available online 16 August 2017

studies with a non-drug user comparison group to examine the natural history of drug use and offending (Hayhurst et al., 2017). Whilst cross-sectional studies can provide information on the extent of the drug-crime association and its strength for different subgroups and offences, the aetiological debate requires longitudinal data to establish the timing of events and to gain knowledge on how the differences between users and non-users evolves over a person's lifetime.

Current evidence about the development of drug use and offending is constrained by design flaws in published studies, particularly the absence of suitable control groups. Our recent review of the evidence base on pathways through opiate use and offending (Hayhurst et al., 2017) highlighted that research has focused on comparing offending that occurs prior to the initiation of drug use with offending that occurs thereafter. A typical example is the study by Anglin and Speckart (1988), which examined the criminal records and clinical data of male methadone patients. Most studies which make this comparison find that offending rates are substantially higher after drug-use initiation (Hayhurst et al., 2017). This pre/post design fails to separate the effects of initiation from the effects of other factors which might also be related to offending, in particular, age, which correlates strongly with offending. In general population samples, offending rates tend to peak during late adolescence (Sweeten et al., 2013) which coincides with the age of drug-use initiation. For example, a large proportion (45%) of users in treatment services in the North West of England report age at first use of heroin between 15 and 19 years of age (Advisory Council on the Misuse of Drugs, 2006). To disentangle the age effects from those of drug-use initiation, it is crucial to control for age, using an appropriate control group. Similarly, gender is known to be a strong influence on offending trajectories and whilst some studies have shown the pre/post contrast is greater for females (Degenhardt et al., 2013), the lack of adequate comparator groups limits the inferences which can be drawn.

This paper reports a retrospective cohort analysis to compare the historical offending trajectory of offenders according to drug test result. Prior analysis on this cohort considered offending rates in the two years prior to drug-test and found that testing positive for opiates was a greater predictor of excess offending than testing positive for cocaine. We therefore focus on opiate use, by comparing the historical offending trajectory of offenders who test positive for opiate use (opiate positives) with a control group who test negative for both opiate and cocaine use (test-negatives). This comparison is performed for all offences committed and for three offence categories (serious acquisitive, non-serious acquisitive, violent) whilst controlling for age and birth cohort, and separately by gender. Information about the age of first opiate use is used to consider whether the contrast between opiate positives and test-negatives is similar both before, and after, the initiation of opiate use. The following hypotheses are considered:

1. Opiate positives exhibit higher rates of offending than negative testers prior to opiate positives' initiation of opiate use;
2. The initiation of opiate use exacerbates the level of offending compared to negative testers;
3. The effect of opiate-use initiation is different for males and females.
4. The effect of opiate-use initiation differs by crime type.

2. Methods

2.1. Data

The analysis cohort was identified from those who received a saliva drug test for opiate and cocaine metabolites following arrest, as recorded by the Drug Test Record (DTR), over the period 1st April 2005 to 31st March 2009. Age at drug-use initiation was obtained for the subset also recorded in the English National Drug Treatment Monitoring System (NDTMS) over the same period. Cohort members' complete recorded offending history (up to 31st March 2009) was extracted from the Police National Computer (PNC).

The cohort was defined from each subject's first drug-test record which satisfied the following criteria: (1) the subject was 18–39 years old; (2) the test was completed and undisputed; and (3) the subject was charged and sanctioned following their arrest, as evidenced from a contemporaneous PNC record. This cohort has been described in detail elsewhere (Pierce et al., 2015), with the modification here of a lower upper age range and the exclusion of Wales. The age range restriction was applied since the profile of individuals whose offending persists into their 40s may be atypical (Moffitt, 1993; Moffitt and Caspi, 2016). Those drug-tested in Wales were excluded because NDTMS has coverage for England only. From the analysis cohort, we define opiate-positive *cases* as those who, on arrest, tested positive for opiates and negative tester *controls* as those who tested negative for opiates and cocaine.

The DTR records a mandatory saliva test for opiate and cocaine (crack or powder form) metabolites following arrest for a 'trigger' offence (pre-defined as associated with problem drug use), or at the discretion of the police officer in charge of the custody area. Trigger offences are: theft; robbery; burglary; vehicle theft; supply or possession of cocaine or heroin (Home Office, 2011). Data are retained on positive and negative saliva test results, test dates, reason for test and basic demographic information. Those who test positive are required to attend an initial assessment with a drugs worker who will help the user seek treatment and other support.

The PNC is an operational database recording all UK arrests that result in a criminal charge. We consider the subset which resulted in a conviction or a caution, reprimand or warning (i.e., *sanctioned* offences). All sanctioned offences committed by the individual were included, from age 10 (the age of criminal liability in England) up to the two weeks prior to the drug test. We excluded this two-week period to negate the effect of the specific offence which resulted in the drug test.

NDTMS records information about individuals who seek treatment for psychoactive substance-related problems by National Health Service and third-sector providers (Marsden et al., 2009). It includes information about the age at which patients first used the drug they sought treatment for. We linked cases in the analysis cohort to NDTMS records for subjects treated for opioid dependence between 1st April 2005 and 31st March 2009. NDTMS has national coverage, so every subject who received drug treatment in this period should have a record. The analysis was conducted on a complete case basis and those with missing age-of-initiation were described (see Appendix A in the Supplementary material).

Linkage between datasets was based on a *minimal identifier* (initials, date of birth and gender). Additionally, the PNC includes a unique identifier (PNC-ID). Those minimal identifiers with multiple PNC-IDs were excluded from the analysis, as this was taken as indicating a duplicated record. All identifiers were anonymised prior to their release to the study team to ensure that features of the original data could not be discerned.

2.2. Statistical analysis

In order to compare life-course offending between opiate-positive cases and negative test controls, offence counts per individual were grouped into 1-year age bands and a generalised estimating equation (GEE) was fitted to the data. GEEs account for correlations within clustered observations; in this analysis, offence counts belonging to the same individual. We used a log-link function and included 'time-at-risk' as an offset, so that the model parameters are interpreted as population-averaged estimates of the log increase in offending rate associated with a unit change in the variable. The exponential of this term is interpretable as a rate ratio (RR). The model employed an exchangeable correlation structure.

The analysis considered two models. Using the whole cohort, the first model estimated the RR associated with being an opiate user, whilst controlling for age (in years: linear and quadratic terms) and