

The effectiveness of diversion programmes for offenders using Class A drugs: a systematic review and meta-analysis

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ABSTRACT

Background and Aims Community-based offenders are an under-researched group. We reviewed existing literature for evidence on the effectiveness of community-based diversion programmes for Class A drug-using offenders.

Methods 31 databases, online resources and bibliographies were searched for studies published 1985 to 2012, with an update search March 2016. No geographic restrictions were applied although only English language papers were considered. Included studies involved community-based Criminal Justice System diversion of Class A drug users via voluntary or court-mandated treatment services. **Results** 16 studies were initially included from the US (10), UK (4), Canada (1), Australia (1). In a meta-analysis, there was evidence for a small impact of diversion to treatment on drug use reduction (for primary Class A drug use: OR random effects 1.68, CI 1.12-2.53, and use of other drugs: OR random effects 2.60, 1.70-3.98). Class A drug users were less likely to complete treatment (OR random effects 0.90, 0.87-0.94) than users of other drugs. There was uncertainty surrounding results for offending, which were not pooled due to lack of comparability of outcome measures and heterogeneity. Individually, studies pointed to a minor effect of diversion on offending. Findings remained unchanged following an update review (March 2016: US [3], Australia [1]). **Conclusions** Treatment accessed via community-based diversion schemes is effective at reducing drug use in Class A drug-using offenders. Evidence of a reduction in offending as a result of diversion schemes for Class A drug users is uncertain. Poor methodological quality and data being largely limited to US methamphetamine users limits the evidence available. Further research is needed to determine whether diversion is effective in settings outside the US and which drug-using offenders may benefit.

Keywords crime; diversion; offenders; substance abuse; systematic review; treatment.

INTRODUCTION

Supply and possession of drugs such as heroin and crack cocaine attract the longest sentences in a number of jurisdictions, including the US and Europe. In the UK, these drugs are classified as Class A (together with drugs associated with recreational use, such as LSD and Ecstasy) [1].

Prevalence of Class A drug use is high among offenders, the population considered in this review, with 38% of UK arrestees testing positive for opiates and/or cocaine (including crack) on entry into police custody [2,3]. European prison samples are characterised by high rates of Class A drug use, with up to a half of inmates reporting lifetime prevalence of cocaine use compared with less than 10% in the general population [4]. Additionally, many individuals entering treatment for Class A drug use self-report recent offending; 55% of Australian heroin users report committing crime in the month prior to treatment entry [5].

The social and economic costs of Class A drug use in England and Wales are estimated to be in excess of £15 billion with drug-related crime accounting for the majority (90%) of these costs [6]. US economic costs associated with heroin use, in particular, have previously been estimated at \$21.9 billion [7]. Opioid dependence is the largest contributor to the global burden of disease attributable to illicit drug use [8].

Diverting arrested Class A drug-using offenders into treatment with the aim of reducing their substance use could have the potential to accumulate significant cost savings (for the justice system and overall economy) via a reduction in the level of drug-related crime. This is predicated on the assumption that much of the offending by this group is undertaken to generate income to fund drug use. However, we have previously reported that drug use expenditure is a weak predictor of acquisitive crime [9], which frequently precedes the onset of Class A drug use [10]. The links between Class A drug use and crime are, indeed, complex and yet to be fully delineated using robust and appropriate methodology [11,12].

The current Government drug strategy provides the policy context for diversion in the UK. It recommends that, *“offenders are encouraged to seek treatment and recovery at every opportunity in their contact with the CJS”* [13]. During 2013/14, 33% of clients entering treatment in England did so via a Criminal Justice System (CJS) referral (2013/14 NDTMS: National Drug Treatment Monitoring System data). The UK diversion approach, the Drug Interventions Programme (DIP) was established in 2003 as the successor to the Arrest Referral scheme [14]. DIP centres on the identification and appropriate treatment referral of drug-using offenders at the point of arrest and/or charge. Identification may involve a drug test resulting from the commission of a “trigger” offence (including theft, robbery or burglary); an assessment of treatment needs carried out by a drug referral worker then proceeds to case management, involving a care plan and the coordination of care and support services. In contrast, the US approach focuses on individuals committing drug offences, often excluding clients with a history of violent offending [15].

Drug treatment itself is associated with reduced offending, for example, crime rates among opiate users (N=3,221) are reduced to less than a half of those observed prior to treatment entry [16]. CJS-referred opiate and/or crack users achieve similar positive treatment outcomes to clients referred via other routes [17]. Limited evidence is available specific to the UK DIP, for example, offending (N=7,726) in the six months following DIP contact was lower than in the previous six months [18]. However, despite central funding for DIP exceeding £91 million (2012/13), there was no robust RCT evidence suggesting likely effectiveness or cost effectiveness available prior to its inception and the efficacy of the diversion approach for community-based drug-using offenders has not been sufficiently evaluated.

In addition, individual studies of diversion are set in varied criminal justice settings. For example, the voluntary referral system that operates via arrest referral schemes into treatment services in the UK may not be comparable with the mandatory referral system operating via the drug court into primarily abstinence-based treatment in the US. Across Europe, countries have at their disposal sanctions to encourage drug-using offenders to voluntarily attend substance misuse treatment, although a number of systems (for example, German, Austrian and Dutch) also incorporate compulsory treatment requirements [15].

This lack of robust evidence on the effectiveness of community-based diversion programmes for drug-using offenders reflects the paucity of research on offenders in the community in general. For example, recent Cochrane and Campbell reviews on interventions for drug-using offenders have focussed largely on participants sampled from prisoner populations [19-22].

We were commissioned by the UK National Institute for Health Research (NIHR) Health Technology Assessment (HTA) programme to examine the efficacy of diversion and aftercare programmes for offenders using Class A drugs. We conducted a systematic review to: (1) assess the effectiveness of community-based diversion for Class A drug-using offenders; and (2) make recommendations for required research based on gaps in the existing evidence base. To provide a framework for the systematic review, the diversion process is defined as the identification of Class A drug users within the CJS and subsequent intervention with the aim of drug treatment. This can be voluntary, mandated, and/or monitored by probation, or drug treatment services.

METHODS

Search strategy and selection criteria

The search methods were based on the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement [23]. For the original study, 31 electronic databases (including MEDLINE and EMBASE) were searched for studies published January 1985 to January 2012. For the purposes of this paper, an update search was carried out in March 2016. The full search strategy and list of all databases searched is available online (Table S1). Reference lists of full-text articles were hand-searched for additional material.

Studies meeting the following inclusion criteria were included: (1) participants aged 18yrs and above; (2) Class A (as defined under the UK Misuse of Drugs Act, 1971) [1] drug users; (3) contact with any part of the CJS; and (4) diversion defined as the identification of drug users within the CJS leading to treatment specifically designed to treat drug use.

Exclusion criteria included: (1) studies that only included participants in prison at the time of the treatment intervention; (2) studies that only included participants with intervention/treatment as a routine element of probation case management; (3) studies with participants who used a broader range of drug classes, with no primary or sub-analysis specific to people using Class A drugs; and (4) non-peer-reviewed findings reported solely in books, conference proceedings, dissertations or theses. Only papers written in English were considered although no geographical restrictions were applied.

Retrieved studies were exported into Reference Manager software and de-duplicated. Inclusion and exclusion criteria were applied to titles and abstracts of studies identified by the search strategy, with full-text articles screened when titles and abstracts were ambiguous. A second reviewer (inter-rater reliability: kappa 0.71) independently screened 50 per

cent of retrieved studies. The full text of potentially-relevant items was independently assessed by two reviewers for inclusion in the review with any disagreement resolved by consensus and a third reviewer where necessary.

Study quality was assessed using the Maryland Scale of Scientific Methods [24], a widely-used quality evaluation scale for research in criminal justice settings [25]. The scale assesses study design, sample size, participant allocation, length of follow-up and attrition.

Data synthesis

Two reviewers independently extracted data via a piloted data extraction form. Data on drug use, offending behaviour and treatment completion were extracted, together with any relevant statistical analyses. Associations between study/participant characteristics and outcomes were explored to inform meta-analysis. Outcomes were pooled via meta-analysis using odds ratios in both random and fixed effects models to obtain a pooled effect size. The most robust models obtained are presented. Heterogeneity was assessed using the Q statistic and the I^2 statistic. Possible publication bias was assessed using Funnel plots. Meta-analysis was carried out using Comprehensive Meta-Analysis software (version 2).

Role of the funding source

The funder of the study had no involvement in study design, data collection, manuscript preparation or the decision to submit this paper for publication.

RESULTS

Selection of included studies

The search process is presented in Figure 1. Fourteen papers, comprising 16 studies, were included in the review. Eley et al (2002) [26] is reported as three sub-studies; one with a sample of participants living in Fife, one with a sample of participants from Glasgow, and one providing a case series sample derived from combined data (see Table 1).

[Figure 1 about here]

Description of included studies

Table 1 reports the characteristics of the 16 included studies, with participant characteristics summarised in Table 2. None of the studies reported a power calculation. Some studies compared diversion to an alternative, or no, intervention [27-34]. However, none of these studies used a randomised controlled trial design to prospectively and randomly allocate participants to the diversion intervention or to a comparator/control group (i.e. in advance of the participant receiving an intervention or treatment). Instead, allocation to groups was *post-hoc*, with group membership determined by the researchers. Data collection in eight studies was retrospective. The follow-up period began at the point of treatment discharge in only three studies [27,35,36]; these had a minimum follow-up of 365 days [27]. Eight studies report group comparisons [27-34].

Participants were majority (or all) methamphetamine users in four US studies [27-29,32]. In other studies, participants were majority opiate and/or crack cocaine users [26^{Glasgow},26^{Fife},26^{Combined},31,33-35,37-39]. In the two remaining studies, participants were, respectively, majority (47%) cannabis users, with 34% of the sample comprising cocaine users [30];

and a sub-sample of Class A drug users (15%, n=40) [36]. Eight of the 16 studies provided baseline frequency of drug use [27-34].

Interventions were mainly pragmatic and *ad hoc* (e.g. services available in the local area) rather than tailor-made specifically as a diversion programme. Details of the diversion process itself were scant. Participants in nine studies were diverted to treatment from a court setting [26^{Glasgow}, 26^{Fife}, 26^{Combined}, 30, 31, 33, 35, 37-39]. The majority of interventions can be described as multi-factorial programmes, comprising day and/or residential settings with components based on both individual and group therapies.

[Table 1 about here]

[Table 2 about here]

Meta-analysis

Continued primary Class A drug use

Data from six studies were available to estimate the impact of diversion on continued primary Class A drug use [26^{Glasgow}, 26^{Fife}, 26^{Combined}, 27, 29, 31]. Data from two studies could not be pooled; one [29] compared methamphetamine users with other drug users and another had a small sample size (n=10) [26^{Combined}].

The results of the meta-analysis of data from the six studies are reported in Tables 3 and 4 and Figure 2. Overall, the analysis indicated a modest impact on primary Class A drug use (reduction in use, pooled OR: 1.7; 95% CI: 1.1 to 2.5; random effects model) with little heterogeneity between studies ($Q=0.75$, $p=0.861$, $I^2=0$). Reductions in primary Class A drug use were greatest for users of opiates treated with methadone maintenance and for heroin users diverted to a multifactorial treatment programme via SACPA instead of custodial detention (see Tables 3 and 4).

[Table 3 about here]

[Table 4 about here]

[Figure 2 about here]

Continued use of other drugs

Data from three studies were pooled to estimate the impact of diversion on continued other drug use [27, 31, 33]. Data on sedative use and cannabis use did not demonstrate an effect in favour of treatment [31], whereas there was an impact on use of other drugs following treatment (reduction in use, pooled OR: 2.6, 95% CI: 1.8-3.8, random effects model; $z=5.00$, $df\ 2$, $p<0.001$) with limited evidence of heterogeneity ($Q=2.48$, $p=0.290$, $I^2=19$) (see Tables 3 and 4 and Figure 3).

[Figure 3 about here]

Continued offending

A lack of comparability in outcome measures and focus meant that it was not possible to pool the data on continued offending. The results of individual studies point to a minor effect of diversion on offending. Initial exploratory analyses of the studies [26^{Combined}, 29, 31, 33, 35, 36, 38] with data that could be included in a meta-analysis of continued offending outcomes, highlighted heterogeneity ($Q=107$ $p<0.001$ $I^2=62$). Outcome measures of continued offending

were diverse, including imprisonment, re-arrest, indictment, and self-report offending; each across a range of crime types.

Treatment completion

Ten studies [27-30,32-34,36,37,39] were included in a meta-analysis to assess the impact of diversion on treatment completion. Most of these focussed on differential completion rates for users of different drug types. Other studies presented data by: mode of intervention [27]; number of treatment sessions attended [33]; treatment engagement [33]; day vs. residential therapy [39]; and referral source [32]. Studies with these outcomes were excluded from meta-analysis as high levels of heterogeneity were obtained ($Q=391$ $p<0.001$, $I^2=94$).

Outcomes for individual Class A drug types point to lower completion rates for heroin users (OR 0.8, CI 0.7-0.9) [27,33,35] and cocaine users (OR 0.7, CI 0.7-0.8) [27,29,35] compared with users of other substances. Pooling across a range of Class A drug types indicates a small but consistent reduction in treatment completion for Class A drug users compared to users of other drugs (pooled OR random effects 0.9 (95% CI 0.9-0.9), $z = -5.10$, $df\ 5$, $p<0.001$, $Q=7$, $p=0.206$, $I^2=31$) (see Tables 3 and 4 and Figure S1).

Publication bias

The uneven distribution in the funnel plot of effect estimate (OR) against standard error is broadly indicative of publication bias (see Figure S2).

Review update

A review update was carried out for this paper (March 2016). This identified four eligible studies from the US ($k=3$) and Australia ($k=1$). Table S2 sets out the characteristics of included studies with individual study effects shown in Table S3. Two studies [40,41] comprised drug court samples, one study [42] comprised probationers mandated to treatment, and the final study [43] used a sample from the Californian Proposition 36 programme. These four studies contributed two statistically significant findings. Heroin users had a lower treatment completion rate (OR 0.2, CI -2.66 to -0.59) than marijuana users in one study [40]; a finding which would not have changed our conclusions regarding treatment completion. Controlling for other potentially predictive factors, cocaine users were more likely to reoffend within 12 months in a further study (OR 1.72, CI 1.06 to 2.79) than methamphetamine users [43]; both substances are Class A drugs and this finding would not have altered our decision not to pool reoffending outcomes. More recent findings did not amend our main conclusions.

DISCUSSION

Summary of main findings

Pooled effect estimates (16 studies) point to a greater likelihood of reduced primary Class A drug use (OR 1.68, 95% CI 1.12 to 2.53) and reduced use of other drugs (OR 2.61, 1.79-3.80) associated with diversion programmes. When compared with users of other drugs, Class A drug users are less likely to complete treatment (OR 0.90, 0.87-0.94). Odds ratios for offending were not pooled as comparable outcome measures were not used. Individual studies point to minimal impact of diversion on offending and there is currently insufficient evidence on the effectiveness of treatment via diversion as a means of reducing offending amongst Class A community-based drug users. Review findings remained unchanged in the light of an update review carried out in March 2016.

Strengths and limitations

The main strength of this review is in its comprehensive search of the literature, which screened 1,300 potential inclusions. This paper incorporates an update of recent available evidence. The review is limited by its focus on English language sources; other reviews have highlighted that the inclusion of non-English language research serves to emphasise less positive outcomes of quasi-compulsory treatment in criminal justice systems [15].

Overall, included studies were of low methodological quality; there were no randomised controlled trials. Sample sizes were modest and attrition rates high. Study design was mostly retrospective and/or correlational with limited follow-up beyond the end of the diversion programme. Comparator groups were limited to unmatched participants drawn from the same location. There was some evidence of publication bias in the available literature. Recommendations for more methodologically sound research in this field are set out below; it is unclear whether more robust studies will reach similar conclusions as those derived here from pooling existing evidence.

Drug use was measured primarily via self-report or scale-based measures; objective measures (e.g. urine screening) were used in four studies [26^{Fife}, 26^{Glasgow}, 30, 38]. For offending, only five studies [26^{Glasgow}, 34, 35, 38, 39] detailed offence types committed by the intervention group; none provided details for comparator groups. The lack of comparability on offending outcomes meant that pooling findings was not possible. The focus of most studies was treatment completion. Although this will be of practical relevance to service providers, drug use and offending outcomes are of greater importance to researchers and policy makers in this field.

Insufficient details of the diversion process were provided, for example, how decisions were made about which intervention might be appropriate for specific participants. This lack of detail made it difficult to conclude which aspects of treatment had been effective (or not) and for whom. Similarly, important participant characteristics such as previous drug treatment history were not provided in over a half of studies.

The majority of studies were US-based and the majority of participants were Californian methamphetamine users. Indeed, nearly all participants included in the review (99.6%) were diverted via the California-based SACPA (Substance Abuse and Crime Prevention Act). This limits the generalisability of pooled findings, particularly to the UK or most other European countries. Clients with primary amphetamine use comprise only 6.7% of the EU treatment population, a figure primarily driven by numbers seeking treatment in the Czech Republic [44]. There is no clear evidence whether the reported outcomes of diversion for methamphetamine users are pertinent to users of other stimulants (e.g. powder or crack cocaine).

In the US, diversion is primarily mandated by the court, or offered as an alternative to custodial sentencing for non-violent offenders, and treatment is primarily via abstinence-based residential programmes. In the UK, CJS diversion can be mandated, or voluntary, with no formal link between the diversion process and court sentencing decisions; treatment is primarily via community-based substitute prescribing services [45]. Less than one-tenth of the 33% entering drug treatment in England via a CJS referral (2013/14 NDTMS data) have a mandatory element of diversion in place via a Drug Rehabilitation Requirement (DRR) [46].

The review centred on one drug class of the UK classification of drugs (Class A), meaning that a substantial body of existing evidence was not eligible. A sizable proportion (31%) of studies identified for potential inclusion were excluded because it was not possible to identify outcomes specifically for the population of Class A drug users, for example, Gottfredson et al (2003) [47]. The focus on Class A use also disregards the potential efficacy of diversion for

offenders who use other drugs, such as cannabis or amphetamines. Similarly, the focus on non-incarcerated individuals participating in diversion programmes led to the exclusion of data from studies previously synthesised in notable reviews. For example, randomised studies of drug-using offenders in prison, such as the UK LEEDS trial [48] were not eligible for inclusion.

Only four of the 16 included studies were rated as of higher quality; these were all US studies, with a focus on SACPA-diverted participants and/or methamphetamine use [27-29,31] and may not be generalizable to UK services and elsewhere.

Further research

This is the first review to synthesise research on the effectiveness of community-based diversion for Class A drug-using offenders. Undertaking the review has allowed us to identify key gaps in the evidence base, which point to the future direction for research activities in this field.

Research is required to evaluate which subgroups of Class A drug-using offenders are more likely to benefit from diversion so that resources can be allocated more effectively and interventions tailored to better meet the needs of particular subgroups. For example, in this review, studies which comprised a higher proportion of women were more likely to report positive outcomes. A further subgroup requiring greater focus is older drug-using offenders. Older adults comprise a large and growing proportion of both treated and untreated users of Class A drugs, for example, 40% of currently-treated English opiate users are aged 40yrs and above [46].

Aspects of the participant's substance use and offending profile are likely to affect the effectiveness of the intervention, for example: primary drug type, frequency and delivery of use; length of drug problem; poly-drug use and pattern of adjunctive substance use; previous drug treatment history; history of offending; offence type (esp. violent vs. non-violent acquisitive). As a minimum, future research should include these factors, in addition to better reporting of intervention components and programme design adherence, in order to better augment the evidence base. Future research also needs to incorporate a longer follow-up period post-intervention/diversion to assess the effect on future substance use, re-presentation to treatment services via CJS/non-CJS referral route, and subsequent re-offending. A diverse range of outcome measures was used in included studies leading to uncertainty, particularly around the outcome of offending. Included studies focussed on treatment completion, which was not of key importance to the review, if not linked to drug outcomes such as abstinence. The field would benefit from work to establish a core outcome set that is valued/ preferred by service users and of relevance to service providers and policy makers.

This review highlights that research with diverted drug-using offenders in community settings is limited. In particular, no randomised trials of diversion interventions have been carried out in the UK; ethical and practical difficulties are cited as overwhelming [49]. Others have commented that this lack of high-quality studies of the criminal justice system is no longer tenable [50]. Randomised studies of mental health interventions for community-based offenders with multiple complex needs, for example, have demonstrated that both legal and ethical difficulties can be overcome [51]. A UK RCT of diversion interventions would appear timely and necessary to account for selection and allocation biases likely to be prevalent in such a non-formalised intervention. The design would need to consider CJS and non-CJS referral routes into drug treatment, plus diversion and non-diversion into treatment services amongst eligible arrestees. Preliminary pilot work involving stakeholders would be required to define the intervention, assess the feasibility and acceptability of a diversion RCT, and identify potential barriers to enrolment of sites and recruitment of participants.

Practice and Policy Implications

Evidence for the effectiveness of diversion schemes is of poor quality, largely limited to US offenders, and characterised by uncertainty surrounding the effect on offending, although the impact on reduction of substance misuse was significant.

Existing evidence does point to the effectiveness of both community treatment for Class A drug misuse [17,52,53] and in-prison treatment for, in particular, opioid dependence [54], although the costs of treatment in prison, compared with treatment in the community, are higher. The provision of drug treatment for offenders in the community is therefore a less costly resource, although as this review has demonstrated, there is currently insufficient evidence to warrant the use of such treatment via community-based diversion as a means of reducing offending amongst Class A drug users.

The link between drug use and crime is not uni-directional; whilst drug treatment may be effective at reducing drug use, our study shows a lack of robust evidence on the effectiveness of drug treatment as a means of reducing crime among Class A drug-using offenders. Drug policy in the UK and elsewhere rests on the tenet of a causal link between drug use and crime [13], producing initiatives such as diversion schemes for drug-using offenders. These initiatives are expensive to implement and deliver and there is no clear evidence as to whether or not they reduce crime; this ought to be of immediate concern to policy makers.

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Table 1 Included studies: design characteristics.

<i>Study</i>	<i>Country</i>	<i>Study design</i>	<i>Sample size: N (n used in analyses)</i>	<i>Length of follow-up (days)</i>	<i>Intervention design</i>	<i>Data collection</i>	<i>Quality (Maryland scale score) ^e</i>
Anglin et al (2007)	US	concurrent group comparison	36,132 (29,757)	730 - 1095	multi-factorial day & residential	retrospective	4
Brecht and Urada (2011)	US	concurrent group comparison	145,947 (73,805) ^b	main outcomes measured only at discharge	multi-factorial day & residential	prospective	4
Brewster (2001)	US	cross-sectional group comparison	235 (235) ^c	365	drug court	retrospective	2
Chun et al (2007)	US	concurrent group comparison	85 (18-85)	Unclear	multi-factorial residential	prospective	4
Eley et al [Glasgow] ^a (2002)	UK	longitudinal follow-up	47 (unclear)	Unclear	multi-factorial day	prospective	2
Eley et al [Fife] ^a (2002)	UK	longitudinal follow-up	49 (unclear)	Unclear	multi-factorial day	prospective	2
Eley et al [Combined] ^a (2002)	UK	case series	10 (10)	0	multi-factorial day	prospective	2
Hartley and Phillips (2001)	US	correlational	196 (196)	Not stated	multi-factorial day	retrospective	1
Hevesi (1999)	US	correlational	154 (147)	1460 (intervention length unclear)	not stated	retrospective	2
Longshore et al (2007)	US	cross-sectional group comparison	492,966 (unclear)	900 for yr 1 intake; 365 for yrs 2 and 3	multi-factorial day & residential	mixed	2
Marinelli-Casey et al (2008)	US	concurrent group comparison	287 (287)	365	multi-factorial day	prospective	4
Newton-Taylor et al (2009)	Canada	concurrent group comparison	365 (365)	730	harm reduction	prospective	1
Passey et al (2003)	Australia	concurrent group comparison	266(262)	average 270	multi-factorial day & residential	prospective	1
Saum and Hiller (2008)	US	'before and after' comparison	456 (452)	1095 for 70% of participants	multi-factorial day	retrospective	2
Turnbull and Webster (2007)	UK	correlational	70 (70)	540	multi-factorial day & residential	mixed	2
Van Stelle et al (1994)	US	longitudinal follow-up	259 (259) ^d	average 540	multi-factorial day	mixed	2

Notes: ^a Eley et al (2002) is an 'umbrella' study addressing the roll-out of a programme in 2 locations - the report divides into 3 sub-studies covering each location separately and combining data. ^b 2 groups excluded as included participants <18yrs. ^c substantial missing data regarding primary drug – analysis based on sub-group of those with primary drug cocaine (N=63) and those with primary drug was marijuana (N=81). ^d analysis based on a sub-sample of Class A drug users (N=40). ^e a higher score indicates a higher methodological standard.

Table 2 Included studies: participant characteristics.

<i>Study</i>	<i>Age: mean (range)</i>	<i>Gender: % male</i>	<i>Ethnicity: % white</i>	<i>Drug use</i>	<i>Offence history</i>	<i>Arrest history</i>	<i>Employment</i>
Anglin et al (2007)	33 (---)	73	45	majority meth (56%)	not stated	not stated	employed 30%
Brecht and Urada (2011) ^b	not stated	74	41	meth users vs. users of 'other' drugs (unspecified)	not stated	arrest/prison past 30 days: meth users: 32% other drug users: 31%	employed 33%
Brewster (2001)	28 (18-75)	81	49	majority cannabis (47% drug court vs. 35% comparison group)	not stated	not stated	employed 57%
Chun et al (2007)	39 (20-62)	64	54	majority opiates (62%)	not stated	99% arrested (lifetime) 0% arrested last 30 days	71% lowest income category
Eley et al [Glasgow] ^a (2002)	30 (19-58)	80	not stated	all heroin	92% non-violent/ 8% drug	not stated	not stated
Eley et al [Fife] ^a (2002)	25 (19-34)	94	not stated	all heroin	unclear	not stated	Employed at DTTO 0%
Eley et al [Combined] ^a (2002)	not stated	100	not stated	all heroin	no details	not stated	not stated
Hartley and Phillips (2001)	34 (21-60)	66	56	majority referred for heroin usage (98%)	not stated	most first time offenders	employed prior to programme 67%
Hevesi (1999)	--- (19-29)	100	not stated	cocaine/crack users (no further details)	65% non-violent/ 6% violent/ 67% drug/ 29% other	not stated	employed at time of arrest 18%
Longshore et al (2007)	33 (---)	68	46	2 groups majority meth (52% & 33%) 1 group majority heroin (29%)	not stated	not stated	not stated
Marinelli-Casey et al (2008)	32 (18-57)	63	57	all meth	not stated	not stated	employed 71%
Newton-Taylor et al (2009)	35 (---)	75	not stated	crack/cocaine users	all non-violent criminal offenders	not stated	employed 22%
Passey et al (2003) ^c	not stated	76	unclear	majority heroin (54%)	14% violent/ 55% theft/ 46% drug/ 12% other	not stated	employed 7%
Saum and Hiller (2008)	30 (18-59)	79	27	majority opiates (24%)	76% violent/ 81% property/ 83% drug/ 75% other	not stated	not stated
Turnbull and Webster (2007) ^d	31 (20-46)	93	57	majority crack and heroin (61%)	43% burglary/ 37% theft/ 10% drug/ 10% other	not stated	not stated
Van Stelle et al (1994)	not stated	100	not stated	15% Class A drug users	not stated	lifetime average of 10 arrests	majority employed full- time
Total sample	31.8	81	48				

Notes: ^a Eley et al (2002) is an 'umbrella' study addressing the roll-out of a programme in 2 locations - the report divides into 3 sub-studies covering each location separately and combining data. ^b Figures for Brecht2011 are the averages for the two groups which meet our inclusion criteria. ^c data apply to the full sample not the sub-set meeting our criteria. ^d The age cited for Turnbull & Webster (2007) is a median rather than a mean. Meth: methamphetamine.

Table 3 Individual study effects.

<i>Study</i>	<i>Comparison</i>	<i>Outcome</i>	<i>OR</i>	<i>95% CI</i>	<i>p-value</i>
<i>Continued Class A Primary Drug Use</i>					
Chun et al (2007)	SACPA vs. non-SACPA	heroin use last 30 days (change from assessments 1 to 2)	2.33	0.97 – 5.57	0.058
Eley et al Glasgow (2002)	DTTO participants	positive test for opiates at 1st test vs. 5th test	1.79	0.53 – 6.05	0.346
Eley et al Fife (2002)	DTTO participants	positive test for opiates at 1st test vs. 5th test	1.54	0.30 – 7.92	0.604
Marinelli-Casey et al (2008)	methamphetamine (MTP + Drug Court) vs. methamphetamine (MTP only)	reduction in methamphetamine use 6 months after treatment	1.49	0.88 – 2.53	0.137
<i>Continued Other Drug Use</i>					
Chun et al (2007)	SACPA vs. non-SACPA	ASI drug (change from assessment 1 to 2)	1.63	0.69 – 3.88	0.267
Marinelli-Casey et al (2008)	methamphetamine (MTP + Drug Court) vs. methamphetamine (MTP only)	ASI drug - 6 months after treatment court appearances - substance abuse reported	2.44	1.44 – 4.15	0.001
Newton-Taylor et al (2009)	TDTC graduated vs. expelled-non-engaged		3.85	1.97 – 7.57	<0.001
<i>Treatment Completion</i>					
Anglin et al (2007)	SACPA (heroin/opiate vs. marijuana/hashish)	treatment completion	0.82	0.74 – 0.92	<0.001
Brecht and Urada, 2011	SACPA (methamphetamine vs. other drugs)	treatment completion	0.92	0.88 – 0.96	<0.001
Brewster (2001)	Drug Court (cocaine vs. marijuana)	survival in programme	0.93	0.51 – 1.69	0.813
Hartley and Phillips (2001)	Drug Court (referred for crack vs. not)	treatment completion	0.75	0.45 – 1.25	0.266
Passey et al (2003)	MERIT + heroin vs. MERIT + other drugs	treatment completion	1.13	0.70 – 1.84	0.620
Van Stelle et al (1994)	TAP (Class A vs. other drug)	treatment completion	0.52	0.25 – 1.07	0.077

Notes: ASI: Addiction Severity Index. DTTO: drug treatment and testing order. MERIT: Magistrates Early Referral Into Treatment. MTP: Methamphetamine Treatment Project. SACPA: Substance Abuse and Crime Prevention Act. TAP: Treatment Alternative Program. TDTC: Toronto drug treatment court.

Table 4 Meta-Analysis.

		Test of null (2-Tail)		Heterogeneity			Tau-squared				
	Effect size (95% CI)	z-value	p-value	Q-value	df (Q)	p-value	I-squared	Tau Squared	Standard Error	Variance	Tau
Continued Class A Primary Drug Use											
Fixed	1.68 (1.12-2.53)	2.493	0.013	0.751	3	0.861	0	0.000	0.187	0.035	0.000
Random	1.684 (1.12-2.53)	2.493	0.013								
Continued Other Drug Use											
Fixed	2.61 (1.79-3.80)	5.001	<0.001	2.478	2	0.290	19	0.028	0.148	0.022	0.169
Random	2.60 (1.70-3.98)	4.387	<0.001								
Treatment completion											
Fixed	0.90 (0.87-0.94)	-5.105	<0.001	7.206	5	0.206	31	0.003	0.008	0.000	0.058
Random	0.88 (0.80-0.96)	-2.810	0.005								

Figure 1 Review search: PRISMA flow diagram.

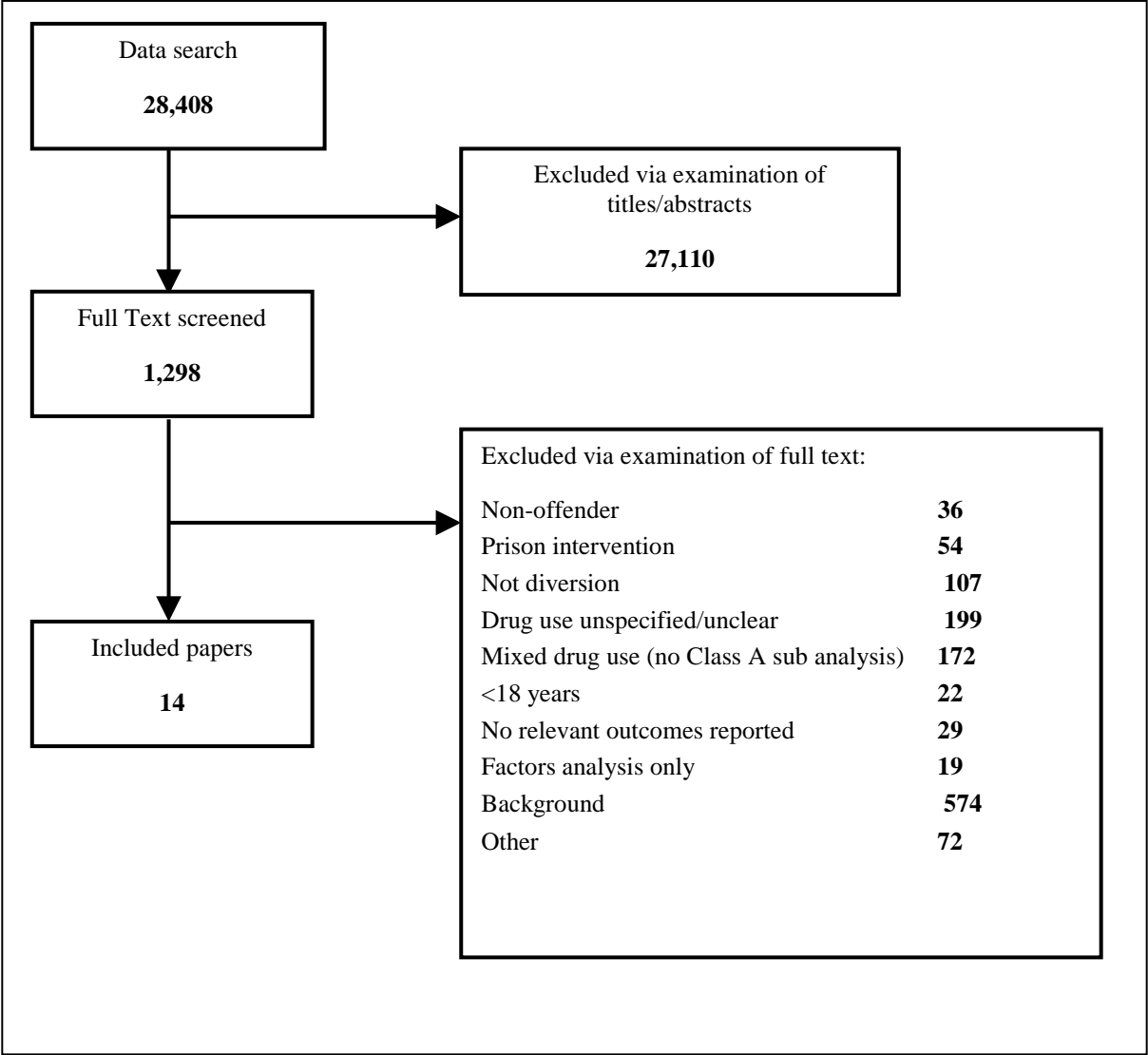


Figure 2 Forest Plot: continued Class A primary drug use.

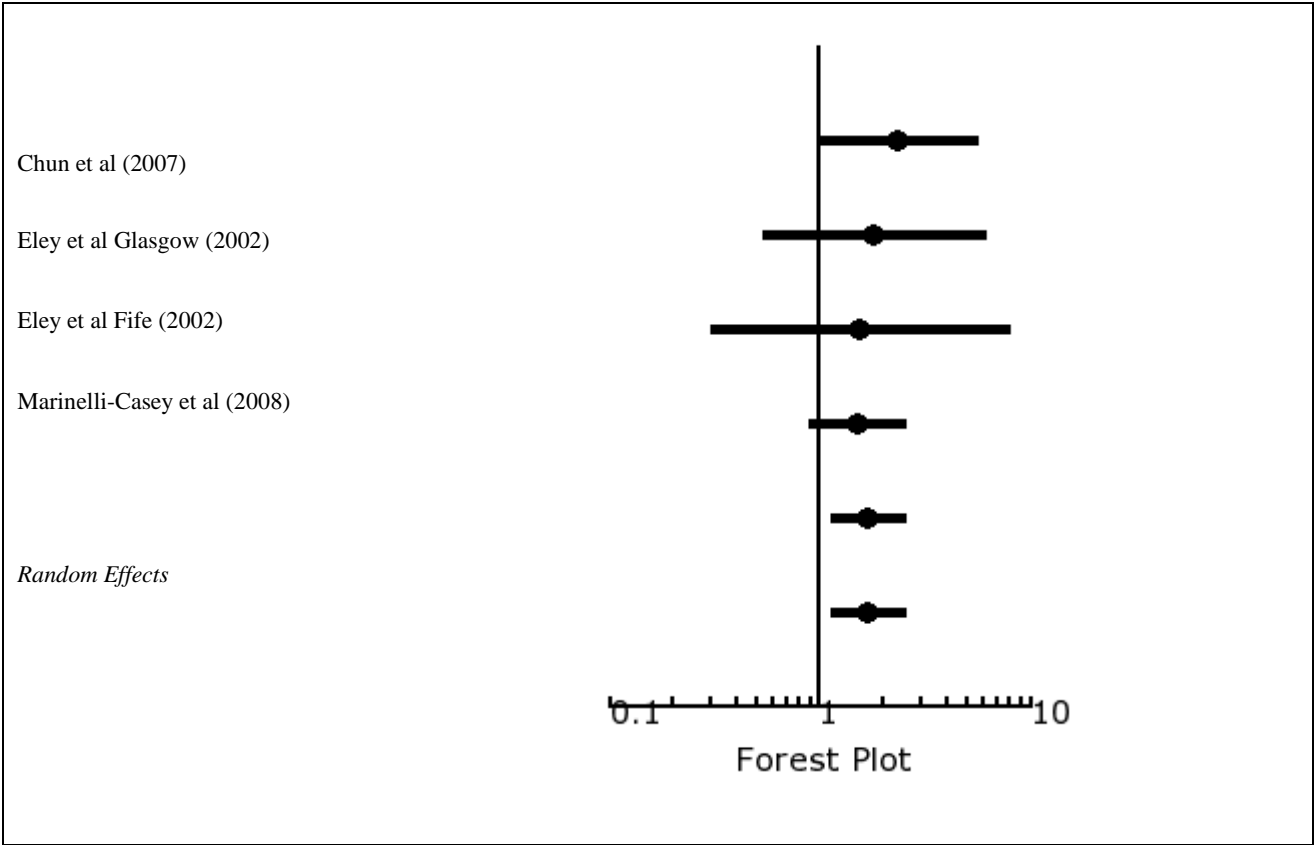


Figure 3 Forest Plot: continued other drug use.

