The statistical association between drug misuse and crime: A meta-analysis

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ABSTRACT

In the last 25 years, there have been a large number of studies conducted on the connection between drug misuse and crime. However, there have been few attempts to date to conduct a meta-analysis of this research. There have also been few attempts to breakdown the relationship by type of drugs and type of crime. This paper investigates the relationship between drug use and criminal behavior by conducting a systematic review of the literature and a meta-analysis of the strength of the relationship. Results of a review of 30 studies showed that the odds of offending were three to four times greater for drug users than non-drug users. The odds of offending were highest among crack users and lowest among recreational drug users. This relationship held true across a range of offence types, including robbery, burglary, prostitution and shoplifting. The paper concludes by discussing the implications of the study for research on the drugs crime connection and for government policy. [1]

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1. Introduction

In the last 25 years, there have been a large number of studies conducted on the connection between drug misuse and crime. However, there have been few attempts to date to conduct a meta-analysis of research on the connection. The only meta-analysis that we have found concerned the relationship between marijuana use and juvenile delinquency and this study showed a modest positive association (Derzon & Lipsey, 1999). As far as we know, there have been no meta-analyses of the relationship between the types of drugs and types of crime most commonly associated with the drugs crime connection.

The relative absence of research in this area is perhaps surprising considering the importance of the topic in terms of government policy and research knowledge. It is also surprising because there are a number of clear advantages in using meta-analysis over conventional 'vote counting' methods, which count the number of statistically significant and non-significant findings (Lipsey & Wilson, 2001). A meta-analysis can provide a single summary statistic of the strength of a relationship across a large number of studies and can assess correlates of effect size. In relation to research on the drugs crime connection, it is possible to provide a quantitative measure of the overall strength of the relationship between drug use and crime and a measure of variations in the strength of the relationship by moderating factors, such as drug type and crime type.

The limited use of meta-analyses in the study of the drugs crime connection might be explained in part by the convention in drugs and crime research to use this method primarily to investigate program effectiveness. However, meta-analysis can be used to summarize both experimental and correlational findings (Lipsey & Wilson, 2001). And it has been used widely in other areas to investigate the associations between variables. Baier and Wright (2001), for example, used meta-analysis to investigate the association between religion and crime. This paper presents the results of our own meta-analysis of recent studies that have reported on the association between drug use and crime. The main aim of the research is to investigate the strength of the relationship and to assess variations in the relationship by type of drug and type of crime.

1.1. Previous reviews of the research literature

There have been a number of reviews of the literature on the connection between drug misuse and criminal behavior. One of the earliest was by Gandossy, Williams, Cohen, and Harwood (1980), who conducted a comprehensive survey of the English language research literature, covering studies from America, Australia, Canada and Europe. The review focused mainly on the association between heroin use and crime, although the relationship between other drugs and crime was also considered. The authors found a strong correlation between drug addiction and reported criminal behavior and concluded, '…it was difficult to avoid concluding that addicts engage in substantial amounts of income-generating crimes. This is true when analyzing the charges against drug-using arrestees, convictions of addicts in prisons, arrest records of treatment populations, or the observations of street addicts.' (Gandossy et al., 1980, p.52). In relation to amphetamine use and crime, they concluded that the research produced contradictory findings. One reason for this was the variation among the samples assessed. Studies based on amphetamine users who had a substantial prior record of criminal involvement were more likely to show a drugs crime connection than studies based on amphetamine users without such a record (e.g., research based on college students). Studies on the relationship between barbiturates and crime also provide mixed findings. Some showed that barbiturate use inhibited violent behavior, while others showed that it encouraged violence. In relation to marijuana and LSD, the authors concluded that there was little evidence that either was linked to criminal behavior.

Chaiken and Chaiken (1990) reviewed the literature on the relationship between drug use and predatory crime (i.e., instrumental offenses committed for material gain). Their review found no evidence of a general association between drug use and participation in crime and no association between drug use and onset or persistence in criminality. They concluded that, when behaviors of large groups of people were studied in aggregate, there was no coherent association between drug misuse and predatory crime. They also concluded that, for the majority of drug types other than heroin and cocaine, drug use was unrelated to the commission of crimes. They also noted that, even in relation to heroin and cocaine, there was no clear evidence of a relationship between consumption and offending. The only consistent evidence of an association between drug use and predatory crime was that offenders who were daily users of heroin or cocaine and those who used multiple types of drugs committed crimes at significantly higher rates than did the less drug-involved offenders. They go on to ask, 'Where, then, lies the strong relationship between drug misuse and criminality?' (Chaiken & Chaiken, 1990, p.212).

Hough (1996) conducted a review of British research investigating the drugs crime connection. This covered studies based on drug-user populations and offender populations, and studies that estimated the proportion of crimes committed to

finance drug use. He concluded that drug misuse made a significant contribution to the overall total number of crimes committed in England and Wales. However, the precise nature of the relationship is influenced by a number of factors including the level of involvement in drug use. He concluded that, '...current knowledge about the volume and cost of drug-related crime is so patchy that all we can say with certainty is that problem drug misuse is responsible for a significant minority of crime in England and Wales' (Hough, 1996, p.19). He estimated that the number of 'drug-driven' crimes committed by dependent heroin users 'probably numbers in the hundreds of thousands, but it could run to a million or more.' (Hough, 1996, p.19).

The above reviews represent some of the most commonly cited reviews of research on the drugs crime connection and together cover a large number of studies. Nevertheless, the conclusions of the reviews are conflicting. Gandossy et al. (1980) concluded that there is a strong association between heroin use and crime, whereas Chaiken and Chaiken (1990) found that there was no general relationship between the two. Hough (1996) summarized the results by saying that the research was too patchy to draw a firm conclusion. There are a number of reasons why previous reviews might arrive at different conclusions. One explanation is that they vary in terms of the studies selected for review. These studies can vary in regard to the nature of the sample, when they were conducted, the quality of research methods, and the types of drug and crime measures. Another explanation is that there might be some variation in the way that authors weigh up and summarize the results of their review. One way of overcoming both of these problems is to conduct a systematic review of the literature using meta-analyses which can identify the details of the studies selected and quantify the results obtained.

1.2. Theories on the drugs crime connection

It is important that the nature of the empirical connection between drug misuse and crime is more clearly understood. One reason for this is that there is a substantial amount of theoretical work that predicts that there would be an association and describes the nature of the relationship, including which drug types and crimes are likely to be involved. Theories of the drugs crime connection can be divided into three different types: (1) those that suggest a direct causal connection (e.g., one of the variables causes the other), (2) those that suggest an indirect causal connection (e.g. other variables cause both), and (3) those based on the view that the connection is non-causal (e.g., the connection is a consequence of a general association between crime, drug use and other problem behaviors).

The first group of theories includes what are sometimes called 'drug-use-causes-crime' and 'crime-causes-drug-use' explanations. These are both direct versions of the connection in that one of the variables is seen as causing the other. The most common 'drug-use-causes-crime' theory is the 'enslavement theory' or 'economic necessity' theory (Goldstein, 1985). This is the view that serious drug users will be unable to support their habit through legitimate activities and will resort to crime to fund their drug use. However, there are other theories in this category including those based on psychopharmacological explanations and the idea that drug intoxification can lead to judgment impairment which can lead to crime (Goode, 1997). The most common 'crime-causes-drug-use' theory is that criminals use drugs as a form of 'chemical recreation' to celebrate the successful commission of a crime (Menard, Mihalic, & Huizinga, 2001).

The second group of theories includes 'common cause' explanations. These describe indirect versions of the connection. 'Common-cause' theories are based on the idea that another variable causes both drug use and crime. The common variable may be of many kinds including psychological, sociological, and environmental factors. Gottfredson and Hirschi (1990), for example, assert that crime does not cause drug use and drug use does not cause crime. Instead, they are both caused by low self-control.

The third group of theories predicts an association between drug use and crime, but argues that it is not causal. Instead, the relationship is viewed as spurious and the result of a co-existence of problematic behaviors. One example of this approach is 'lifestyle' explanations (also known as 'systemic' theories) in which drug use and crime are viewed as intrinsic elements of a broader deviant lifestyle. Goldstein (1985) noted, for example, the way in which drug users and offenders are both drawn into a deviant subculture which can involve violent disputes over territory, conflicts between group members, and informal enforcement of normative codes (Goode, 1997). Other writers have noted the link between deviant lifestyles and crime at the community level. White and Gorman (2000) note that community disorganization can provide a general context (but not necessarily a cause) for both drug use and criminality.

2. Aims

This paper aims to investigate the relationship between drug use and criminal behavior across a number of studies by conducting a systematic review of the literature. It also reports a meta-analysis of the results in order to estimate the strength of the relationship between drug use and crime and the extent to which it varies by moderating factors.

3. Methods

3.1. Systematic reviews

The current research is based on a systematic review of the literature on drug use and crime. Systematic reviews have a number of advantages over traditional methods. They include rigorous and transparent methods for locating, appraising and

synthesizing research evidence and are sufficiently detailed to allow replication (Farrington & Petrosino, 2001). Some of the key features of a systematic review are explicit eligibility criteria for inclusion in the review, search methods that reduce potential selection bias, exhaustive searches that aim to obtain as many eligible studies as possible, quantitative summaries of effect sizes, and detailed reporting of the methods and results (Farrington & Welsh, 2002).

3.2. Criteria for inclusion

Studies were included in the current review if they met certain eligibility criteria. The criteria for inclusion covered four main topics: type of study, type of methods, type of measures, and type of sample. The 'type-of-study' requirement was that the research had to address the issue of the links between drug use and crime. Studies that concerned other aspects of drug use or crime (such as drug preferences or crime methods) were excluded. The 'type-of-method' requirement concerned the quality of the research methods used. As the review was based on investigating associations rather than causality we were able to accept the lowest level requirement on the Maryland Scientific Methods Scale (SMS) that the study demonstrated correlation (Sherman et al., 1997). This required a comparison of different levels of drug use and different levels of crime. The 'type-of-measure' requirement was that there was at least one measure of both drug use and crime (e.g. heroin use and shoplifting). It was also important that the two measures were correlated in some way. The 'type-of-sample' requirement was that the study should be based on offender samples, drug-user samples, or general population samples. A further requirement was that the studies were published during the time window of January 1980 to July 2003.

3.3. Search method

The main selection method was to search online databases, to conduct secondary searches from the selected references, and to contact key researchers in the field. In addition, papers already in our possession were included in the review.

The online databases searched were: IBSS (International Bibliography of the Social Sciences), Criminal Justice Abstracts, the Home Office publications database, and PsychInfo psychological abstracts. The databases were searched using a range of search terms covering drugs and crime generally and specific drug names and specific crime types. The search resulted in an initial list of titles and abstracts. Studies that clearly did not address the issue of the links between drug misuse and criminal behavior were removed from the list. All of the remaining studies were included for further investigation and an

Table 1
Description of studies meeting the eligibility criteria

Author date	Location	Context of study	Sample size	Data source
Santo, Hooper, Friedman and Conner (1980)	USA	Drug users	2312	Self-report
McBride (1981)	USA	Offenders	292	Self-report
Hunt, Lipton and Spunt (1984)	USA	Drug users	510	Self-report/ethnographic
Mott (1986)	UK	Offenders	174	Official records
Wish (1986)	USA	Offenders	4847	Self-report/ urinalysis
Dembo et al. (1987)	USA	Offenders	253	Self-report/urinalysis
Parker and Newcombe (1988)	UK	Offenders	300	Self-report/off. records
Johnson, Wish, Schmeidler and Huizinga (1991)	USA	General population	1539	Self-report
Harrison and Groeffer (1992)	USA	General population	32,594	Self-report
Kuhns, Heide, and Silverman (1992)	USA	Offenders	100	Self-report
Kokkevi et al. (1993)	Greece	Drug users/offenders	362	Self-report
Nurco, Kinloch and Balter (1993)	USA	Drug users/gen. pop.	601	Self-report
Dembo, Williams and Schmeidler (1994)	USA	Offenders	229	Self-report/ urinalysis
Graham and Wish (1994)	USA	Offenders	212	Self-report/ urinalysis
Johnson, Natarajan, Dunlap and Elmoghazy (1994)	USA	Drug users	1003	Self-report
Klee and Morris (1994)	UK	Drug users	202	Self-report
Webb and Delone (1996)	USA	Offenders	1958	Self-report/ urinalysis
Morentin, Callado, L.F. and Meana (1998)	Spain	Offenders	578	Self-report
Hammersley, Ditton, Smith and Short (1999)	UK	Drug users/gen. pop.	229	Self-report
Makkai and Feather (1999)	Australia	Offenders	280	Self-report/ urinalysis
Bennett (2000)	UK	Offenders	740	Self-report/ urinalysis
French et al. (2000)	USA	General population	7503	Self-report
Hawke, Jainchill and DeLeon (2000)	USA/Canada	Drug users	920	Self-report
Farabee et al. (2001)	USA	Drug users	10,010	Self-report
Gilchrist et al. (2001)	UK	Offenders	177	Self-report
Turpeinen (2001)	Finland	Drug users	119	Self-report
Yacoubian, Urbach, Larsen, Johnson and Peters (2001)	USA	Offenders	3587	Self-report/ urinalysis
Born and Gavray (2002)	Belgium	General population	139	Self-report
Yacoubian, Arria, Fost and Wish (2002)	USA	Offenders	209	Self-report/ urinalysis
Holloway and Bennett (2004)	UK	Offenders	3091	Self-report/ urinalysis

attempt was made to obtain them. Those obtained were screened for eligibility using the inclusion criteria described above. Eligible studies were analyzed and relevant data were entered into a research database.

In addition to the database searches, the citations of all studies included as eligible were searched for relevant studies that had not already been selected. We also searched our own collection of papers on drugs and crime and included those not identified from other sources. Further, selected researchers who had published in the field were contacted and details of their publications were requested.

3.4. Attrition rates

The initial trawl of the databases resulted in a total of 5160 hits: IBSS (1170), Criminal Justice Abstracts (1841), Home Office publications database (15), Psychological Abstracts (2048), and a further group of studies were obtained from secondary leads (29) or were already in our possession (57).

The titles and abstracts of all studies identified were analyzed for relevance and 536 studies were considered as potentially suitable. Of these, 344 were obtained. The main reason for not obtaining studies was that the publications were not available through local libraries or inter-library loan. The studies obtained were then examined to determine whether they met our eligibility criteria. In total, 60 studies met our eligibility criteria. Thirty of the 60 studies published information on the association between drug use and crime in a form suitable to be included in the meta-analysis.

3.5. Studies included in the meta-analysis

Details of the included studies are shown in Table 1. Seven of the 30 studies included in the review were published in the 1980s, 13 in the 1990s, and 10 in the 2000s. The majority (18 of the 30) were conducted in the USA. The remainder was conducted in the UK (7), other European countries (4) and Australia (1). The types of samples were drug users (10), offenders (16), and the general population (4). Most of the studies were based on fairly large sample sizes. Twenty-five were based on samples over 200 and 9 were based on samples of over 1000. The most common method of data collection used was self-report interviews (included in 29 of the 30 studies). Some of these used additional data-collection methods such as urinalysis or official records.

Table 2
Individual effect sizes

Author date	Drug measure	Crime measure	OR	CI	p
Santo et al. (1980)	HR drug use (S)	Arrest (S)	1.74	1.45–2.09	0.0001
McBride (1981)	Heroin (S)	Property	1.25	0.64–2.44	NS
Hunt et al. (1984)	Heroin (S)	Property (S)	2.63	1.51–4.57	0.0001
Mott (1986)	Addict (R)	Conviction	1.20	0.45–3.20	NS
Wish (1986)	PCP (U)	Theft (R)	1.17	0.92–1.48	NS
Dembo et al. (1987)	Marijuana (U)	Felony (R)	4.67	1.14–19.15	0.03
Parker and Newcombe (1987)	Opiate (R)	Theft (R)	0.95	0.57–1.61	NS
Johnson et al. (1991)	Cocaine (S)	Delinquency (S)	2.50	1.53–4.07	0.0001
Harrison and Groeffer (1992)	Cocaine (S)	Shoplifting (S)	7.23	6.02–8.69	0.0001
Kuhns et al. (1992)	Heroin (S)	Prostitution (S)	5.53	1.71–17.84	0.0001
Kokkevi et al. (1993)	Drug use (S)	Conviction (S)	3.22	1.61–6.45	0.0001
Nurco et al. (1993)	Opiate (R)	Crime (S)	2.90	1.89–4.45	0.0001
Dembo et al. (1994)	Cocaine (S)	Sold cocaine (S)	2.26	1.13–4.51	0.02
Graham and Wish (1994)	Heroin (S)	Prostitution (S)	2.74	1.37–5.48	0.02
Johnson et al. (1994)	Crack (S)	Shoplifting (S)	2.83	1.10–7.30	0.03
Klee and Morris (1994)	Heroin (S)	Shoplifting (S)	1.34	0.76–2.36	NS
Webb and Delone (1996)	Crack (S)	Felony (R)	2.72	1.63–4.54	0.0001
Morentin et al. (1998)	Heroin (R)	Recidivism (R, S)	6.90	4.65–10.23	0.0001
Hammersley et al. (1999)	Ecstasy (S)	Shoplifting (S)	3.22	0.93–11.08	NS
Makkai and Feather (1999)	Opiate (U)	Property (R)	5.27	2.58–10.78	0.0001
Bennett (2000)	Heroin (S)	Shoplifting (S)	8.54	5.82–12.54	0.0001
French et al. (2000)	Drug use (S)	Property (S)	8.09	7.02–9.32	0.0001
Hawke et al. (2000)	Amphetamine (S)	Property (S)	2.39	1.44–3.97	0.0001
Farabee et al. (2001)	Heroin (S)	Arrest (S)	1.24	0.89–1.72	NS
Gilchrist et al. (2001)	Drug use (S)	Prison (S)	0.29	0.03–2.49	NS
Turpeinen (2001)	Opiate (S)	Prison (R)	10.18	1.20–86.69	0.03
Yacoubian et al. (2001)	Opiate (U)	Prostitution (R)	0.76	0.35–1.65	NS
Born and Gavray (2002)	Drug use (S)	Theft (S)	14.17	1.68–119.22	0.01
Yacoubian et al. (2002)	Ecstasy (S)	Property (R)	0.75	0.31–1.86	NS
Holloway and Bennett (2004)	Heroin (S)	Property (S)	20.94	14.72–29.80	NS
Fixed effects			3.78	3.52–4.05	0.0001
Random effects			2.79	1.96–3.98	0.0001

Notes: OR=Odds Ratio, CI=Confidence Interval, S=Self-report, R=Records, *p*=probability of *z*, NS=Not Significant.

4. Results

4.1. Method of analysis

In order to carry out a meta-analysis of the relationship between drug use and crime a comparable effect size is needed for each study. As the data to be analyzed were based on the proportion of subjects who used drugs and committed crime, the most appropriate measure of effect size is the odds ratio (see Lipsey & Wilson, 2001, p.52).

4.2. Overall strength of the relationship

Table 2 summarizes the results of the 30 studies included in the analysis. The table shows the author(s) and date of publication, the drug measures and crime measures used in the analysis, and the OR, along with its confidence intervals and significance levels. As only one effect size was required for each study, a method of selecting drug and crime measures was chosen based on a pre-determined system of prioritization. In relation to drug use, we selected heroin, crack, and cocaine first, in that order, followed by amphetamines, ecstasy and marijuana. In relation to crime, we selected shoplifting, theft and property crime first, followed by fraud, receiving, burglary, robbery and vehicle crime. The comparison condition was also based on a system of priority. The first priority for a comparison measure of drug use was no drug use, followed by marijuana, ecstasy and amphetamines, and then cocaine, crack and heroin. The first priority for a comparison measure of crime was no crime followed by the crimes shown above in reverse order.

Table 2 shows that the OR was greater than 1 for 26 of the 30 studies and statistically significant ($p<.05$) for 19 of the 30. The OR was less than 1 for 4 of the 30 studies and statistically significant for none of them. Overall, the studies show that there is a significant positive association between drug use and crime. However, the significance of the results depends partly on sample size. A significant result could indicate a large effect in a small sample or a small effect in a large sample. Hence, it is more appropriate to conduct a meta-analysis rather than 'vote counting' (i.e. counting the number of significant results) as it can estimate the combined effect size.

There are two common ways of calculating a mean effect size using meta-analysis. The first is the fixed effect (FE) model in which each effect size is weighted by the inverse of its variance (1/VAR). In the FE model, it is assumed that the observed effect size falls within the range of normal sampling error. The second is the random effects (RE) model in which each effect size is weighted by the inverse of its variance, plus an additional factor. In this model, it is assumed that the variance associated with each effect size is based on sampling error and a second component that reflects random variations between the studies, such as differences in procedures and settings[2].

Table 2 shows the results for both methods. The weighted mean OR was 3.78 using the FE model and 2.79 using the RE model. Hence, it can be concluded that, taken together, the 30 studies show that the odds of offending are about 2.8 to 3.8 times greater for users of the drug types shown compared with non-users.

The findings for all studies combined are informative and provide a 'bench mark' measure for the overall strength of the drugs–crime relationship. However, the overall results mask possible variations in the relationship among particular types of drugs. It has been hypothesized (see earlier sections on theory) that some drugs will be more strongly related to crime than others. One of the advantages of meta-analysis techniques is that studies can be selected on the basis of variables of interest and separate meta-analyses can be conducted for subgroups. Therefore, it is possible to compare mean effect sizes across studies in relation to different types of drug.

4.3. Variations by type of drugs

The three drugs most commonly associated with the drugs–crime connection are heroin, crack and cocaine. The results of the meta-analyses for these three drug types are shown in Table 3. The first section of the table summarizes the results of 14 studies that compare heroin or opiate use and offending. The weighted mean OR for the 14 studies was 3.59 using the FE model and 3.08 using the RE model. Hence, it can be concluded that heroin use and crime are positively associated and that the odds of offending are about 3.0 to 3.5 times greater for heroin users than non-heroin users.

The second section of the table summarizes the results of 6 studies that examined the relationship between crack cocaine and crime. The weighted mean effect size for all studies combined was 6.21 using the FE model and 6.09 using the RE model. Hence, taken together, the 6 studies show that the odds of offending are about 6 times greater for crack users than non-crack users. The third section of the table shows the findings of 11 studies that looked at the relationship between cocaine use and crime. The weighted mean OR for all studies combined was 2.62 using the FE model and 2.56 using the RE model. Hence, the results show that cocaine users are about 2.5 times more likely (in terms of the increase in OR) to offend than non-cocaine users.

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[2] Assuming that all the ESs are randomly drawn from the same distribution of ESs, the best way of estimating the mean of that distribution is the FE model, in which each ES [ln(OR)] is inversely weighted according to its variance. Hence, studies based on larger samples get larger weightings. However, if the heterogeneity of the ESs is significant (measured by the Q statistic), then it is possible that they are not all drawn from the same distribution. In this case, there are at least two possibilities: 1. calculate the mean ES for more homogeneous subcategories (e.g. types of crimes or drugs); 2. use the RE model which adds a constant to the variance of each ES so that they are no longer heterogeneous. However, the effect of this is that each ES gets much the same weighting in the calculation of the mean, so small-scale studies are just as important as large-scale studies. Overall, since the FE and RE models have advantages and disadvantages, we give results for both. We also present results for more homogeneous subcategories.

Table 3
Individual and mean effect sizes for heroin, crack and cocaine

Author date	Drug measure	Crime measure	OR	CI	*p*	Design
Heroin						
McBride (1981)	Heroin	Property crime	1.25	0.64–2.44	NS	3
Hunt et al. (1984)	Heroin	Property crime	2.63	1.51–4.57	0.0007	2
Parker and Newcombe (1988)	Opiates	Theft	0.95	0.57–1.61	NS	3
Kuhns et al. (1992)	Heroin	Prostitution	5.53	1.71–17.84	0.004	3
Nurco et al. (1993)	Narcotics	Crime	2.90	1.89–4.45	0.0001	3
Klee and Morris (1994)	Heroin	Shoplifting	1.34	0.76–2.36	NS	2
Graham and Wish (1994)	Heroin	Prostitution	2.74	1.37–5.48	0.004	3
Morentin et al. (1998)	Heroin	Conviction	6.90	4.65–10.23	0.0001	1
Makkai and Feather (1999)	Opiates	Property crime	5.27	2.58–10.78	0.0001	3
Bennett (2000)	Heroin	Shoplifting	8.54	5.82–12.54	0.0001	3
Farabee et al. (2001)	Heroin	Arrest	1.24	0.89–1.72	NS	2
Yacoubian et al. 2001	Opiates	Prostitution	0.76	0.35–1.65	NS	3
Turpeinen (2001)	Opiates	Prison	10.18	1.20–86.69	0.03	2
Holloway and Bennett (2004)	Heroin	Property crime	20.94	14.72–29.80	0.0001	1
(*n*=14)						
Fixed effects			3.59	3.14–4.11	0.0001	
Random effects			3.08	1.70–5.61	0.0002	
Crack						
Kuhns et al. (1992)	Crack	Prostitution	19.74	6.08–64.02	0.0001	3
Johnson et al. (1994)	Crack	Shoplifting	2.83	1.10–7.30	0.03	1
Webb and Delone (1996)	Crack	Arrest	2.72	1.63–4.54	0.0001	3
Bennett (2000)	Crack	Shoplifting	4.97	3.48–7.10	0.0001	3
Yacoubian et al. (2001)	Crack	Prostitution	3.97	2.91–5.41	0.0001	3
Holloway and Bennett (2004)	Crack	Property crime	20.16	14.20–28.63	0.0001	1
(*n*=6)						
Fixed effects			6.21	5.20–7.41	0.0001	
Random effects			6.09	2.98–12.46	0.0001	
Cocaine						
McBride (1981)	Cocaine	Property crime	0.94	0.58–1.52	NS	3
Hunt et al. (1984)	Cocaine	Property crime	2.49	1.58–3.92	0.0001	2
Johnson et al. (1991)	Cocaine	Crime	2.50	1.53–4.07	0.0002	3
Kuhns et al. (1992)	Cocaine	Prostitution	8.14	3.05–21.71	0.0001	3
Dembo et al. (1994)	Cocaine	Supply	2.26	1.13–4.51	0.02	3
Graham and Wish (1994)	Cocaine	Prostitution	2.83	1.25–6.38	0.01	3
Johnson et al. (1994)	Cocaine	Shoplifting	1.20	0.42–3.44	NS	1
Webb and Delone (1996)	Cocaine	Arrest	1.87	1.10–3.17	0.02	3
Farabee et al. (2001)	Cocaine	Arrest	0.91	0.68–1.23	NS	2
Yacoubian et al. (2001)	Cocaine	Prostitution	4.43	3.17–6.19	0.0001	3
Holloway and Bennett (2004)	Cocaine	Property crime	11.53	8.23–16.15	0.0001	1
(*n*=11)						
Fixed effects			2.62	2.28–3.01	0.0001	
Random effects			2.56	1.43–4.58	0.002	

Notes: OR=Odds Ratio, CI=Confidence Interval, *p*=probability of *z*, NS=Not Significant, Design=Comparison method: 1=D1vD0 (Drug use compared with no drug use), 2=D1vD2 (Drug use compared with other drug use), 3=D1vD2/D0 (Drug use compared with other drug use and no drug use).

Comparing the mean effect sizes for the three drug types shows that the odds of offending are highest among crack users, second highest among heroin users, and lowest among cocaine users. These findings are important because they provide a quantitative measure of the strength of the relationship between particular drug types and crime. They are also important because they show clear differences between the three drugs most commonly associated with the drug–crime connection.

The analysis can also be used to determine the strength of the relationship between recreational drug use and crime. It is widely believed (and some theories predict) that recreational drug use is either not associated with crime or less associated with crime than is hard drug use. It is possible to repeat the above analysis for marijuana and amphetamine use. There were insufficient studies available to extend the analysis to other recreational drugs. The results of the analysis are shown in Table 4.

Ten studies compared marijuana use and offending. The mean effect size was 1.51 using the FE model and 1.46 using the RE model. These results indicate that there is a relationship between marijuana use and crime. The odds of marijuana users offending are about 1.5 times higher than the odds of non-marijuana users offending. However, the relationship is weaker than for heroin, crack or cocaine. Six studies investigated the relationship between amphetamine use and crime. The overall mean effect size was 1.86 and 1.93 for the FE and RE models respectively. These results also show a relationship between recreational drug use and crime, with amphetamine users about 1.9 times more likely than non-amphetamine users to offend. However, the relationship again was weaker than those found for more serious drug use.

Table 4
Individual and mean effect sizes for marijuana and amphetamines

Author date	Drug measure	Crime measure	OR	CI	p	Design
Marijuana						
McBride (1981)	Marijuana	Property crime	2.18	1.26–3.76	0.005	3
Dembo et al. (1987)	Marijuana	Conviction	4.67	1.14–19.15	0.03	3
Johnson et al. (1991)	Marijuana	Crime	1.86	1.44–2.40	0.0001	3
Kuhns et al. (1992)	Marijuana	Prostitution	2.51	0.70–8.96	NS	3
Dembo et al. (1994)	Marijuana	Supply	0.91	0.45–1.81	NS	3
Graham and Wish (1994)	Marijuana	Prostitution	1.40	0.40–4.93	NS	3
Johnson et al. (1994)	Marijuana	Shoplifting	0.26	0.06–1.14	NS	1
Webb and Delone (1996)	Marijuana	Arrest	1.39	1.11–1.73	0.004	3
Makkai and Feather (1999)	Marijuana	Property crime	1.45	0.84–2.50	NS	3
Yacoubian et al. (2001)	Marijuana	Prostitution	0.98	0.58–1.65	NS	3
(n=10)						
Fixed effects			1.51	1.31–1.74	0.0001	
Random effects			1.46	1.13–1.88	0.004	
Amphetamines						
McBride (1981)	Amphetamines	Property crime	1.24	0.76–2.04	NS	3
Kuhns et al. (1992)	Amphetamines	Prostitution	3.67	1.54–8.70	0.003	3
Makkai and Feather (1999)	Amphetamines	Property crime	1.69	0.77–3.71	NS	3
Hawke et al. (2000)	Amphetamines	Property crime	2.39	1.44–3.97	0.0007	2
Yacoubian et al. (2001)	Amphetamines	Prostitution	0.91	0.37–2.27	NS	3
Turpeinen (2001)	Amphetamines	Prison	3.79	1.42–10.13	0.007	2
(n=6)						
Fixed effects			1.86	1.41–2.44	0.0001	
Random effects			1.93	1.27–2.93	0.002	

Notes: OR=Odds Ratio, CI=Confidence Interval, *p*=probability of *z*, NS=Not Significant, Design=Comparison method: 1=D1vD0 (Drug use compared with no drug use), 2=D1vD2 (Drug use compared with other drug use), 3=D1vD2/D0 (Drug use compared with other drug use and no drug use).

4.4. Variations by type of crime

Theories of the drugs–crime connection predict that certain kinds of offenses are more likely than others to be associated with drug use. These include offenses, such as shoplifting, theft, robbery, burglary and prostitution that might be committed to raise funds to purchase drugs. In the UK, it is widely believed that hard drug users often commit shoplifting as a means of financing their drug use. The result of a meta-analysis of the relationship between shoplifting and drug use is shown in Table 5.

Five studies investigated the relationship between shoplifting and drug use. All 5 studies found a positive connection between drug use and shoplifting, 3 of which were statistically significant. The mean effect size was 6.31 using the FE model and 4.01 using the RE model. Consequently, the odds of shoplifting among drug users (mainly heroin, crack and cocaine users) were about 4 to 6 times greater than among non-users of these drugs.

Additional analyses for prostitution, burglary, and robbery are shown in Table 7 in summary form. Six studies investigated the correlation between drug use and prostitution. The mean effect size was 2.89 for the FE model and 2.75 for the RE model. The main drug types used in the comparison were heroin, crack and cocaine. Hence, the results show that the odds of prostitution among these kinds of drug users were almost three times greater than among non-users of these drugs. The mean effect size of the relationship between drug use and burglary was statistically significant with a mean OR of 2.22 using the FE model and 2.53 using the RE model. The mean effect size of the relationship between drug use and robbery was 1.71 using the FE model and 1.72 using the RE model.

Therefore, the results of the meta-analyses showed that drug use was significantly related to all of the selected offense types.

Table 5
Individual and mean effect sizes for shoplifting and drug use

Author date	Drug measure	Crime measure	OR	CI	p	Design
Harrison and Groeffer (1992)	Cocaine	Shoplifting	7.23	6.02–8.69	0.0001	1
Klee and Morris (1994)	Heroin	Shoplifting	1.34	0.76–2.36	NS	2
Johnson et al. (1994)	Crack	Shoplifting	2.83	1.10–7.30	0.03	1
Hammersley et al. (1999)	Ecstasy	Shoplifting	3.22	0.93–11.08	NS	3
Bennett (2000)	Heroin	Shoplifting	8.54	5.82–12.54	0.0001	3
(n=5)						
Fixed effects			6.31	5.40–7.37	0.0001	
Random effects			4.01	2.05–7.83	0.0001	

Notes: OR=Odds Ratio, CI=Confidence Interval, *p*=probability of *z*, NS=Not Significant, Design=Comparison method: 1=D1vD0 (Drug use compared with no drug use), 2=D1vD2 (Drug use compared with other drug use), 3=D1vD2/D0 (Drug use compared with other drug use and no drug use).

4.5. Variations by type of drug user

It cannot be assumed that the relationship between drug use and crime is constant for all individuals. Instead, it is likely that the relationship will vary by individual factors. The most common individual factors discussed in the drugs–crime literature are gender and age.

4.5.1. Gender

There is some evidence to suggest that female offenders might be more heavily involved in drug misuse than male offenders (Holloway & Bennett, 2004). It has also been argued that female drug users are more likely than male drug users to be involved in shoplifting and prostitution as a means of generating money for drug use (Hough, 1996). However, the relationship between gender and the drugs–crime connection has not been analyzed systematically using meta-analysis. The association between drug use and crime is shown in Table 6 in relation to both males and females.

Nine studies investigated the relationship between drug use and crime separately for samples of males. All studies estimated ORs over the value of 1, and 6 of the 9 results were statistically significant. The mean effect size was 2.80 using the FE model and 2.47 using the RE model. Hence, in relation to males only, the odds of offending among drug users are about 2 to 3 times higher than those for non-drug users. Six studies looked at the relationship between drug use and crime among female samples. Three studies showed a positive and significant relationship and three found no significant relationship. The mean ORs were 6.69 using the FE model and 2.24 using the RE model. Hence, the studies were variable in terms of their individual findings and in terms of the estimated mean effects sizes using the FE and RE models. In part, this variation might be a product of different sample sizes (the studies varied from the lowest with a sample of 100 to the highest with a sample of almost 10,000). However, it is also likely to be a result of unmeasured differences between the studies. The strongest comparisons can be made across studies that provide results for both males and females using the same methods. French et al. (2000) and Farabee, Joshi, and Anglin (2001) both found that the effect sizes for females were higher than the effect sizes for males. Hence, there is some evidence to suggest that the odds of offending among female drug users are greater than among male drug users. However, more studies of male and female drug users are needed in order to test the relationship more thoroughly.

4.5.2. Age

The effect of age on the strength of the drugs–crime connection is more difficult to estimate because few studies provide age breakdowns and those that do categorize their samples into different age groups. Nevertheless, some studies indicated whether they were based on adults or juveniles. The results of the meta-analysis relating to age are shown in Table 7. Studies coded as 'adults' include studies based wholly on adults and studies based on mixed samples of adults and juveniles. Studies coded as 'juveniles' included studies based wholly of juveniles.

The table shows that 22 studies were based wholly on adults or an adult–juvenile mix. The mean effect size of all studies combined was 4.62 using the FE model and 2.92 using the RE model. The smaller mean effect in the RE model might be a result of

Table 6
Individual and mean effect sizes for drug use and crime by gender

Author date	Drug measure	Crime measure	OR	CI	p	Design
Males						
Mott (1986)	Addict	Conviction	1.20	0.45–3.20	NS	3
Wish (1986)	PCP	Theft	1.17	0.92–1.48	NS	3
Nurco et al. (1993)	Opiate	Crime	2.90	1.89–4.45	0.0001	3
Kokkevi et al. (1993)	Drug use	Conviction	3.22	1.61–6.45	0.001	1
Dembo et al. (1994)	Cocaine	Sold cocaine	2.26	1.13–4.51	0.02	3
Webb and Delone (1996)	Crack	Felony	2.72	1.63–4.54	0.0001	3
Makkai and Feather (1999)	Opiate	Property	5.27	2.58–10.78	0.0001	3
French et al. (2000)	Drug use	Property	5.61	4.63–6.80	0.0001	1
Farabee et al. (2001)	Heroin	Arrest	1.32	0.84–2.09	NS	2
(n=9)						
Fixed effects			2.80	2.48–3.17	0.0001	
Random effects			2.47	1.44–4.22	0.0005	
Females						
Kuhns et al. (1992)	Heroin	Prostitution	5.53	1.71–17.84	0.004	3
Graham and Wish (1994)	Heroin	Prostitution	2.74	1.37–5.48	0.004	3
French et al. (2000)	Drug use	Property	11.55	9.35–14.26	0.0001	1
Farabee et al. (2001)	Heroin	Arrest	1.57	0.95–2.57	NS	2
Gilchrist et al. (2001)	Drug use	Prison	0.29	0.03–2.49	NS	1
Yacoubian et al. (2001)	Opiate	Prostitution	0.76	0.35–1.65	NS	3
(n=6)						
Fixed effects			6.69	5.59–8.00	0.0001	
Random effects			2.24	0.71–7.06	NS	

Notes: OR=Odds Ratio, CI=Confidence Interval, p=probability of z, NS=Not Significant.
Design=Comparison method: 1=D1vD0 (Drug use compared with no drug use), 2=D1vD2 (Drug use compared with other drug use), 3=D1vD2/D0 (Drug use compared with other drug use and no drug use).

Table 7
Mean effect sizes for selected groups of studies

Group	N	Fixed effects				Random effects			
		OR	CI	Z	Q	OR	CI	Z	Q
Type of crime									
Prostitution	6	2.89	2.25–3.70	0.0001	0.05	2.75	1.70–4.46	0.0001	NS
Burglary	6	2.22	1.80–2.73	0.0001	0.0001	2.53	1.01–6.31	0.05	NS
Robbery	3	1.71	1.39–2.11	0.0001	NS	1.72	1.33–2.21	0.0001	NS
Individual factors									
Adults	22	4.62	4.26–5.00	0.0001	0.0001	2.92	1.90–4.50	0.0001	NS
Juveniles	8	1.97	1.71–2.28	0.0001	0.05	2.21	1.64–2.98	0.0001	NS
Comparison group									
D1 v D0	8	8.06	7.28–8.92	0.0001	0.0001	6.86	4.69–10.04	0.0001	0.02
D1 v D2/D0	16	2.06	1.8–2.35	0.0001	0.0001	2.21	1.47–3.31	0.0001	NS
D1 v D2	6	1.71	1.48–1.97	0.0001	0.05	1.78	1.35–2.34	0.0001	NS
Year of study				–					
1980s	7	1.51	1.32–1.72	0.0001	0.05	1.49	1.12–1.99	0.006	NS
1990s	13	4.71	4.15–5.34	0.0001	0.0001	3.39	2.38–4.83	0.0001	NS
2000s	10	6.20	5.55–6.93	0.0001	0.0001	3.26	1.54–6.87	0.001	NS
Country of origin									
Europe (exc. UK)	4	5.94	4.26–8.30	0.0001	NS	5.69	3.33–9.74	0.0001	NS
UK	7	5.59	4.55–6.87	0.0001	0.0001	2.49	0.81–7.61	NS	NS
USA	18	3.48	3.22–3.76	0.0001	0.0001	2.37	1.55–3.62	0.0001	NS
Sample source									
General population	4	7.34	6.58–8.19	0.0001	0.001	5.94	3.99–8.85	0.0001	NS
Offenders	16	3.02	2.66–3.44	0.0001	0.0001	2.49	1.36–4.55	0.003	NS
Drug users	10	1.86	1.64–2.12	0.0001	0.05	2.10	1.64–2.70	0.0001	NS

Notes: OR=Odds Ratio, CI=Confidence Interval, z=a measure of the significance of OR, Q=a measure of the heterogeneity of the ORs, NS=Not Significant Research Design=Comparison method, D1vD0=Drug use compared with no drug use, D1vD2=Drug use compared with other drug use, D1vD2/D0 (Drug use compared with other drug use and no drug use.

the heterogeneity of the studies (as measured by the Q statistic). Nevertheless, it can be assumed that the odds of offending were about 3 to 5 times greater for drug users than non-drug users when looking wholly at adult or adult mix samples. Eight studies provided information on the relationship between drug use and crime among juveniles. The mean effect size was 1.97 using the FE model and 2.21 using the RE model. Hence, it can be assumed that the odds of offending were about twice as great for drug users than non-drug users when using only juvenile samples. Overall, the two results taken together indicate that the drugs–crime connection is stronger for adults than for juveniles.

4.6. Other variations

The studies also provide information on a number of other factors that might be associated with the strength of the drugs–crime connection (see Table 7).

4.6.1. Comparison group
One possible source of variation among studies is the type of comparison method used. Drug users are sometimes compared with non-drug users and sometimes with users of other drugs or a mixture of the two (other drug users and non-drug users). It is likely that comparisons of drug users with non-drug users will show a stronger relationship than comparisons between some drug users (e.g. heroin users) and other drug users (e.g. marijuana users). The results of the meta-analysis offer support for this hypothesis. The 8 studies based on a comparison of drug users with non-drug users showed the strongest relationships between drug use and offending (FEOR 8.06 and REOR 6.86), whereas the 6 studies based on a comparisons on one type of drug use (usually more serious) with another type of drug use (usually less serious) showed the weakest relationships (FEOR 1.71 and REOR 1.78). Studies using a combination of comparison groups showed mean effect sizes falling between these two findings.

4.6.2. Year of study
Studies published in the 1980s tended to provide weaker evidence of a relationship (FEOR 1.51 and REOR 1.49) than studies published in the 2000s (FEOR 6.20 and REOR 3.26). The results for individual studies can be seen in Table 2, which shows seven studies conducted in the 1980s. These tended to have relatively low ORs compared with later years and only three of the effect sizes reached statistical significance. Thirteen studies were conducted in the 1990s. The ORs were more wide ranging and all bar two were statistically significant. Ten studies were conducted in the 2000s and these were the most heterogeneous with five producing non-significant results. If the trend shown in mean effect size over time reflects real differences, then this would suggest that the drugs–crime connection has been growing stronger over the last two decades.

4.6.3. Country of origin
The majority of the studies (18 of the 30) were conducted in the United States, 7 were conducted in the UK, and 4 were conducted in Europe (excluding the UK). The single study for Australia was not included in this analysis. The odds of offending

among drug users were greatest among studies conducted in Europe (FEOR 5.94 and REOR 5.69), slightly lower in UK studies (FEOR = 5.59 and REOR 2.49), and lowest in the American studies (FEOR 3.48 and REOR 2.37). The difference might be a result of real differences between drug users in the different countries or differences in other factors associated with the strength of the relationship. For example, the majority of studies conducted in Europe were based on comparisons between drug users and non-users, which tend to be associated with stronger relationships.

4.6.4. Sample source

The sample source was mainly the general population in 4 studies, offenders in 16 studies, and drug users in 10 studies. The results show that the mean effect sizes were lowest among studies based on drug users (FEOR 1.86 and REOR 2.1) and highest among studies based on the general population (FEOR 7.34 and REOR 5.94). This difference might be a result of other study differences. For example, three of the four general population studies were based on comparisons of drug users with non-users. Further, general population surveys (especially those based on school children) are often based on minor drug use and minor offending, which might be strongly related because of their association with other types of minor deviance.

5. Conclusions

It was mentioned in the Introduction that there have been many studies conducted on the drugs–crime connection over the last few years, but few attempts have been made to investigate the results of this research using systematic reviews or meta-analysis. It was noted that meta-analysis has the potential not only to identify the existence of a relationship (which has been done many times before), but also to quantify the strength of the relationship (which has not been done many times before—at least not across multiple studies). Moreover, meta-analysis also has the potential to identify variations in the strength of the relationship by type of drug use and type of crime and help determine whether other factors, such as age or gender, influence the strength of the connection.

Results of a meta-analysis of 30 studies showed that the odds of offending were between 2.8 and 3.8 times greater for drug users than non-drug users. Therefore, the study not only confirms the previous evidence of an association between drug use and crime, but also provides a quantitative measure of the strength of the relationship. The results also showed that the relationship was not the same for all drug types. The greatest odds of offending were highest among crack users (about 6 times greater), second highest among heroin users (about 3 times greater) and third highest among cocaine users (about 2.5 times greater). There was also a statistical association between recreational drug use and offending (the odds of offending were about 1.5 times greater for marijuana users and 1.9 times greater for amphetamines users). However, the association was much weaker than for crack, heroin and cocaine users. These results show, therefore, that the strength of the drugs–crime connection varies by type of drugs used.

The research has a number of implications for the study of the drugs–crime connection. First, the research has shown that systematic reviews and meta-analyses can provide a useful means of summarizing a diverse body of literature. The research in the area of drug use and crime is varied and largely uncoordinated with different research teams exploring different outcomes, among differing populations, over different time periods, using different methods. Drawing conclusions from such variable studies is particularly difficult. The research has shown that this problem can be ameliorated to some extent through the use of repeated systematic reviews.

Second, the review has drawn attention to the problem of comparison groups. Ideally, it would be most useful to compare drug users with non-drug users. However, in practice, research is often based on samples selected from among drug users (e.g., drug users in treatment) or among samples with a high proportion of drug users (e.g., offender samples). This means that it is often difficult to identify a comparison group that is wholly drug free. This generates a problem that there may be considerable similarities between drug users and users of other drugs which would serve to underestimate a drugs–crime relationship. This problem has been tackled to some extent in the current review by testing the different comparison methods used in the research. However, future research should perhaps attempt to ensure that the comparison groups are drug free.

Third, few studies disaggregate their findings by subgroups. In most cases, the major findings and analysis of the research relate to the sample as a whole. It would be useful to disaggregate findings by types of drug use and types of crime and as many individual factors as possible. It has been shown in the current research that the drugs–crime relationship varies considerably depending on the nature of the combination of these factors. Hence, it is important that future research provides breakdowns of the association. This would mean that future research would need to be based on larger survey samples whenever possible to enable such breakdowns to be made.

The research also has some implications for theories of the drugs–crime connection. It has shown that there is empirical support for the many theories that predict that drug use will be associated with criminal behavior. In particular, there is support for the most popular theories that argue that expensive drug use (such as heroin, crack, and cocaine use) is associated with commission of income-generating crime. However, theories of the drugs–crime connection pay less attention to variations in drug use and crime. The study suggests that there might be something to be gained from developing theories that can explain a greater variety of associations, including the association between marijuana use and crime and the greater involvement of female and adult drug users in crime.

The research also has a number of implications for government policy. The current UK drugs strategy makes few distinctions between types of drug use and types of crime and makes no reference to possible variations in the relationship by individual factors (Cabinet Office, 2001). The UK strategy, like the US strategy, draws attention to the special problems faced by heroin and crack users. However, the strategy applies broadly to these more serious forms of drug use and to crime in general or property

crime in particular. The results of the current research suggest that there might be something to be gained if drugs strategies focused on the types of drug use and types of crimes that were most strongly implicated in the drugs–crime connection. This would suggest that priority should be given to crack and heroin use in relation to drugs and shoplifting and prostitution in relation to crime. Further, while the research is less clear about the influence of individual factors in the relationship, there may be something to be gained from paying particular attention to those categories of drug users who have the greatest odds of offending.

References

Baier, C., & Wright, B. (2001). A meta-analysis of the effect of religion on crime. *Journal of Research on Crime and Delinquency*, *38*, 3–21.

Bennett, T. (2000). Drugs and crime: The results of the second developmental stage of the NEW-ADAM programme. *Home Office Research Study No. 205.* London: Home Office.

Born, M., & Gavray, C. (2002). Deviant trajectories at the turning point between adolescence and adulthood. In S. Brochu, C. Da Agra, & M. Cousineau (Eds.), *Drugs and crime deviant pathways* (pp. 97–114). Aldershot: Ashgate Publishing.

Chaiken, J. M., & Chaiken, M. R. (1990). Drugs and predatory crime. In M. Tonry & J.Q. Wilson (Eds.), *Drugs and crime* (pp. 203–240). Chicago: University of Chicago Press.

Dembo, R., Washburn, M. A., Wish, E. V., Yeung, H., Getreu, A., Berry, E., et al. (1987). Further examination of the association between heavy marijuana use and crime among youths entering a juvenile detention center. *Journal of Psychoactive Drugs*, *19*(4), 361–373.

Dembo, R., Williams, L., & Schmeidler, J. (1994). Cocaine selling among urban black and white adolescent males. *International Journal of the Addictions*, *29*(14), 1813–1834.

Derzon, J. H., & Lipsey, M. W. (1999). A synthesis of the relationship of marijuana use with delinquent and problem behaviors. *School Psychology International*, *20*(1), 57–68.

Farabee, D., Joshi, V., & Anglin, M. D. (2001). Addiction careers and criminal specialization. *Crime and Delinquency*, *47*(2), 196–220.

Farrington, D. P., & Petrosino, A. (2001). The Campbell Collaboration Crime and Justice Group. *Annals of the American Academy of Political and Social Science*, *578*, 35–49.

Farrington, D. P., & Welsh, B. C. (2002). Effects of improved street lighting on crime: A systematic review. *Home Office Research Study No. 251.* London: Home Office.

French, M. T., McGeary, K. A., Chitwood, D. D., McCoy, C. B., Inciardi, J. A., & McBride, D. (2000). Chronic drug use and crime. *Substance Abuse*, *21*(2), 95–109.

Gandossy, R. P., Williams, J. R., Cohen, J., & Harwood, H. J. (1980). *Drugs and crime: a survey and analysis of the literature.* Washington: US Department of Justice.

Gilchrist, G., Taylor, A., Goldberg, D., Mackie, C., Denovan, A., & Green, S. T. (2001). Behavioral and lifestyle study of women using a drop-in centre for female street sex workers in Glasgow, Scotland: A 10 year comparative study. *Addiction Research and Theory*, *9*(1), 43–58.

Goldstein, P. J. (1985). The drugs/violence nexus: A tripartite conceptual framework. *Journal of Drug Issues*, *39*, 143–174.

Goode, E. (1997). *Between politics and reason.* New York: St Martin's Press.

Gottfredson, M. R., & Hirschi, T. (1990). *A general theory of crime.* Stanford: Stanford University Press.

Graham, N., & Wish, E. (1994). Drug use among female arrestees: Onset, patterns, and relationships to prostitution. *Journal of Drug Issues*, *24*(2), 315–329.

Hammersley, R., Ditton, J., Smith, I., & Short, E. (1999). Patterns of ecstasy use by drug users. *British Journal of Criminology*, *39*(4), 625–647.

Harrison, L., & Groeffer, J. (1992). The intersection of drug use and criminal behavior: Results from the National Household Survey on Drug Abuse. *Crime and Delinquency*, *38*, 422–443.

Hawke, J. M., Jainchill, N., & DeLeon, G. (2000). Adolescent amphetamine users in treatment: Client profiles and treatment outcomes. *Journal of Psychoactive Drugs*, *32*(1), 95–105.

Holloway, K., & Bennett, T. (2004). The results of the first two years of the NEW-ADAM programme. *Home Office Online Report 19/04.* London: Home Office Retrieved February 25th 2005, from http://www.homeoffice.gov.uk/rds/pdfs04/rdsolr1904.pdf

Hough, M. (1996). *Drugs misuse and the criminal justice system: a review of the literature.* London: Home Office.

Hunt, D. E., Lipton, D. S., & Spunt, B. (1984). Patterns of criminal activity among methadone clients and current narcotics users not in treatment. *Journal of Drug Issues*, *14*(4), 687–702.

Johnson, B. D., Natarajan, M., Dunlap, E., & Elmoghazy, E. (1994). Crack abusers and non-crack abusers: Profiles of drug use, drug sales, and non-drug criminality. *Journal of Drug Issues*, *24*(1–2), 117–141.

Johnson, B. D., Wish, E. D., Schmeidler, J., & Huizinga, D. (1991). Concentration of delinquent offending: Serious drug involvement and high delinquency rates. *The Journal of Drug Issues*, *21*(2), 205–229.

Klee, H., & Morris, J. (1994). Crime and drug misuse: Economic and psychological aspects of the criminal activities of heroin and amphetamine injectors. *Addiction Research*, *1*(4), 377–386.

Kokkevi, A., Liappas, J., Boukouvala, V., Alevizou, V., Anastassopoulou, E., & Stefanis, C. (1993). Criminality in a sample of drug abusers in Greece. *Drug and Alcohol Dependence*, *31*, 111–112.

Kuhns, J. B., Heide, K. M., & Silverman, I. (1992). Substance use/misuse among female prostitutes and female arrestees. *International Journal of the Addictions*, *27*(11), 1283–1292.

Lipsey, M. W., & Wilson, D. B. (2001). *Practical meta-analysis.* Thousand Oaks, California: Sage.

Makkai, T., & Feather, M. (1999). Drug use monitoring in Australia (DUMA): Preliminary results from the Southport site, 1999. *Trends and Issues in Crime and Criminal Justice*, *142*, 1–6.

McBride, D. (1981). Drugs and violence. In J. A. Inciardi (Ed.), *The drugs–crime connection* (pp. 105–123). Beverly Hills, California: Sage.

Menard, S., Mihalic, S., & Huizinga, D. (2001). Drugs and crime revisited. *Justice Quarterly*, *18*(2), 269–299.

Morentin, B., Callado, L. F., & Meana, J. J. (1998). Differences in criminal activity between heroin abusers and subjects without psychiatric disorders: Analysis of 578 detainees in Bilbao, Spain. *Journal of Forensic Sciences*, *43*(5), 993–999.

Mott, J. (1986). Opioid use and burglary. *British Journal of Addiction*, *81*(5), 671–678.

Nurco, D. N., Kinloch, T., & Balter, M. B. (1993). The severity of pre-addiction criminal behavior among urban, male narcotic addicts and two non-addicted control groups. *Journal of Research in Crime and Delinquency*, *30*(3).

Parker, H., & Newcombe, R. (1988). Heroin and acquisitive crime in an English community. *British Journal of Sociology*, *38*(3), 331–350.

Santo, Y., Hooper, E., Friedman, A. S., & Conner, W. (1980). Criminal behavior of adolescent non-heroin polydrug abusers in drug treatment programs. *Contemporary Drug Problems*, *9*(3), 301–.

Sherman, L. W., Denise, Gottfredson, Doris, MacKenzie, Peter, Reuter, John, Eck, & Shawn, Bushway (1997). *Preventing crime: what works, what doesn't, what's promising. A report to the U.S. Congress.* Washington, D.C.: U.S. Department of Justice.

Turpeinen, P. (2001). Outcome of drug abuse in a 20-year follow-up study of drug-experimenting schoolchildren in Finland. *Nordic Journal of Psychiatry*, *55*(4), 263–270.

Webb, V. J., & Delone, M. A. (1996). Drug use among a misdemeanant population: Exploration of a legal syllogism of the 'drug war'. *Crime, Law and Social Change*, *24*, 241–255.

White, H. R., & Gorman, D. M. (2000). Dynamics of the drug–crime relationship. *Criminal Justice*, *1*, 151–218.

Wish, E. D. (1986). PCP and crime: just another illicit drug? *National Institute on Drug Abuse: Research Monograph Series*, *64*, 174–189.

Yacoubian, G. S., Arria, A. M., Fost, E., & Wish, E. D. (2002). Estimating the prevalence of ecstasy use among juvenile offenders. *Journal of Psychoactive Drugs*, *34*(2), 209–214.

Yacoubian, G. S., Urbach, B. J., Larsen, K. L., Johnson, R. J., & Peters, R. J., Jr. (2001). A comparison of drug use between prostitutes and other female arrestees. *Journal of Alcohol and Drug Education*, *46*(2), 12–26.