

DRUG POLICY MODELLING PROJECT  
**MONOGRAPH 08**

**A REVIEW OF APPROACHES TO STUDYING  
ILLCIT DRUG MARKETS**

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Drug Policy Modelling Project Monograph Series

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## THE DRUG MODELLING POLICY PROJECT

This monograph forms part of the Drug Policy Modelling Project (DPMP) Monograph Series. Drugs are a major social problem and are inextricably linked to the major socio-economic issues of our time. Our current drug policies are inadequate and governments are not getting the best returns on their investment. There are a number of reasons why: there is a lack of evidence upon which to base policies; the evidence that does exist is not necessarily analysed and used in policy decision-making; we do not have adequate approaches or models to help policy-makers make good decisions about dealing with drug problems; and drug policy is a highly complicated and politicised arena.

The aim of the Drug Policy Modelling Project (DPMP) is to create valuable new drug policy insights, ideas and interventions that will allow Australia to respond with alacrity and success to illicit drug use. DPMP addresses drug policy using a comprehensive approach, that includes consideration of law enforcement, prevention, treatment and harm reduction. The dynamic interaction between policy options is an essential component in understanding best investment in drug policy. Stage One has: a) produced new insights into heroin use, harms, and the economics of drug markets; b) identified what we know about what works (through systematic reviews); c) identified valuable dynamic modelling approaches to underpin decision support tools; and d) mapped out the national policy-making process in a new way, as a prelude to gaining new understanding of policy-making processes and building highly effective research-policy interaction.

This Monograph (No. 08) provides a reflective account of the different disciplinary approaches to studying illicit drug markets. The term ‘drug market’ is used widely in illicit drug research, and means different things to different researchers. An economist may have a very specific view of what is meant by a drug market, and that will differ from one held by an ethnographer. The monograph endeavours to describe and explain five different disciplinary approaches to studying drug markets – ethnographic and qualitative approaches; economic approaches; behavioural and psychological research; population-based and survey research; and criminology and law enforcement evaluation. Each discipline has strengths and limitations. I do not argue for the supremacy of one approach, but that we need to appreciate the different approaches and develop better multi-disciplinary models.

Monographs in the series are:

01. What is Australia’s “drug budget”? The policy mix of illicit drug-related government spending in Australia
02. Drug policy interventions: A comprehensive list and a review of classification schemes
03. Estimating the prevalence of problematic heroin use in Melbourne
04. Australian illicit drugs policy: Mapping structures and processes
05. Drug law enforcement: the evidence
06. A systematic review of harm reduction
07. School based drug prevention: A systematic review of the effectiveness on illicit drug use

08. A review of approaches to studying illicit drug markets
09. Heroin markets in Australia: Current understandings and future possibilities
10. Data sources on illicit drug use and harm in Australia
11. SimDrug: Exploring the complexity of heroin use in Melbourne
12. Popular culture and the prevention of illicit drug use: A pilot study of popular music and the acceptability of drugs
13. Scoping the potential uses of systems thinking in developing policy on illicit drugs

DPMP strives to generate new policies, new ways of making policy and new policy activity and evaluation. Ultimately our program of work aims to generate effective new illicit drug policy in Australia. I hope this Monograph contributes to Australian drug policy and that you find it informative and useful.

A handwritten signature in black ink that reads "Alison Ritter". The signature is written in a cursive, flowing style.

Alison Ritter  
Director, DPMP

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## INTRODUCTION

The Drug Policy Modelling project (DPMP) is an examination of the dynamic relationships between law enforcement, treatment, prevention and harm reduction policies, with goals of expanding the evidence-base and the tools available to decision-makers. DPMP comprises 14 separate projects that include reviews of efficacy and effectiveness of policy interventions, examinations of the policy processes, reviews of modelling approaches, and economic and epidemiological analyses. In order to have a comprehensive understanding of heroin use and drug policy, understanding of the heroin drug market is required.

Understanding illicit drug market(s) is important for a number of reasons. For policy decisions, we need to understand supply routes, price elasticity and the nature of competition. Knowledge of the higher levels of the market (production and distribution) can assist in designing and evaluating source country interventions, interdiction and other law enforcement efforts. At the local level, understanding the operations of the retail market can assist in designing and evaluating harm reduction, treatment and law enforcement interventions.

This report reviews the ways in which drug markets have been conceptualised and studied. It arose out of a number of observations by the author: there is much ‘drug market’ literature; working with an economist revealed specific understandings of drug markets from an economic perspective; drug researchers frequently use the term ‘drug market’ without necessarily having a theoretical conceptualisation of what they mean by the term; and there appeared to be a number of specific disciplinary approaches to studying drug markets, each with their own ‘language’ and approach.

It was reassuring then, to discover that I was not alone in grappling with the notion of markets:

“Because economists, from Adam Smith forward, have with confidence and enthusiasm, although not necessarily with shared view, written about markets, it is plausible to expect that they would have had quite a bit to contribute to the resolution of the market-definition issue. Plausible but erroneous” (Horowitz, 1981 p.1)

“What is a market? Is it a place, is it a process, a principle, a power? History though yields no definitive answers to the questions” (Agnew, 1986 p.17)

“Indeed, what is usually referred to as 'the market' is no more than a blank space occupied by a diversity of changing social relations” (Tribe, 1981 p.94)

In this monograph, I identify five different disciplinary approaches to understanding illicit drug markets:

- Ethnographic and qualitative approaches
- Economic approaches
- Behavioural and psychological approaches
- Population-based and survey research
- Criminology and law enforcement evaluation

There is much overlap between them – I am not wishing to draw fine distinctions, but to describe the body of work in a useful way by distinction on the basis of discipline<sup>1</sup>. Each perspective has something to offer. I will not be arguing for the supremacy of one over another – rather pointing out what they collect, understand, and what they can offer to improve our understanding of drug markets. In the end, a multi-disciplinary approach is essential.

The monograph is focussed on illicit drug market(s). It is not intended to provide data per se (see Moore et al., 2005 DPMP Monograph No. 09), so detailed information on the types of markets, market characteristics, geography and behaviour of actors within the markets is limited to some specific examples to highlight disciplinary approach. In a like manner, the review does not cover everything that has been written on drug markets from each discipline (that would be a much larger undertaking!).

As part of the feasibility research into the controlled availability of opioids, Bammer (1993) held a one-day workshop in February, 1993 to examine Australian research on the structure and economics of drug markets. The workshop aimed to give an overview of current research and available information, provide a forum for discussion of methodological difficulties, and identify gaps and future directions (Bammer, 1993). We have come some substantial way since then with improved data. Nonetheless the research gaps and issues identified in the 1993 workshop still exist. Co-operation between different disciplines and practices is still lacking; standardisation of measurement is absent; legal protection for researchers has not been pursued; and ethical dilemmas remain.

Coomber (2004) notes that studying drug markets is a “new vogue”. He highlights the difficulties associated with studying an illegal behaviour, and the difficulties associated with multi-disciplinary data sources. For example, he cites the contradictions between his qualitative research (where key informants all noted the practice of adulterating heroin) and forensic data (which does not support the practice of adulteration). Best et al. (2004) likewise reported forensic purity levels significantly higher than those self-reported by heroin users. These examples serve to highlight the difficulties associated with understanding drug markets and the use of data from different sources and disciplines. As Coomber cautions us “drug markets...do not conform to much that is commonly thought about them” (Coomber, 2004 p. 503).

## METHOD

The literature was obtained through searches of a number of databases and library resources. These included:

- Academic databases: CINCH, PsychInfo, EconLit, Medline, Social Sciences Research Network;
- Specialist library holdings (ADF, ADCA)
- Internet sites: eg CIA, Interpol, RAND, and Australian internet sites: eg ACC, ACPR, AIC, CMC, Informit (online Australasian information)
- Cross-citations in the obtained literature.

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<sup>1</sup> It is also not intended to typecast particular research, and apologies if I have incorrectly ‘classified’ some research.

Keywords included illicit drug markets, drug economy, economics and markets. All sources were included: peer review journal articles, government reports, unpublished reports, theses, conference presentations and educational resources.

The research reviewed here represents a sample of literature, chosen to reflect the disciplinary approaches and with view to citing the most recent research. As will be seen, within the five disciplinary approaches, there is significant diversity within each approach. The examples were chosen to highlight this diversity and so should not be taken to be representative of a discipline's study of illicit drug markets.

I start with the ethnographic and qualitative approaches<sup>2</sup>.

## **ETHNOGRAPHIC AND QUALITATIVE APPROACHES**

Ethnography seeks to understand the lived experiences, social processes, cultural practices and structural parameters of a group or community. In its traditional form, ethnography involves long-term immersion in the social context under study and is grounded in sociology and anthropology (as the disciplinary bases). There are differing conceptions of the ethnographic method and debate about it as well as important distinctions from qualitative research, as articulated by Moore and Maher (2002) and others in the same volume. The ethnographic and more general qualitative approach has been used extensively to document illicit drug markets. The approach enables a rich picture of the market (for example the different roles and structures to the market), the marketplace (for example the interactions between actors) and social and cultural norms in individual illicit drug markets.

As early as 1969, a qualitative study of the heroin market in New York was published which described the levels and hierarchies to the market (Preble & Casey, 1969). Since then there have been many ethnographic or qualitative studies of illicit drug markets, which have largely focussed on the local retail level.

From the UK, Dorn, Murji and South (1992) describe a qualitative research study. They interviewed a significant number of traffickers, police, police informers and user-dealers. They identify seven different types of trafficking "firms". They made two central claims about the structure of the drug market: they argued that there was no evidence for the large scale organised, top-down hierarchies controlled by 'Mr Big'. Second, the researchers found that the drug markets are constantly fluid and changing. Some of the variables that may drive this diverse and 'messy' phenomenon include social background, resources and cultures. The researchers describe people weaving in and out of the trade, sometimes moving up the market, sometimes moving down the market, with constant interactions with law enforcement resulting in market changes. They do not subscribe to the view of a simple hierarchical organisation, with levels of distribution characterised by the weights, price and purity of the drugs traded (a potentially important finding for economists wishing to specify the market in such terms).

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<sup>2</sup> Consistent with the ethnographic approach, I should specify my own disciplinary background – which is clinical psychology. Whilst I have engaged in multidisciplinary research for many years, I am by no means an expert in the disciplines discussed herein. In this sense my reflections on ethnography, economics, criminology, population-based and survey research could be regarded as an outsider's perspective; or as an end-user of their respective research product.

In a more recent UK example of a comprehensive qualitative analysis of four local drug markets, May, Duffy, Few and Hough (2005) interviewed 68 drug sellers, 60 police members, 64 community members, conducted 200 street interviews and engaged in participant observation in the four chosen drug market sites. They draw a number of conclusions about the nature and differences between the four local drug markets, their connectedness to the local community, local concerns about crime and violence, and the behaviour of drug dealers.

From the USA, ethnographic research has described typologies of the drug markets. For example Natarajan and Belanger (1998) differentiate between organisational structure and tasks/roles in their analysis of New York drug trafficking organisations. In relation to tasks (and excluding the retail level), Natarajan and Belanger (1998) identify 5 tasks: grower/producer; manufacturer; importer/smuggler; wholesale distributor; and regional distributor. In relation to structure they identify four types: freelance; family businesses; communal business; and corporations. A grid can then be made of task and structure combinations. Such a typology can then be used to more accurately assess ethnographic research and place the particular cases under study within the context of a variety of organisational and task related drug market features.

South (2004) describes two case studies of heavy recreational drug users. In this context of the small dealer at a lower level of the market, selling drugs becomes normalised. Better understanding this aspect of the market is important and challenges existing notions of drug dealers. “This relative normalisation of segments of the drug market has enormous potential consequences for...understanding what constitutes the ‘drug market’, what kinds of individuals inhabit it and what penalties should apply” (Coomber, 2004, p 503). The South (2004) paper also provides rich descriptions of employment, finances, selling behaviour and budgeting of the 13 individuals in the two case studies.

May and Hough (2004) describe trends in the UK drug market over 10-15 years. They note the change in the market from an open street-based market to a closed market (as also noted in Fitzgerald and Dietze’s work in Australia), and associate this with the widespread introduction of mobile phones, coupled with community concern about public space. May and Hough (2004) use the term ‘retail market’ to describe this segment, and distinguish it from the ‘middle-level’ drug markets. They document a number of different types of retail markets – each with their own systems of operation (May & Hough, 2004). They speculate on the rise of the internet and its potential impact on drug markets of the future.

Above this retail level, May and Hough (2004) document two types of distributions systems – the more traditional pyramidal market (prevalent in the 1980’s and characterised by highly disciplined and hierarchical organisation); and the fragmented, non-hierarchical entrepreneurial market (characterised by little structure, fluidity and free enterprise). May and Hough (2004) note that they cannot determine which of these two structures predominates.

From an anthropological perspective comes work from Wendel and Curtis (2000) on the heroin stamps used in New York since the late 1960’s (but now fading out). Studying these as ‘material artifacts’ of the culture of heroin use, they note that dope stamps can “enable users to seek out “good” heroin...construct the daily routine...identify sellers to both consumers and law enforcement...(and) provide a narrative of notable events, personalities and attitudes that resonate through drug markets” (p. 233).

In Australia we have had a long tradition of qualitative research in illicit drug markets (see for example Langer, 1976, 1977). Maher (1996) describes an ethnographic study conducted in

Cabramatta in late 1995. Observational fieldwork and in-depth interviews were conducted with 40 young heroin users, largely new recruits to heroin. Findings are reported in relation to the nature of the sample of users, the emergence of street-based injecting culture and the apparent ‘resilience’ of the local drug market to law enforcement pressures (Maher, 1996).

Ethnographic research is particularly valuable in understanding local drug markets. By way of example, Maher’s work revealed an important dimension within the local drug market – that of the “size” of the deal (Maher, 1996). The research revealed different types of half-weights (Asian halves and Aussie halves – where aussie halves are pejorative and underweight – reserved for ‘aussie junkies’). These kinds of data speak to the utility of ethnographic research in understanding the price mark-ups, units and weights and the degree of variability within and across different markets.

Ethnographic research can also collect ‘economic market data’ such as information on price and purity. For example, in Maher’s work (1996) she reports details of the local purchases (70% were ‘caps’, 30% half-weights), the mean purchase price for a cap was \$30.42 (range \$20.00 to \$40.00), women appear to pay significantly less than men for both caps and half-weights. Buyers purchased an average of 2 caps, most subjects paid in cash (87%), and purity evaluations by the users indicated a range of normal, more or less purity.

Details from the ethnographic research on selling behaviour (Maher, Dixon, Lynskey & Hall, 1998) can be used for estimating mark-ups and other price indices. In their work, Maher et al. (1998) report that for heroin sales, the median amount earned that week was \$830.00 (range \$30 to \$11,200), and most (89%) were paid in cash.

Highlighting once again the diversity of drug markets Miceski (2001) studied middle-level drug ‘sellers’ in Queensland, from a largely suburban and middle class sample, located in residential (rather than street-based) markets. The 12 respondents were all active dealers in marijuana, amphetamines and ecstasy. From these 12 qualitative interviews, Miceski (2001) reports on the structure of the drug trade (a diversified series of networks with variety in operations and structure); and the importance of friendships and alliances (in the freelance way in which the market(s) operate). She describes how middle-level dealers in marijuana and ATS set their prices (and vary them for certain customers – friends and females) and reports on the behaviour of dealers. The participants in the Miceski (2001) study describe strong loyalty to their suppliers (because of the difficulties of assessing quality). Purity and potency were crucial issues for these dealers – their reputation and income depended upon good product.

Qualitative research can also inform the nuance of the behaviour of drug market participants. For example, the dealers in Miceski’s (2001) study reported an aversion to transactions with “drug addicts” – they showed abhorrence towards the addicts, and wished to distance themselves from the lower levels of the drug market(s). They also reported stereotypical views about addicts being untrustworthy. (All the dealers in her study were legitimately employed, drifting between lawful and unlawful careers but they were also all drug users themselves). Miceski (2001) also describes other aspects of dealer behaviour – including providing drugs ‘on tic’ (on consignment); the way they spent their profit; the degree of bartering; work ethic (and hours worked); the importance of accessibility (via mobile phone); the use of violence; and strategies to avoid police detection.

The striking differences between the work of Miceski and that of Maher and colleagues highlights that each market is different, with different cultural norms, roles, behaviours and economic

aspects. This makes generalisation to a singular understanding of *an Australian drug market* untenable, except at the most broad level.

From a social semiotic approach, Fitzgerald and Threadgold (2004) have studied the spatial practices associated with the street heroin market (with themes such as obituaries, hand-touching, vomit, bodies and blood). Their primary thesis is that “the fear that arises from an encounter with the signs of the street drug market is not a fear of drugs, but can be a fear of the dissolution of the sensible world” (p.408).

Research has also used ecological approaches to improve our understanding of drug markets and the physical and social contexts in which they operate. This work emerges from examination of the harms associated with injecting drug use. The ecological approach aims to understand the injecting environment in its entirety and examine both the physical attributes of the space, as well as social and cultural influences that may impact upon the behaviour of users and the attendant risks (see Rhodes, 2002). This ecological approach to risk reduction accommodates the dynamic interactions between users’ behaviour, drug market characteristics, police activity, treatment and harm reduction services and the local community/neighbourhood area. Ecological studies are another source of information about the ways in which drug markets operate and some of their defining characteristics.

The strengths of the ethnographic or qualitative approach include the detailed analysis of the local drug market, the behaviour of the various participants within the market and the nuances associated with transactions. Ethnographic research also collects “data” on such things as price, price-mark-ups, profits, types of participants and so on. All these data can be used to develop models (in other disciplines such as economics) about market operations. The major limitation of the ethnographic approach is associated with a key feature of drug markets – each market is unique and one cannot assume that operations in one market (both in terms of geography and person) can be applied to another market – even if it is the same drug. The specificity of ethnographic research is both its major strength and major limitation.

## **ECONOMIC APPROACHES**

“Still little is known about the structure and dynamics of drug markets at national, regional and global levels.... Illicit drugs are commodities at the centre of lucrative, clandestine and transnational markets. Albeit illegal, these markets obey basic supply and demand rules” (United Nations Office on Drugs and Crime (UNODC), 2004).

Studying markets is ‘core business’ for economics. Some of the important economic concepts applied to markets include: supply and demand curves and their interaction, the numbers of buyers and sellers, extent of product substitutability, costs, and ease of entry and exit. Economics is also concerned with mapping and understanding the motivations, opportunities and decisions of economic actors participating in a market. The broad and not unreasonable assumption is that many of the economic principles that apply for legal goods also apply to illegal goods. Moore et al. (2005) in their DPMP Monograph outline some of the basics to an economic framework of illicit drug markets.

A self-evident advantage of using the economic discipline to studying illicit drug markets is that economics provides a comprehensive theoretical approach. In a traditional economic framework,

there is a taxonomy of market structures (perfect competition; monopolistic competition; oligopoly; and monopoly). Theory around the relationships between supply and demand, and the ways in which both supply and demand curves shift are central to an economic approach to illicit drug markets.

Other economic approaches are also relevant. For example, one of the major issues for study of illicit drug markets is defining the boundaries of markets. Legal economic work on anti-trust cases<sup>3</sup>, provides a test of the market boundaries through the ‘hypothetical monopoly test’ (sometimes referred to as the SSNIP test. See Dobbs, 2002; Massey, 2000). Furthermore, there are economic approaches to applying geographic market definition (eg: Elzinga/Hogarty inflow/outflow analysis. See Capps, Dranove, Greenstein & Satterthwaite, 2001). The application of these economic concepts to the illicit drug market may provide substantial advancement of our understanding of the nature of the market(s) and market boundaries<sup>4</sup>. These are raised merely as examples of economic approaches that could be applied to illicit drug markets (there are many others).

An economic framework can provide a useful window to examine the drug market (for example Wagstaff, 1989). At the same time, there has been acknowledgement of the limitations of a pure economic modelling approach (eg. Nell, 1994). Caulkins & Reuter (in press) point out idiosyncrasies of the illicit drug market that might produce economically counter-intuitive results, such as downward sloping supply curves. “Economic analysis of drug markets and drug control interventions should not be content with presuming that elementary market models apply in all cases” (Caulkins & Reuter, in press).

Economics can inform both the supply-side aspects of the illicit drug market (market structure, pricing practices, profits, importation and distribution systems) and demand side (consumption, prices paid, price elasticity and cross-price elasticity of demand). Examples of demand-side economic research applied to illicit drugs are outlined first, followed by supply-side. The section concludes with other economic research that has been applied to policy questions.

## Demand-side economic research

When discussing characteristics of demand, I am referring to the market characteristics associated with potential buyers and their purchasing decisions. Much of this work has been done in relation to cannabis, and has concentrated on examining trends in price, price elasticity, cross-elasticity of demand, complements and substitutes and some market behaviour.

Price is a key feature of illicit drug market(s). Caulkins and Reuter (1998) argue that price data can be used to test assumptions and characterisations of drug markets. In addition, policy implications can be modelled against price changes. Caulkins and Reuter (1998) provide an excellent and accessible summary of the data and the utility of price information. The difficulties associated with reliable and valid price data are articulated by Manski, Pepper and Petrie (2001).

Examination of trends in real prices of cocaine, heroin and cannabis between 1975 and 2003 have shown dramatic reductions in the real price of cocaine and heroin in the US (Grossman,

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<sup>3</sup> Economics has identified three different types of markets: the strategic market (the smallest viable area of economic activity); the trading market (traditional economic definition, goods are sufficiently homogenous and ‘law of one price’ holds); and the anti-trust market (from competition policy, which identifies markets with differentiated goods from which companies may exert a monopoly).

<sup>4</sup> It is another question as to whether the data exist to be able to conduct a SSNIP test. This requires price and elasticities data, sales and costs data, all difficult to obtain for an illegal product.

2004). Cannabis shows a different trend, with an overall modest price increase over the 28 year period, but with price swings within that period (Grossman, 2004). These detailed price analyses, undertaken by economists and using econometric techniques, have relevance because there is now a good evidence-base to show that demand is sensitive to price.

In Australia, Williams (2004) has examined the extent to which demand for cannabis is price sensitive, and found greater price sensitivity for people aged under 25 years, compared to those 25 years and older (with potential policy implications). Zhao and Harris (2004) examine the cross-commodity correlation between cannabis, alcohol and tobacco distinguishing participation in drug use, from level of consumption.

Clements (2004) has studied several aspects of the Australian cannabis price: how it has changed over time, how it compares with the price of other agricultural products, price elasticities, and regional price differences. Interestingly there are country differences in relation to whether alcohol is a complement or substitute for cannabis (see Clements, 2004). This highlights the importance of careful definition of the market and the fact that similar product markets may operate differently in different places. It is hard to make generalisations in this area.

These examples serve merely to highlight the approaches that economists take to studying demand for illicit drugs – most of the work is in relation to cannabis, largely because of the availability of population level consumption measures for cannabis and the inaccessibility of good price data on other illicit drugs.

Manski et al. (2001) see the specification of demand functions as vital to evaluation of drug policy. They identify nine difficulties in estimating such demand functions: lack of reliable price data; price dispersion; importance of other costs; lack of quantity data; addiction; heterogeneity of consumers; cross-elasticities; the dynamics of drug use; and heterogeneity of drugs. Disciplines other than economics could assist in resolving some of these difficulties.

## **Supply-side economic research**

On the supply-side, economic research has concentrated on production and distribution networks, price mark-ups and the economics of drug dealing. I start with a description of the available information on production and distribution of illicit drugs. Some insights from agricultural economics can be applied here, as heroin is produced from plant products.

The United Nations Office on Drugs and Crime (UNODC) World Drug Report (2004, 2005) covers production, seizures, prices and consumption, divided by drug type. Formally called the Global Illicit Drug Trends report and a separate World Drug Report, these are now merged. Data come from the ARQ (annual report questionnaire) completed by governments, and supplemented by other sources.

The figures for cultivation, production and manufacture data appear to be fairly robust, derived from monitoring programs established in source countries (eg. The “Illicit Crop Monitoring Program” launched in 1999). UNODC also supports direct monitoring in opium producing countries, using remote sensing technology (ie analysis of satellite imagery) along with field visits. Both census and sampling approaches are used (sampling more common for opium). Yield surveys in some countries have also started (measures the yield of test fields then extrapolate to volume of poppy capsules). The transformation ratios – from opium to heroin production (efficiency of the laboratories), and likewise from heroin production to distribution (eg wastage

and loss in shipment) are specified. The UNODC use a 10:1 ratio to convert from opium to heroin. UNODC assume that all opium is converted to heroin (ie no loss through local consumption of opium) but given the transformation ratio this is likely to be underestimated (UNODC, 2004; 2005). I provide the above details as a way of highlighting some of the intricacies and details required for good understanding of particular data sources (and return to this point later).

Trafficking data can be summarised using the ARQ plus Interpol, World Customs Organisation, and UNODC field officers. There are some technical problems with converting to a standard metric (some are reported in weight (kg), some in volume (litres) and some in “units”). Seizure data are transformed into “kilogram equivalents” in some parts of the report. Seizure data needs to be interpreted in conjunction with price and purity data. For example increasing seizures along with falling prices (without any other significant changes) probably means an increase in trafficking activity. Whereas increase in seizures plus increase in price probably means effective law enforcement. In addition careful interpretation is required because of contextual factors, such as international co-operative efforts, upstream market disruptions, or decisions to follow the shipment to end users.

The previous UNDCP reports also included various details about the market characteristics and operations. For example, in 1998, they reported that “individuals do not appear to be major players, and early analogies to a cottage industry now make little sense” (page 6, UNDCP 1998). The UNDCP (1998) report also included the gross profit margin, mark-ups and distribution of heroin ‘gross profit’ between traffickers (90%), farmers (6%), processors (2%), and traders (2%).

There have been a number of economic studies to estimate the total value of the drug market, with associated complexities such as whether the figures reported are trade flow estimates or revenues at the retail level. UNDCP produces such estimates, along with more critically analytic researchers (for example Kleiman, 2004; Reuter & Greenfield, 2001).

In theory, the World Drug Report should provide the standardised global information on the illicit drug trade. In practice, there are difficulties with the veracity of some of the data, and there are complex methodological issues as well as political sensitivities.

Morrison (2003) demonstrates how the data from UNODC reports can be used to establish trends in relation to the heroin trade from Burma (Myanmar) to Australia. She reports cultivation levels; yield; farm-gate prices; and eradication levels. She also makes the point that whilst such descriptive research approaches are valuable, we also require sound theoretical models of the heroin supply chain, and she proposes a ‘supply theory’ for heroin.

In another example of economic research examining the structure of illicit drug markets, Jacobson (2004) explores the degree to which ‘agglomeration economies’ can explain the relationship between cannabis prices, youth cohort size and arrest rates. He finds that youth cohort size affects supply-side factors (because use and price move in opposite directions – price is lower in larger youth cohorts) through two mechanisms: economies of scale in cannabis distribution and to a lesser extent the probabilities of arrest (Jacobson, 2004).

At the lower levels of the supply chain, economics has been used to study the behaviour of drug dealers. One example comes from research that used data compiled by a gang leader to study the financial activities of a drug-selling gang (Levitt & Venkatesh, 1998). From these data, Levitt and Venkatesh can estimate the profit of the business, the average wages and wage distribution, and

apply some economic principles (for example in relation to wages, compensating differentials and efficiency wages were noted; and in relation to prices, the use of pricing below marginal cost).

Caulkins, Johnson, Taylor & Taylor (1999) examined costs and profits from the perspective of the drug dealer. They identified four types of sellers: entrepreneurs; independent consignment sellers; consignment sellers; and sellers, based on interviews with approximately 300 drug sellers in New York. The research enables appreciation of the size and nature of different selling transactions; the costs of selling drugs (overheads); and the variations on return. Similarly, from Washington D.C., Reuter, MacCoun and Murphy (1990) studied the number of people involved in drug selling, their earnings and patterns of participation. These economic studies of drug dealing have now been complemented with work on the intrapsychic aspects of decisions to participate in the illegal drug trade (see below section).

### **Economic analyses of drug policy options**

Thus far, the cited economic research has highlighted the ways in which economics can be used to describe the illicit drug market – at both the production and distribution and local retail ends of the spectrum. Over and above such descriptive work, economic research can also be used to examine and test models of different policy options. Some examples are chosen to reflect the diversity of this economic approach.

An obvious area for economic research is examination of the relative investment and cost-savings associated with different drug policy interventions. There is an extensive literature on this, but here I concentrate only on one example of this approach that explicitly relates to disrupting drug markets. Wagstaff (1989) considered a question about allocating law enforcement resources along the supply/distribution chain. Is it a better investment to concentrate on the high level of the market (importers and wholesalers) or on the low level of the market (street retailers and users)? Being able to answer this question entails understanding the way the drug market(s) work at these different levels.

Another research area has been economic analyses of legalisation and taxation schemes. As with the above example of benefit-cost analysis of policy options, there is a good literature examining the various economic aspects to legislation (including different legislative and taxation regimes). Economists would argue that any analysis of regulatory regimes perforce includes an analysis of the drug market – the potential shifts in both supply and demand that may result from regulatory change. An example of this work is that by ImpactTeen (2002). (See also Grossman, 2004; Williams, 2004 for discussion of this issue).

In a different economic approach, Zetland (2003) has evaluated a policy option where the USA purchases all the Afghan opium. Zetland (2003) models the short-run effect of this (unrealistic) policy option: the US purchasing all the opium from Afghanistan farmers. This “SuperBuyer” model would cost between \$300 and \$450 million, funded through the diversion of the existing ‘war on drugs’ effort, but representing a mere 1% of the current expenditure according to Zetland (2003). Of course the key problem with analyses such as these is the focus on the short-term, with no accommodation or consideration of the implausibility of such a strategy in the longer term.

In an economic approach to evaluating the impact of law enforcement, Poret (2003) argues that the effects of greater law enforcement intensity vary by whether directed at traffickers/wholesalers or directed at retailers; and secondly vary by type of arrest or sanction.

Using mathematical models, Poret (2003) demonstrates that under tougher law enforcement the number of consumers in the market can grow (through a decrease in retail price when the law enforcement strategy pursues retailers and the probability of arrest is high leading to an increase in unitary sanction).

The risks and prices framework is primarily an economic approach to evaluate law enforcement (Reuter & Kleiman, 1986). Price is used as a surrogate outcome measure of law enforcement effectiveness. Price in this framework represents the risks associated with being arrested and imprisoned (for both local dealing and trafficking); compensation for sellers' time; and compensation for risks and injury associated with the violence within some illicit drug markets. (See also Moore et al., 2005 for more detailed discussion and analysis of the risks and prices framework).

There are two problems for the risk and prices framework: price data are complicated; and the model has not held up over time – decreasing prices in heroin and cocaine have occurred despite increasing law enforcement intensity. So, somewhere our understanding of the retail price market, the way in which law enforcement operates on the market, or the behaviour of dealers and users is awry. Once again, this highlights both the complexity of the retail drug market and the various theoretical or disciplinary approaches that one may adopt (or appropriate) to try to understand the phenomenon.

## BEHAVIOURAL AND PSYCHOLOGICAL RESEARCH

I have chosen to distinguish behavioural and psychological research from the economic perspective but in reviewing the approaches, it is apparent that the behavioural approaches sit very close to and at times merge with the economic perspective, most notably in the area of behavioural economics.

Behavioural choice theories (such as rational addiction, hyperbolic discounting and melioration) have grown in recent years (see Vuchinich & Heather, 2003). There is much to criticise in the behavioural choice theories as grand unified theories of addiction and addictive processes<sup>5</sup>. But the aspect of interest in relation to drug markets is the area of behavioural economics, and more specifically the relationship between choice and price. Given the ubiquity of polydrug use, behavioural economics may be particularly helpful in understanding purchasing choice in a local drug market where multiple drugs are potentially available. Own-price and cross-price elasticity of demand, complements and substitutes are central concepts. The literature in this area comes from both economics and the behavioural field. An excellent recent example is the behavioural economic analysis of alcohol, amphetamines cocaine and ecstasy purchases from the UK (Sumnall, Tyler, Wagstaff & Cole, 2004). In a laboratory setting with simulated drugs, the researchers tested price elasticities, substitutions and complements.

From psychology, there have been numerous research reports in the area of contingency management. These studies examine the type, schedule and quantity of rewards (and discounting behaviour). Whilst the intent of researchers is not to establish elasticities of demand, their data could be used as such (for example the work of Haney and colleagues at Columbia University in New York where they are testing medications for marijuana dependency, and using contingency

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<sup>5</sup> "...an intellectual *tour de force* of unknown relevance to the phenomenon of real-world addiction" MacCoun & Reuter (2001).

management models). Data on price elasticity, complements and supplements that has been derived from psychological research could inform models of local drug markets, particularly useful in understanding polydrug use.

Coming from a psychological, decision-making perspective, Caulkins and MacCoun (2005) describe a model where dealers operate under limited rationality – providing one explanation for the fall in heroin and cocaine prices in the US despite increases in law enforcement intensity. They draw an important distinction between the initial decision to sell drugs, and the decision to continue selling drugs (Caulkins & MacCoun, 2005) and using prospect theory, demonstrate the differences in risks and benefits (the perceived risks deviate from the actuarial risks, and can be understood through human decision-making theory, eg: cognitive biases and the like). (See also Caulkins & MacCoun, 2003).

Risk-sensitive foraging in animals has shown that under conditions of deprivation, animals will choose riskier food sources. Bickel and his team (Bickel, Giordano & Badger, 2004) have applied the animal risk-sensitive foraging paradigm to heroin dependent people. In the laboratory, they replicated the risk-prone choices in conditions where the heroin users were in a satiated versus deprived state. Bickel et al. (2004) draw the conclusions together around an evolutionary model of exaptation, arguing that drug dependency may be situated in our evolutionary past. For our purposes, the risk-sensitive foraging model may explicate users behaviour in certain local drug markets, and demonstrates that the behaviour is dynamic and dependent upon the individual state and the environmental circumstance (abundance versus drought). In light of the Australian heroin shortage, the foraging model may offer some new insights into our current drug market operations in the circumstance of restricted supply.

Psychology has also offered research that studies the roles that drug users take in the market, the associated social networks and the implications for more effective interventions. For example Johnson, Goldstein and Preeble (1985) have extensively studied the behaviour of users and dealers in the retail market. More recently, Sherman and Latkin (2002) examined the involvement of drug users in the lower levels of the drug market (they call it the drug economy). They identified the characteristics (sociodemographic, drug use rates, social networks) of those involved in roles within the market versus those drug users not involved (ie only a buyer). Their particular interest is in the implications of roles in the drug market for improving interventions.

## **POPULATION-BASED AND SURVEY RESEARCH**

Population-based analysis of patterns of drug use (referred to by some as epidemiology and surveillance research) has an important contribution to make in understanding drug markets. The key contribution is in relation to the systematic collection and analysis of population data. (See also Degenhardt and Dietze, 2005 DPMP Monograph No. 10 for detailed reviewed of the data sources).

Household surveys have been used to analyse data on illicit drug markets – such as price and purchase behaviour. For example the New Zealand National Household Survey was used by Wilkins, Reilly, Pledger and Casswell (2005) to analyse the cannabis market. They report type of sale, average prices per unit of purchase, spending on cannabis, and dollar value of the cannabis market in New Zealand. There are many other examples of the use of household surveys to elicit

analyses of the nature of an illicit drug market (by economists, see above example by Clements) and by social scientists.

The major limitation with the use of household surveys is the substantial under representation of illicit drug users in these surveys. The temptation to use household surveys (because of the freely available data, the large number of data points and the capacity to do time trends analysis) entices researchers who do not have a grounding in the complexities of epidemiological data on illegal behaviours. Specialist drug researchers are much less likely to make such mistakes. In order to better understand illicit drug markets we need to rely much more heavily on targeted survey research than on population-based surveys (because of the hidden nature of the population).

Targeted data collection includes the regular surveys and surveillance activities that can provide quantitative data on market aspects such as street price and purity. For example, in the USA the Arrestee Drug Abuse Monitoring (ADAM), demonstrates the value of questions about street price to better understanding the market. Golub and Johnson (2004) describe the analyses of the ADAM dataset in relation to typical spending on drugs.

In Australia, the Illicit Drug Reporting System (IDRS; Breen et al., 2004) collates annual data on price, purity, availability and patterns of illicit drug use through the triangulation of three data sources: interviews with IDUs, interviews with key informants and indicator data sources. Median price per gram and per cap are reported for each jurisdiction and data are available across at least four years (2000 onwards). The amount in a cap is variously reported but half of the IDU sample reported 0.1grams in a cap (Interestingly the translation from kg to grams and between grams and caps has been complicated and transcription errors in some data are found. Care must be exercised when analysing these data).

The IDRS (Breen et al., 2004; Jenkinson, Miller & Fry, 2004) contains data pertaining to user behaviour that can be used to form a picture of the behaviour of users in the drug market. For example data are collected on the place users usually score (street dealer, dealer's home, mobile dealer or friend) and on location of injecting (private home, public toilet, street/park/beach, car, other).

DUMA (Drug Use Monitoring in Australia) commenced in 1999 and is a survey of individuals in police custody (Makkai & McGregor, 2003; Milner, Mouzos & Makkai, 2003). Self-reported information on basic demographics, drug use, drug market information and treatment history is obtained, along with a urine sample. In this monograph, we are most interested in the 'market characteristics'. These include: method of contacting dealer; location of last buy; place of purchase; and source (regular, occasional, new). It is unclear, however, what 'level' of the market the DUMA respondents represent, or if they are heterogeneous or homogenous in relation to this. Thus, the published DUMA data are broadly informative around market characteristics, but lack specificity in relation to which level of the market. It is also interesting to note the variables that the researchers choose to identify as 'market-related'. Other disciplines may choose different variables to summarise the market.

The Australian Institute of Criminology conducted a survey of 2,135 male offenders incarcerated in prisons in NT, Qld, WA and Tasmania in mid 2001 (known as the DUCO study; Makkai & Payne, 2003). This one-off study of male prisoners is rich with data in relation to drug markets and crime. (There is also a parallel study of female prisoners: Johnson, 2004).

The results of these targeted surveys of injecting drug users, and those in the criminal justice system can be used to increase our understanding of the Australian drug market and can also be used to estimate the size of the market and its activity level. For example, we could use the figures in the DUCO study on years prior to drug selling to examine the potential number of drug sellers (based on populations of users) and their career trajectory. We can also use the estimates from charges and conviction rates to examine law enforcement effectiveness.

The strength of population-based and survey research is the application of population and survey sampling techniques and the collection and collation of large data sets. The difficulty is that the data collection approach is not necessarily driven by a theory of drug markets, hence the variables chosen, and data collection methods may not be best suited to a study of markets.

## CRIMINOLOGY AND LAW ENFORCEMENT EVALUATION

Criminological research is another disciplinary approach to the study of drug markets.

Using crime theory, including social control, social normative and routine activity theories, Gruenewald, Freisthler, Remer, LaScala and Treno (2003) explore geospatial models to predict violence based on people and place characteristics. Gruenewald and colleagues (2003) describe new research into the use of geospatial coding to develop ecological models of alcohol (and drug) crime. ‘Crime potential’ – the likelihood that a crime will occur – is a function of people characteristics and place characteristics. Whilst the research reported in the cited paper is concerned with alcohol, the authors document the potential role that illicit drug markets may play in their geospatial model. In addition, their methodology could be applied to illicit drug markets.

Mazerolle, Kadleck and Roehl (2004) used cluster analytic techniques to identify types of drug-dealing places. The six types of places were: petty drug nuisance; conflictual; apathetic and blighted; nosy neighbour; and dangerous drugs. These six different drug-dealing places were characterised by environmental characteristics such as police calls for service, degree of commercial or residential activity, length of the street block, civil activity and civil disorder (to name a few).

Eck (1995) is most widely quoted in relation to criminological analysis of the geography of illicit retail drug markets. His work demonstrates that the type of marketing (selling to known associates versus selling to strangers) results in different geographical patterns of retail drug markets. The key driver to this model is the balance between access (by buyers) and security (for sellers). Eck notes that the model does not apply when there is no risk (ie from enforcement or from violence and threats from participants). Eck (1995) argues that a geographical model of retail drug markets can advance research on the typology of such retail markets, as well as enable clearer understanding of the impacts of policy choices (such as law enforcement or/and treatment).

The remaining section deals with law enforcement evaluation. Law enforcement has a significant role in addressing drug problems and most strategies operate through reducing supply at the higher levels of the drug market (such as source country control and interdiction efforts) or through local law enforcement efforts to disrupt the lower levels of the drug market<sup>6</sup>. Because

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<sup>6</sup> For a comprehensive review of law enforcement effectiveness, see the work by Mazerolle and her team published as part of the DPMP Monograph series.

law enforcement is explicitly focussed on drug markets, much of the law enforcement research is directly relevant to understanding illicit drug markets.

In relation to data sources, law enforcement agencies at local, state, federal and international levels retain an immense amount of information that informs the operations of illicit drug markets at all levels. Much of this information is not in the public domain – and could not be sourced for this monograph.

By way of federal information, in Australia, the Australian Crime Commission (ACC) produces reports on the types of drugs imported to Australia, the quantities and source (for example, ACC, 2005). The ACC report (2005) provides trends over time in both quantity and number of heroin seizures (from 1993/4 to 2003/4). The total amount of seized heroin at the border for 2003/04 was less than 100kg (ACC, 2005). The most frequent border detection method was via parcels in the post, but the greatest yield of heroin (as measured by weight) was from sea cargo (ACC, 2005). The border seizures are distinguished from the domestic seizures (within Australia). These kinds of data can inform economic analyses of the trade in illicit drugs. They are not necessarily structured around a particular theoretical approach to understanding illicit drug markets.

The Australasian Centre for Policing Research has published a discussion paper on the role of general law enforcement activities in reducing the illicit drug trade (Australasian Centre for Policing Research (ACPR), 2003). Within the paper, they provide a description of the current understanding of the Australian importation market. They note (ACPR, 2003) that up until the mid-late 1990's the transnational criminal organisations involved in drug smuggling to Australia had been seen as large international syndicates, with established infrastructure within Australia. It is now clearer that this is no longer the case. The current predominate model is “transactional crime”. The drug trafficking is done by groups of relatively independent criminals who come together for specific transactions (but are not part of the one organisation). There is little evidence of vertical integration between source countries and the Australian borders, and likewise little evidence of profits moving offshore. ACPR (2003) describe the current operations as fluid syndicates, with members that come and go, “constantly forming, disbanding and reforming in response to the nature of the crime that they are committing” (page 4). The implications of these fluid, non-organisation-bound structures is clear – removing a key individual does not disable the system<sup>7</sup>.

The Problem-Oriented Guides for Police are produced by COPS (Community Oriented Policing Services, US Department of Justice). The focus of these series is to assist police to understand and respond to their local community needs in relation to specific crime and disorder problems. They are designed as user-friendly guides, with background notes, key questions for discussion and simple summaries of possible police responses. Guide number 31 is entitled “Drug dealing in open-air markets” (Harocopos & Hough, 2005). (There is also a guide for “Drug dealing in privately owned apartment complexes”, No. 4, Sampson, undated).

While clearly not a research publication, the guide does offer useful insight into open-air drug markets and police responding. It highlights those aspects of the drug market that are of most interest and utility to community policing. Open-air markets are clearly defined as the lowest level of the drug market (Harocopos & Hough, 2005). They describe two different types of retail markets – those that are person-specific and those that are place-specific. They also describe

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<sup>7</sup> This structure applies to heroin importation, but for amphetamines, the outlaw motor cycle gangs operate in the former manner – as a transnational organisation with hierarchical integration.

geographical features of open-air markets: usually located in economically depressed neighbourhoods; dealers sell from static sites; located close to or around a transport hub; and can grow large in size and concentrated in activity. Situational factors include aspects such as overgrown foliage; poor street lighting; street layout (ingress and egress routes); parking availability; vacant buildings and “place managers”. The POPS publication (Harocopos & Hough, 2005) also nominates the different types of organisation for an open-air market: freelance; family businesses; culture-based; and corporations. Roles include sellers, look-out, holders, steerers, touts and middle-men.

A conference paper presented by Curtis and Wendel (2000) is a New York example of the relationship between law enforcement effectiveness and drug markets. They identified three different types of crack markets (freelance; corporate-style; and socially-bonded) on three NY blocks. The law enforcement intervention was identical (largely buy busts). The research demonstrated that the impact of the law enforcement intervention differed depending on the market. The number of arrests, degree of displacement and level of community support (the three outcome measures) varied by drug market (Curtis & Wendel, 2000).

The Queensland Police Service has piloted a method for mapping illicit drug markets (Voltz, 2000). Using existing data sources from police records, community services and so on, they have undertaken geospatial mapping of the heroin drug market in the Ipswich LGA. The spatial analysis revealed two clusters of heroin activity (offences and suspected suppliers), a significant relationship with transport hubs, and a drug market that crossed two regional police boundaries (Voltz, 2000). Importantly they note significant problems with the data, with about 10% of the data unable to be used due to inaccuracies and inconsistencies in recording<sup>8</sup>.

The dynamic nature of illicit drug markets and how they may respond to police activity is reviewed by Kerr, Small and Wood (2005). They cite evidence to support the hypothesis that police activity targeted at local drug markets can impact negatively on health and create social harms. A good theoretical model that can depict the dynamic relationships between drug users, their environment, market operations, and interventions (law enforcement, treatment, harm reduction) would enable more evidence-based policy.

There have been a number of studies evaluating the impact and effectiveness of heroin seizures in changing the retail drug market. Four examples are provided. In a study of the short-term impact of a large heroin seizure in Port Macquarie (NSW, October 1999, 400kg) on the Melbourne heroin market, Rumbold and Fry (1999) reported stable retail heroin market characteristics (retail price, purity, patterns of purchase and use). Smithson, McFadden, Mwesigye and Casey (2004) evaluated the effectiveness of law enforcement seizures by comparing trends in seizures (number and weight of seizures) with average purity and harm measures (such as non-fatal overdose and crime) in the ACT<sup>9</sup>. Weatherburn and Lind (1997) conducted a study of the relationship between seizures and street level price, purity or perceived availability. They selected one locale for the study (Cabramatta) to collect data on price and purity. The heroin samples were purchases made by undercover police officers, or recovered from people arrested. This was matched to price via either the purchase price paid by the undercover police officer; or the offender was asked the price he/she had paid for the heroin at point of arrest. This methodological aspect of the work enabled examination of the degree to which there may be systematic bias in price data depending upon the source of that data (police or users). There have

<sup>8</sup> It is unclear whether the Queensland Police Service has further developed this methodology, or its use in practice.

<sup>9</sup> Further work mapping the association between price (per pure gram) and harm indicators has been completed by the DPMP team (Moore, Caulkins & Dietze, 2005). See also Moore et al., 2005).

also been Australian efforts to establish a cost-related harm index that measures the amount of harm averted by seizures, per kilogram (see McFadden & Mwesigye, 2002; McFadden, Mwesigye & Williamson, 2002).

Qualitative research concerned with evaluating the impact of a saturation policing strategy also provides descriptions of a local street-based heroin market (Aitken, Moore, Higgs, Kelsall & Kerger, 2002). The researchers note the change in spatial organisation of the market over the time of the police intervention, and the capacity for the market to adapt to new conditions very rapidly.

## OTHER APPROACHES

One of the challenges in trying to summarise research by disciplinary approach is that in many instances, the work is conducted using multiple methods and a multidisciplinary team. Most particularly in drug research, we tend to be atheoretical in our approach, and much research does not have a strong disciplinary base. The advantage of this is that research is not hamstrung by a particular discipline, the disadvantage is that it can seem disassociated from any grounded theory.

Here I cite some specific examples of research conducted in the area of illicit drug markets that have used multiple methods, and have not been driven from a singular disciplinary stance.

The best example of this is the various studies of the Australian heroin shortage (see for example: Degenhardt, Day & Hall, 2004; Dietze & Fitzgerald, 2002; Dietze, Miller, Clemens, Matthews, Gilmour & Collins, 2004; Topp, Day & Degenhardt, 2003; Weatherburn, Jones, Freeman & Makkai, 2001; 2003). Australian research on the heroin shortage examined heroin distribution and consumption patterns, behavioural changes in injecting drug users and trends in heroin-related harm and crime. Primary data sources across the studies included interviews with users and key informants, and secondary data from law enforcement, surveys of injecting drug users (the IDRS), and crime and drug treatment data. There is agreement that there was a sudden change in heroin supply in Australia, but there is little agreement about both the causes and the consequences.

The impact of one harm reduction intervention (pill testing) has been examined from the perspective of its impact on the illicit market. Since 1992, the Netherlands has had pill-testing available to party drug users as part of a surveillance and harm reduction program (Spruit, 2001). Campaigns about particularly dangerous products are launched out of the pill-testing results. Spruit (2001) cites positive findings in relation to changes in the market, that is, those products that were identified as particularly dangerous and the subject of warning campaigns, were eliminated from the market. There are similar reports from pill-testing interventions in Switzerland (Kriener, Billeth, Gollner, Lachout, Neubauer & Schmid, 2001), suggesting that pill-testing might have the ability to change the black market in positive ways.

Another example of relevant research that has not been referred to elsewhere is recent international focus on the relationship between terrorism and the illicit drug trade. A report by Kleiman (2004) for the US Congressional Research Service suggested five ways in which the illicit drug trade may contribute to terrorism: supplying cash, creating chaos, supporting corruption, providing cover, and sustaining common infrastructures. At the same time, Kleiman (2004) notes the divergent interests of ideologically-driven terrorists and financially-driven drug traders.

The limitation to using individual studies to understand drug markets is that the kinds of data collected are largely driven by the hypothesis under study by the individual research team. In this sense individual projects can inform parts of our understanding but do not necessarily provide a comprehensive analysis of drug markets.

## CONCLUSIONS

I start this section with a few brief observations on: language and definitions; different markets; and data sources. This is followed by a summary of the five disciplinary approaches. I conclude with some brief comments about future directions.

Language and definitions is a key theme. I have not systematically documented the definition of ‘drug market’ for each discipline, mainly because most of them (with the exception of economics) do not have one. I will also not endeavour to specify a unifying definition. The best I can offer is the observation that one must appreciate the absence of a unifying definition - one cannot presume to know what a particular discipline or researcher is referring to when s/he uses the term ‘drug market’.

One frustration associated with language is that we do not have a shared lexicon for different levels of the drug markets. The study of the 2000/2001 Australian heroin shortage describes six levels of the heroin market: cultivation (opium); production (heroin); trafficking (source country to distribution country); distribution (within destination country); street level; and consumption (user) (Degenhardt et al., 2004). Use of terms such as low-level and middle-level are poorly characterised and differ between researchers. It should be possible to establish a standard set of terms to describe the different levels of the market as they pertain to Australia (even if we cannot establish a definition of the ‘market’!).

The review highlights the need for careful specification of the ‘market’ in any research. At the retail level, drug markets are active, dynamic phenomenon, with differences in geography, space, participant behaviour and economics. One cannot rely on work in Cabramatta for example, to describe a retail market in Melbourne, nor at different time points in the same location. At the same time, some of the markets research concerns specification of the markets at higher levels of abstraction (such as the production and importation level) where it may be possible to generalise across both time and geography.

Anyone studying drug markets can use multiple data sources, which may exist outside their own discipline: such as government data on global collations of supply routes and production; national and local databases (federal police, customs, state police); epidemiological data including population surveys, and targeted surveys; and effectiveness and evaluation research. The disciplinary approach is likely to influence the nature of the data collected, the conceptualisation of the market and the conclusions that are drawn.

This monograph has reviewed five disciplinary approaches to studying illicit drug markets. Each discipline has its own unique contribution to make as well as limitations. Ethnographic and qualitative research are rich in their capacity to describe in detail the operations of a local drug market. However, it is not necessarily possible to generalise from these studies to broader markets, and the information on market characteristics that is collected may be driven by the idiosyncratic nature of the particular ethnographic phenomenon under study.

Economic approaches afford good descriptive research on the operations of drug markets, but also provide a theoretical backdrop to the study of drug markets. The advantage of a strong theoretical framework to guide the data collection, analyses and hypotheses cannot be underestimated. At the same time, economics must also use other disciplines in order to make full sense of the illicit drug market. The straight application of free-market economics to the area of illicit drugs encounters problems. The economic approach is also limited to broad generalisations about markets - generic analyses of price, for example, cannot accommodate the diversity of types of drug markets.

Population-based and survey research can provide the strongest data to inform studies of the illicit drug market. Without high quality data series, many analyses could not be conducted. The major limitation of the survey approach is that the kinds of data collected may not conform to a theoretical approach to drug markets, and in some instances data are used out of context by researchers from other disciplines who do not appreciate the limitations of the particular epidemiological data in use. Surveys are good tools for descriptive research, but are less amenable to questions of 'how' and 'why'.

Another approach driven by a strong theoretical framework is that offered by behavioural, psychological and criminological research. As with economics, the strength resides in the application of theory. Perhaps the largest drug market literature can be found in the area of evaluation of law enforcement. Evaluation of the effectiveness of law enforcement has relied strongly on illicit drug market analyses, arising out of the risks-and-prices framework. As Manski et al. (2001) point out, evaluation of law enforcement needs to make more use of systems research and develop research in the areas of geographic substitution, deterrence effects, and market adaptation. Others would argue that law enforcement research on illicit drug markets also needs to concern itself with studying iatrogenic harms, and could make use of an ecological framework in this context.

Multi-disciplinary research is inevitable, and I describe below the ways in which this may be furthered. At the same time I argue that single discipline approaches should also be strengthened. In parallel, we can develop single disciplinary understandings of illicit drug markets (and use the integrity of the discipline to advance to knowledge) alongside inter- and trans-disciplinary approaches as described below.

There is an inevitability about the need for multi-disciplinary approaches in studying illicit drug markets. One example of the need to use research from multiple disciplines is represented in the price data. Price information can be obtained from survey sources (such as household surveys); from law enforcement data (such as through buy-busts); from convenience samples of injecting drug users (for example, the IDRS); and from ethnographic research in select markets (such as that by Maher). The fact that these different data sources all come from different research perspectives creates challenges for the researcher. Appreciating the unique issues associated with each data set and the underlying disciplinary assumptions that will have been made in the collection and analysis process, are crucial for any effective illicit drug market research.

A multi-disciplinary approach, defined above as the use of multiple disciplines to study drug markets, has both risks and limitations. The risks are the misappropriation of tools and methods leading to fallacious or misleading conclusions. Klein (1990) highlights the dangers of 'borrowing' from other disciplines and includes: distortion and misunderstanding of the borrowed material; use of data, methods and concepts out of context; and a tendency to dismiss contradictory

findings (amongst others) as common problems. The limitation of multi-disciplinary work is that it lacks synthesis across the disciplines. For this, we need to turn to inter-disciplinary and trans-disciplinary approaches.

Inter-disciplinary and trans-disciplinary approaches aim to synthesise and integrate different disciplinary approaches leading to new methods or new concepts and ideas. It goes beyond the use of multiple approaches to transcend disciplinary boundaries in search of new knowledge. It seems that the area of illicit drug markets is ripe for inter- and trans-disciplinary endeavours. The overall goal is integration - in order to achieve new insight (see Bammer, 2005).

I also argue for the integrity of single discipline approaches. Each discipline is most suited to certain questions – and it would be foolish to presume that inter- or trans-disciplinary work is the only way forward. Theoretical advances in all disciplines in relation to illicit drug markets could significantly advance our understanding, in the context of careful specification of the research questions to which the discipline is most suited.

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Studying the online illicit drug market through the analysis of digital, physical and chemical data. Rhumorbarbe D1, Staehli L2, Brosius J3, Rossy Q3, Esseiva P3. Author information. Darknet markets, also known as cryptomarkets, are websites located on the Darknet and designed to allow the trafficking of illicit products, mainly drugs. This study aims at presenting the added value of combining digital, chemical and physical information to reconstruct sellers' activities. In particular, this research focuses on Evolution, one of the most popular cryptomarkets active from January 2014 to March 2015. Evolution source code files were analysed using Python scripts based on regular expressions to extract information about listings (i.e., sales proposals) and sellers. How could we change our approach to drugs? What would a public health approach to drugs look like for Canada? This paper is intended to start that discussion. Under a public health approach, drug use would be treated as a health issue not a criminal issue. Some turned to the illegal alcohol market, sometimes with tragic results. The federal government soon realized that the health, social and criminal harms of alcohol prohibition far outweighed any benefits. It is for the same reasons that cannabis laws are changing in Canada, and why some want to see similar action for all drugs.