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How much crime is drug-related? History, limitations, and potential improvements of estimation methods

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Prologue

Drug-related crime imposes an enormous burden on society, but how big is enormous? And how do “we” as citizens, policy analysts, and policy makers develop sound intuitions for the scale of something that directly or indirectly affects hundreds of millions of people? This is the first in a series of articles (see “The Cost of Crime” by Caulkins and Kleiman, 2013, and “Drug Control and Reductions in Drug-Attributable Crime” by Caulkins, 2013) that attempt not so much to answer those questions in the sense of computing specific numerical estimates, but rather to provide guidance on how one should understand and interpret such estimates.

After all, we do not lack for estimates of the annual costs of illicit drug use. The 2011 National Drug Intelligence Center report says the answer is \$193 billion just for 2007 (NDIC, 2011); Henrick Harwood and his coauthors said that it was \$97.7 billion just for 1992 (Harwood et al., 1998) — which would have been \$135.5 billion in 2007 dollars. What is lacking is *understanding* of what such figures mean. Is one right, and the other wrong? Are either right? Is it possible to provide a single “right” number and, even if so, what response would the number imply, in terms of changing public policies?

These figures dwarf everyday experience just as surely as do other “facts” that swirl around us. We measure computer memory in Gigabytes, where one Gigabyte is 1,073,741,824 bytes. No one can count that high. If we counted one number per second every second of every day — without pausing to sleep, eat, or go to the bathroom — it would take 34 years to count to Giga. And Giga is by no means

the largest scale that informed citizens need to comprehend. After all, it is “only” a billion.

Although Senator Everett Dirksen probably never said it takes several billions before one is even talking real money, it is true that the cost of drug-related crime is so enormous that no one can even hope to estimate it to the nearest billion. “A billion here, a billion there” really is just round off error when trying to grapple with the enormity of the costs of drug-related crime.

Great mischief blossoms when common sense retreats in awe of such quantities. Buried behind the estimates of the National Drug Intelligence Center and Harwood and his coauthors and others like them are value judgments and crude approximations and tacit assumptions that need to be surfaced. That a calculation produces a big number, and takes two hundred pages to explain, does not imply that the resulting number is accurate. Indeed, depending on a variety of factors, the opposite may be true.

To be clear, we mean no disrespect toward the authors of these enormous estimates. The analysis is daunting, having some estimates is clearly better than pure ignorance, and we could do no better. Rather, the goal in these articles is to make consumers of these figures better able to appreciate and use them effectively.

Introduction

Estimating the total societal burden or “cost” of drug-related crime entails two tasks: measuring the total cost of all crime and determining the portion of crime that is “drug-related.” This article and “The Cost of Crime” delve into these tasks,

but in the opposite order. For reasons of exposition that will only become apparent as we proceed, it is useful to start by investigating the relationship between drugs and crime, and then in “The Cost of Crime” (Caulkins and Kleiman, 2013) to examine the relationship between crime and its costs.

The literature on drugs-crime connections is vast. For reviews, see Chaiken and Chaiken, 1990; Roth, 1994; Boyum and Kleiman, 2001; Boyum and Reuter 2005; Bennett and Holloway 2005, 2009; Boyum et al., 2011; and Caulkins and Kleiman, 2011. We seek to draw on but in no way summarize the wisdom of that universe. Our target is much narrower: improving our understanding of the proportion of street crime in the U.S. that should be thought of as caused directly or indirectly by drug use.

There is a literature that attempts to answer this narrower question by estimating so-called drug attribution factors (DAFs). The history and calculation of DAFs are discussed more thoroughly below, but initially they can be thought of as estimates of the proportion of crime attributable to illicit drug use. Our thesis is that DAFs are flawed in two respects. First, they suffer from a variety of correctable technical limitations, such as being based on interviews with current inmates, which over-samples those with long sentences relative to interviewing an intake cohort of new prisoners. Second, they overlook important indirect causal pathways through which drug use causes crime. Because we do not believe it is possible to quantify all of these indirect pathways, we recommend a two-layer approach to thinking about the amount of drug-related crime: a quantified estimate of the amount of crime that is *directly* and contemporaneously caused by drug-related *activity* plus a qualitative

framework describing previously neglected indirect effects to remind us of the limits of the quantification.

Causality here should be understood in the standard sense. How much less crime would there have been had the drug use never existed? Or, equivalently, how much less crime would there be in a hypothetical universe that is identical to our own but for that drug use?

A few definitional notes are in order. We interpret our scope as including crimes committed by drug dealers, such as violence perpetrated to acquire or defend drug selling “turf.” The logic model is that drug use, or perhaps more properly the demand underpinning that drug use, is a necessary precondition for drug production and distribution. Without the demand for drugs, there is no drug supply industry, and thus no related crimes. In that sense, drug users are responsible for the sins of the sellers, not the other way around. While there was once a notion that drug dealers hook unsuspecting and helpless naïfs to drum up business (hence, the term “*drug pusher*”), that myth has long since been dispelled (Kaplan, 1983).

Arguably, attempts to quantify the crime and violence caused by drug production and distribution are too ambitious, even with regard to crimes generated directly by those supply-side activities. However, while narrowing the scope to crimes committed by users might improve precision, it would also strip the estimates of all meaning. It would be akin to the public health community estimating only the tobacco-related deaths due to heart disease because the lung cancer deaths are too hard to quantify.

However, we do exclude the crimes of drug production, sale, and possession per se; they are only crimes because the drugs are prohibited.

We also focus primarily on *non-consensual* crime caused by drug-related activity. We set aside for separate discussion certain types of crimes, including corruption of public officials and drugged driving which we think are best discussed and monitored separately. (See box.) So for the remainder of this section, the word “crime,” without qualification, refers to conventional or “street” crime: perpetrators hurting people and taking things.

We proceed as follows. We begin by explaining what Attribution Factors (AF) are generically, tracing the history of quantitative estimates of Drug Attribution Factors (DAFs) in the United States, and suggesting some strategies for improving those DAFs. That material was developed in collaboration with colleagues at RAND’s Drug Policy Research Center via a related project conducted for the Office of National Drug Control Policy (Pacula et al., 2013).

We then discuss fundamental limitations of the traditional DAFs when it comes to crimes that are caused by drug use indirectly, and close with a suggestion for a framework for keeping those indirect pathways in mind, even if they cannot be quantified at present, and perhaps not ever.

Special Crime Types

There are certain crime types that merit separate discussion. Perhaps the most important is drugged driving. One argument is that drugged driving per se is

does not harm anyone; only crashes caused by drug driving do, and vehicular manslaughter is already counted under violent crimes. On the other hand, when there is only property loss, and no fatality, the drugged driver may not end up as an inmate convicted of drugged driving, so as a practical matter inmate-based DAFs would under-emphasize the importance of drugged driving. And instances of driving under the influence of drugs and alcohol may only get logged as drunk driving.

Another argument against measuring drugged driving alongside street crime is that the loss of life and property caused by drugged driving is not an intended outcome; it is an accident. However, parallel reasoning does not prevent criminally-negligent involuntary manslaughter from being seen as a crime.

Our view is that drugged driving ought to be thought of as a drug-related crime, although its quantitative estimation may be done in ways that are entirely distinct from those — such as inmate surveys — used to monitor other types of drug-related crime.

We defined our scope above to be non-consensual crimes, but the National Drug Intelligence Center (2011) treats prostitution in exactly the same way it treats other income-generating crimes. NDIC (2011) reports that among the relatively small number of inmates sentenced to jail for prostitution, 49 percent answered “yes” when asked whether they committed that offense to obtain money to buy drugs; the corresponding proportions for prison inmates were much lower.

Diversion of precursor chemicals and money laundering are consensual crimes, so they are formally excluded from the discussion above and have

historically been ignored by DAFs, even though they are both clearly systemic drug-related crimes as byproducts of drug distribution.

Corruption of public officials is similarly consensual so ignored both in this current consideration and traditionally by DAFs, but certainly relevant for truly comprehensive considerations of the costs of illicit drug use.

Attribution Factors in Medicine and Public Health

Attribution Factors (AFs) are an epidemiological tool. Formally they are just descriptive statistics comparing populations of individuals exposed to a condition to others that have not been exposed. However, the word “attribution” suggests an intent to support causal attribution. The validity of causal interpretations has been challenged (e.g., Levine, 2007), but it is exactly that interpretation which interests the drugs-crime literature.

Attribution factors are used — or, in some people’s view, misused — for quantifying the contribution of particular factors to diseases, such as lung cancer, for which there is not just a single cause. Tobacco smoking causes most but not all cases of lung cancer. Others are caused by radon, asbestos, and other sources, perhaps including marijuana smoking. So if the public health community wanted to estimate the benefits of interventions that cut tobacco smoking by, say, 50 percent, they would include a reduction in lung cancer, but could not claim that lung cancer would be reduced by 50 percent. There is no need to discuss an attribution factor

for a disease that has a single cause since all incidents of that disease could be traced to that one cause.

The attributable risk is defined as the incidence of the disease in a population exposed to the condition (in this case, tobacco smoking) minus the incidence of the disease in a corresponding population that is not exposed to the condition.

The population attributable *fraction* (PAF) is this difference divided by the rate in the exposed population. It is often interpreted as the proportional reduction in disease incidence or mortality that would follow from a hypothetical intervention that eliminated exposure to the risk factor throughout the population (e.g., a no smoking counterfactual).

For smoking and lung cancer the PAF is about 0.8 (lower for females, higher for males). So one might hope that cutting smoking rates in half could reduce the long run incidence of lung cancer by about 40 percent ($0.8 * 50 \text{ percent} = 40 \text{ percent}$). It would also reduce pancreatic cancer, but only by about 10 percent because smoking's PAF for pancreatic cancer is only about 0.2; most pancreatic cancers are attributed to other causes.

Note: a diseases' PAF's can sum to more than one if removing any one of a set of sufficient causes is enough to avert a case of the disease. Likewise, to be valid as a causal interpretation, one must consider an intervention that reduces the risk factor in question without simultaneously affecting the distribution of any other risk factor; real as opposed to hypothetical interventions might not meet that test (Benichou, 2005). We discuss implications of this for drug-attributable factors at length below.

Brief History of Drug-Related Crime Attribution Factors

The drugs-crime literature is enormous. By 1980, Gandossy et al. were already describing it as so “vast,” “complex,” and “varied” methodologically that it was hard to pin down what is known and where the gaps are. Needless to say, if comprehensive review was difficult to achieve in a 173-page treatise a generation ago, encyclopedia coverage of today’s still-larger literature is not realistic here. Given the excellent recent reviews of DAFs provided by NDIC (2011) and Pacula et al. (2013), we present here just a bare-bones sketch.

Early efforts to quantify amounts of crime that were causally connected to illegal drugs focused on income-generating crimes committed by heroin users. In particular, Barton (1974, 1976) assumed that all income-generating crimes committed by high-frequency heroin users should be attributed to that drug use (and no other crimes were counted). Perhaps one could view that as an attribution factor of 1.0, although presuming a one-to-one correspondence between offense and cause is in a sense exactly the sort of simplistic thinking that attribution factors are supposed to supplant. It is not credible to imagine that in the no-drug counterfactual universe, every one of those individuals would have been a crime-free angel.

So arguably Cruze et al. (1981) get credit for using the first drugs-crime attribution factor when they augmented the Barton assumption (all income-producing crime committed by daily heroin users) with the (ad hoc) assumption that 20 percent of income-generating crime committed by users of all other drugs

could be attributed to that drug use. The resulting attribution factors were crime-specific, e.g., 18.6 percent for larceny and 26.8 percent for robbery. Overall, though, they suggested that roughly one-in-five of the standard property crimes could be attributed to drugs. Cruze et al. also included 100 percent of drug-law violations; as noted above, we view drug-law violations as a separate consideration and so omit them from this review.

Perhaps in recognition of the widespread violence associated with wholesale markets for cocaine (in the 1980s, especially in Miami) and emerging street markets for crack, Harwood et al. (1984) broadened the definition by adding 10 percent of all violent crimes. This was not 10 percent of violent crimes committed by admitted drug users or committed while under the influence; it was simply 10 percent of all violent crimes — again, a rather ad hoc assumption.

Harwood et al. (1998) substantially revised the algorithm for computing DAFs, in addition to using a newer inmate survey. The principal change was basing the DAFs on responses to a survey question that asked if the inmate committed the crime to get money in order to buy drugs. If yes, the crime was considered to be drug-related; if not, it wasn't. Those proportions turned out to be close to 30 percent for robbery, burglary, and larceny, in the neighborhood of 10 percent for prostitution, motor vehicle theft, and stolen goods offenses, and 2-5 percent for assaults of various kinds.

Harwood et al. also treated homicides separately, using detailed data compiled by the FBI. Of homicides in which circumstances were known, 15.8 percent listed drugs, juvenile gangs, and/or gangland killings as relevant

circumstances. Harwood et al. used that proportion as the DAF for all homicides, which was viewed as conservative inasmuch as circumstances were more likely to be unknown for street crime than for, say, domestic violence or love triangles that led to a homicide.

ONDCP (2001, 2004) used Harwood et al.'s DAFs, but NDIC (2011) updated them. NDIC abandoned the special treatment of homicides. Instead, the DAF for all crimes (except drug law violations) is based on inmates' response to the two survey questions:

1. "Did you commit the (governing offense) in order to get money to buy drugs?"
2. "Were you under the influence of drugs when you committed the (governing offense)?"

The DAF was set equal to the proportion reporting they committed the crime to get money to buy drugs (termed "instrumental crimes") plus 10 percent of all the others who reported being under the influence when they committed the offense.

Relative to Harwood et al. (1998), this increased the DAFs by about ten percentage points for larceny, motor vehicle theft, and stolen goods offenses, and cut it for homicide by about ten percentage points from 15.8 percent to 7.2 percent. Changes for other offenses were modest. See Table 1.1.

Table 1.1: Evolution of DAFs Over Time

	Cruze et al. (1981)	Harwood et al. (1984)	Rice et al. (1990)	Harwood et al. (1998)	ONDCP (2001,2004)	NDIC (2011)*
Homicide	-	10.0%	10.0%	15.8%	15.8%	7.2%
Agg. Assault	-	10.0%	10.0%	5.1%	5.1%	5.1%
Sex. Assault	-	10.0%	10.0%	2.4%	2.4%	3.7%
Other Assault	-	-	-	5.1%	5.1%	7.6%
Robbery	26.8%	26.8%	26.8%	27.2%	27.2%	28.0%
Burglary	22.4%	22.4%	22.4%	30.0%	30.0%	33.6%
Larceny	18.6%	18.6%	18.6%	29.6%	29.6%	39.1%
MVT	18.6%	18.6%	18.6%	6.8%	6.8%	17.7%
Stolen Goods	18.6%	18.6%	18.6%	15.1%	15.1%	27.0%
Prostitution	12.8%	12.8%	12.8%	12.8%	12.8%	12.4%
Drug Law	100%	100%	100%	100%	100%	100%

Source: Table developed by Beau Kilmer.

NDIC computed attribution factors by crime type and by inmate type (jail, state prison, and federal), but for purposes of apportioning societal costs, all were aggregated into four overall DAFs: 0.12 for violent crimes, 0.31 for property, 1.0 for drug-law violations, and 0.08 for other crimes. So, for example, NDIC multiplied its estimates of the total crime victimization costs for violent and property crimes by 0.12 and 0.31, respectively, to find the victimization costs attributable to drugs.

However, this aggregation paid no attention to the relative importance of different types of crimes, and it considered robbery to be a violent offense. So the 0.12 DAF for violent offenses is an odd amalgam. About 0.02 comes from 20 percent of inmates reporting being under the influence when they committed their violent offenses (10 percent of 20 percent is 0.02). The remaining 0.10 is an arithmetic average of very different answers for robbers and other violent offenders to the instrumentality question. About 30 percent of robbers report committing their

crime to get money to buy drugs; very few of those serving time for rape, homicide, or assault do. Since robbers account for very roughly one-third of violent crime inmates, their 30 percent averaged with the quite low rates for the others produces the 0.10 which, when added to the 0.02, gives the overall violent crime DAF of 0.12. But one should not imagine that a violent-crime DAF of 0.12 means that only 12 percent of robberies are drug-related or as many as 12 percent of rapes are.

That's it. That is the state of the art for drug-attributable fractions, at least in the U.S.

It is worth pausing to make a few observations. First, this is not rocket science. Multipliers of 10 percent and 20 percent crop up repeatedly. These are not universal constants like π , Planck's constant, or the speed of light in a vacuum. To be polite, they represent expert judgment grounded in a rich knowledge of the literature. To be cynical, they are plucked from thin air with no outstanding virtue other than their simplicity, which usefully connotes the shroud of ignorance which precludes finer estimation.

The arbitrariness of the central parameters underpinning DAFs is no secret. To its credit, NDIC (2011, p.8) readily acknowledges that "There appear to be no research-based findings that might justify our selection of a probability here, and so we choose to err conservatively by assuming that the proportion of related offenses that are drug induced is 0.10. This is an area where additional research effort is warranted."

Second, while the modern DAFs are probably improvements on those from a generation ago, the rate of technological advance would not thrill computer scientists or molecular biologists.

Third, the *conception* of DAFs is heavily influenced by practicalities concerning measurement. That is not healthy. Practicalities can reasonably constrain estimation, but they should not limit understanding or interpretation.

We next briefly discuss some “technical” ways DAFs might be improved before returning to conceptual issues concerning their interpretation.

Opportunities for Improving Conventional DAFs

Add or broaden questions

Given the great interest in estimating the amount of crime that is drug-attributable, it is astonishing that the DAFs are based entirely on responses to just two questions. One can think of other relevant questions. In Canada arrestees are asked: “Do you think you still would have committed this crime if you had not been drinking and/or using drugs?” (Pernanen et al., 2002). Australia asks inmates how many of their offences were drug-related, with possible responses including all, most, about half, some, or none (Collins and Lapsley, 2006). Those variants are not necessarily better, but there is no compelling reason not to be willing to ask them in addition to the one now included in U.S. inmate surveys. Since authorities already pay the cost of conducting the surveys, merely adding additional questions could yield valuable data at minimal cost.

The survey could also ask circumstance-specific questions. There has at times been great concern about “date-rape drugs” (Fitzgerald and Riley, 2000). There is no reason to think that the current questions would detect such crimes; the perpetrator is not doing them to get money, and with date-rape drugs the intoxication pertains to the victim not the perpetrator. So why not ask rapists a different set of drugs-crime questions than we ask burglars?

Victims’ intoxication could play a role in other crimes as well. People who are drunk or “nodding” on heroin might be easy marks for pick pockets, and in barroom brawls, it is not necessarily only the arrestee whose intoxication contributes to the escalation to violence. So it might be sensible to factor in responses to a question about the victim’s intoxication.

The current questions might also be usefully broadened. Psychopharmacological crimes are generally construed as including not only the effects of intoxication but also instances in which the offender’s actions are affected by *withdrawal* (Goldstein, 1985), something that could be addressed with an additional or reworded question. Likewise, the current inmate survey question asks if the crime was committed to get *money* for drugs. Robbers and burglars who swap or barter stolen goods in return for drugs are not counted. Neither are pharmacy break-ins, or other direct thefts of drugs.

Recognize that inmates might lie

A moderately large literature developed in the 1980s and 1990s seeking to understand by how much survey respondents under-report their drug use (E.g.,

Darke, 1998). Comparisons of self-report to urinalysis tests are routine for arrestees, and special studies have been done for the household population in which survey respondents were asked to contribute urine samples (Harrison et al., 2007). Based on this literature, survey-based estimates of drug-prevalence are routinely bumped up by some factor; e.g., Kilmer et al. (2011) assumed that marijuana use is under-reported in the household population by 20 percent.

It is not clear *a priori* that inmates necessarily *under-report* being under the influence or committing crimes to get money to buy drugs. Conceivably those “explanations” can seem appear exculpatory. So *over-reporting* is possible.

Nevertheless, under-reporting of substance use is the norm, even of less stigmatized intoxicants. Cook (2008) describes U.S. alcohol consumption as being under-reported in surveys by a factor of two, a rate not inconsistent with what is reported in the international literature (Gmel and Rehm, 2004).

So it is striking and perhaps a little strange that the DAF literature should be so unquestioningly trusting of the veracity of inmates’ descriptions of the circumstances of their crimes. If improving the quality of DAFs was a priority, one might wish to conduct studies comparing inmates’ responses to statements they made closer to the time of arrest, or, better, police reports, prosecutors’ statements, and case files concerning the offences for which they are incarcerated. One could also imagine studying a sample of offenders prospectively, asking them the same set of questions about reasons for their offense at various points of time to see whether

their responses are consistent over time, or whether their stories get better with each retelling.¹

Focus on new not current inmates

Prisons provide a convenient pool of identifiable and often cooperative criminals, but inmates are not at all representative of offenders. Criminals who are never arrested and convicted may have different drug use profiles than those who end up behind bars. Perhaps the burglars and robbers that practice their craft in order to buy drugs are clumsier than those whose judgment is not compromised by a determination to obtain their next fix. If so, surveys targeting only the criminals that end up incarcerated might overestimate the attribution factor for property crimes. Conversely, if drug-dependent burglars are more easily diverted into treatment or other alternatives-to-incarceration schemes, then inmate surveys might underestimate the attribution factor.

Thus, the DAFs described above are not the attributable fractions for all crimes; they are, at best, the attributable fractions of the controlling offenses for current inmates.

Current inmates differ from current offenders for a variety of reasons, including the simple passage of time. Drug use and related outcomes vary substantially over time (Caulkins, 2004), so one would expect DAFs to vary as well.

¹ We thank Henry Brownstein for raising this point that by the time inmates are asked to describe events surrounding the crimes for which they are incarcerated, they have in some sense “rehearsed” a story line many times over, and for any number of reasons their reconstructions may depart from what a video-taped recording of the crimes would reveal.

Certainly the DAF must be higher in 2012 than it was in 1962 before drug use became common. Prison inmates are describing crimes committed some years ago.

A perhaps more important issue is that inmates are a highly selected sample of offenders. Only some crimes lead to arrest. Only some arrests lead to prosecutions. Only some prosecutions produce convictions, and only some convictions result in incarceration. It is not entirely obvious whether the DAF for inmates' is larger or smaller than the true DAF for crimes overall, but the potential exists for a considerable gap.

One feasible step for closing a part of that gap would be to base the DAFs on inmates who were incarcerated within the last year, rather than on all inmates currently behind bars. Since criminals with longer sentences have more opportunities to be selected by a random sampling of the prison population than do inmates with shorter sentences, sampling from all inmates oversamples crimes, such as homicide, that produce long sentences. Since the DAF for homicide is lower than it is for income-generating crimes, this will tend to bias the DAF down. There may be other crimes — perhaps, for example, simple assault — for which the bias is in the opposite direction. Only a full analysis could determine whether the net bias is up or down, but it is a bias that would be relatively easy to remove.

A more substantial step would be to shift from inmate surveys to surveys of arrestees (e.g., through ADAM).

Elephants in the room

The last couple of pages discussed “tactical” limitations of DAFs that would be relatively easy to address. Addressing them all would leave untouched several more fundamental problems. To be blunt, the current approach to DAFs omits entirely several crucial aspects of the drugs-crime relationship. These “elephants in the room” — meaning obvious problems that no one wants to discuss — are much more serious.

Elephant #1: Missing One of the Three Tripartite Categories

Many discussions of the drugs-crime relationship use or build on Paul Goldstein’s (1985) heralded tripartite framework, which distinguishes three types of drug-related violence: psychopharmacological, economic compulsive, and systemic.²

Psychopharmacological mechanisms include diverse consequence of a person actually ingesting the substance, including intoxication and withdrawal, use by the victim as well as the perpetrator, and not just “irrational” effects (clouded judgment, hair-trigger nerves, etc.) but also intended effects (drinking to boost courage).

² Despite — or perhaps because of — the widespread acceptance of Goldstein’s tripartite framework, many scholars have critiqued and sought to improve on it. For example, they note that the three categories are not mutually exclusive, such as when an intoxicated user robs a dealer to obtain drugs. Nor are they comprehensive. There is no category that would include a brother assaulting a drug dealer in retribution for hooking his kid sister on heroin — yet, the crime is certainly drug-related. And in fact, that very event was described to an ethnographer by a street dealer who was involved in a study of crack markets whose transcripts we read. We do not dispute these observations, but such embellishments to Goldstein’s seminal work are orthogonal to the main points made here.

Economic compulsive violence includes crimes (notably robbery) committed in order to finance the purchase of expensive drugs. Note that the definition is not restricted to committing crimes to obtain *money* to buy drugs. The broader term “to finance” is used instead.

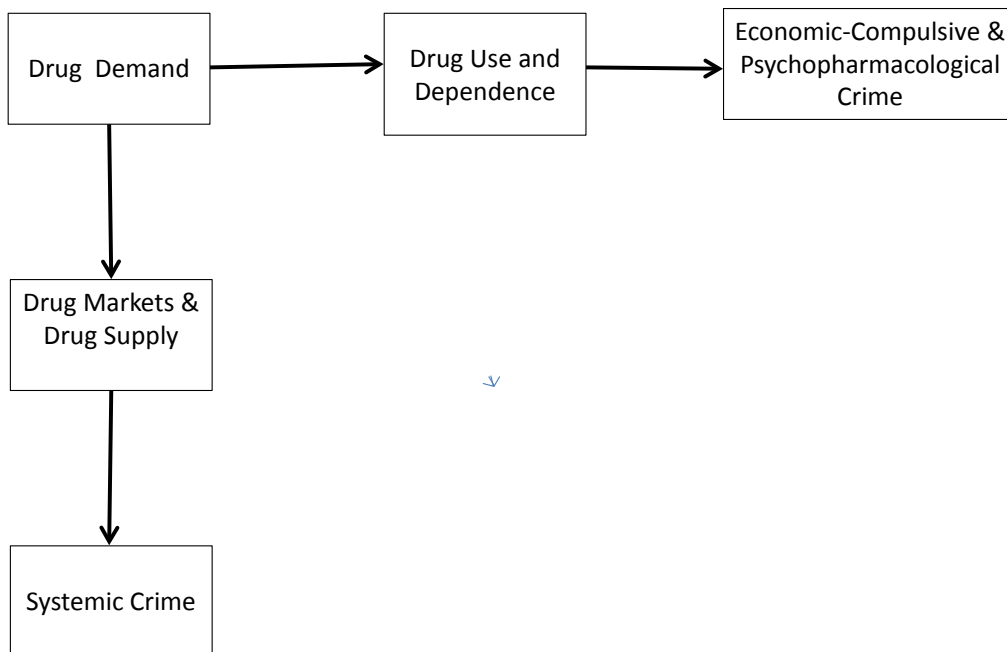
Systemic violence is stereotyped as conflicts between rival selling organizations, but also includes intra-organizational violence (e.g., punishing workers for mistakes, fighting over succession) and conflicts between sellers and customers (for debt collection or punishment for selling low quality drugs), as well as robbery of dealers and ancillary other acts (killing or intimidating witnesses).

The first and most obvious elephant is that current DAFs almost completely ignore systemic drug-related crime (“almost” not “entirely” because robbing dealers is now included). This is an enormous oversight inasmuch as a substantial proportion of drug-related violence is market-related violence, and as Frank Zimring and Gordon Hawkins (1999) have noted, crime per se is not the biggest problem in the United States; violence is.

Figure 1.1 captures the idea. The current DAFs trace the relationship across the top of the figure: Drug demand causes drug use and dependence, which in turn causes psychopharmacological and economic-compulsive crime. (And, as discussed, the DAFs are not even comprehensive in this regard. They only capture the subset of economic-compulsive crimes that involve obtaining money to buy drugs, and they consider only psychopharmacological effects that occur through the offenders’ current intoxication, not withdrawal or the victim’s intoxication.)

The DAFs completely ignore the pathways down the left side of the figure: Drug demand leads to the creation of a drug supply industry which in turn generates a variety of systemic drug-related crimes.

Figure 1.1: Pathways by Which Drug Demand Leads Directly to Goldstein's Three Types of Drug-Related Crime and Violence



Note: It is common to think of demand and supply as interacting in parallel to produce consumption (use). Indeed, it would be perfectly reasonable to add an arrow from drug supply to the box for drug use and dependence. However, we think it is appropriate to stress the arrow running from drug demand to drug supply. By and large drug suppliers do not market or promote their goods the way that legal industries do; as noted previously, the myth of a drug “pusher” pushing drugs on unsuspecting youth is just that, a myth (Kaplan, 1983). (Coomber, 2003,

notes that when dealers give “freebies” it is to maintain a relationship with existing customers, not to hook new ones.) If some demand control intervention — whether treatment, prevention, or coerced abstinence — managed to cut demand by 50 percent, then in the long run, the size of the market and the volume of drug market-related activity would also fall by pretty nearly 50 percent. In technical terms, the best understanding (admittedly on rather limited information) is that the long-run supply curve is rather flat.

Elephant #2: Ignoring Indirect Effects of Drugs

DAFs appear to have lulled the community into thinking only about temporally proximate effects of drugs on crime. Drug use, however, has many lagged and indirect effects on crime. We illustrate the idea with examples from each of the three tripartite categories.

Drug use can have psychopharmacological effects that persist long after intoxication ends. A recent and highly controversial example is Meier et al.’s (2012) finding that frequent or dependent use of cannabis as a teen appears to cause reductions in IQ when measured at follow up as an adult. Inasmuch as reduced IQ can harm prospects for legitimate employment and so increase the relative appeal of committing crime, there is a well-defined logic model through which past chronic use of marijuana could cause later crime.

A conceptually parallel and more familiar mechanism involves stimulants. Stimulant use can cause contemporaneous crime; for example, Stuart et al. (2008) found that stimulant use was associated with acts of intimate partner violence (IPV)

committed later that same day. But if stimulant-induced psychoses manifest or persist after the user is no longer intoxicated, any resulting crime could be viewed as psychopharmacological even though the user was not under the influence at the time of the crime.

For systemic violence, consider Blumstein and Cork's (1996) hypothesis concerning the diffusion of guns through youth networks. Drug sellers — including adolescent sellers — have means and incentive to arm themselves. Once they have guns, others in their social circles may wish to match their firepower. Then when armed youth argue over love triangles or who will win the NCAA tournament, fights may get resolved with bullets, not fists. Had it not been for the drug dealing, some of those conflicts would have been assaults, not homicides.

Something similar can happen on a larger scale in drug source and transshipment countries. Drug production and trafficking could increase the availability of guns to organizations like the FARC in Colombia and various Drug Trafficking Organizations (DTOs) in Mexico, and those organizations are involved in a wide range of violent activities besides drug dealing. Furthermore, the DTOs presence can undermine the effectiveness of the criminal justice system, undermining deterrence for third parties who commit routine crimes and violence.

Perhaps the biggest omission, though, concerns economic consequences of long-term use and dependence. Suppose someone used heroin for an extended time during which they were criminally active and out of the legitimate labor market. That history might render them effectively unemployable. Now suppose they stop using drugs, but still cannot obtain gainful employment, and turn to crime to get

money for food or rent. The current DAF would not count even a portion of those crimes as drug-attributable because the person is not currently using drugs.

The substantial deficiency of the reasoning becomes starkly apparent when considering the parallel situation with tobacco smoking and cancer. Suppose someone smoked cigarettes for twenty years, developed lung cancer, and quit smoking last year, but is now dying of cancer. Any health study would attribute that cancer — or more precisely something like 0.8 of that cancer—to smoking even though the person had already quit. They would never say, “Oh that is only an ex-smoker. None of her health consequences can be blamed on smoking.”

Or consider the following example, a variant of which also appears in Pacula et al. (2013):

Imagine a woman who was sexually molested as a child by an alcoholic father, expelled from high school before graduating for marijuana use, suffered permanent brain damage from a heroin overdose, was crippled when beaten for non-payment by a ruthless crack dealer, lives by a flagrant street market that has driven away all legitimate businesses, and whose resume has a ten-year gap corresponding to imprisonment for drug distribution. She steals so she can afford medicine to treat the HIV she acquired by injecting meth with a dirty needle. That theft is in no way drug-related, according to DAF, unless she happened to be high at the time – and a one-in-ten-chances coin flip happens to come up heads.

Compare that with a smoker who develops lung cancer. The affected lung is successfully removed, but only after the cancer has spread to other organs, and that metastasized cancer eventually kills the person. People calculating the smoking attributable fraction of cancer deaths would not say, “No, it wasn’t cancer of the lung that killed her, so we can’t view her death as having been attributable to smoking.”

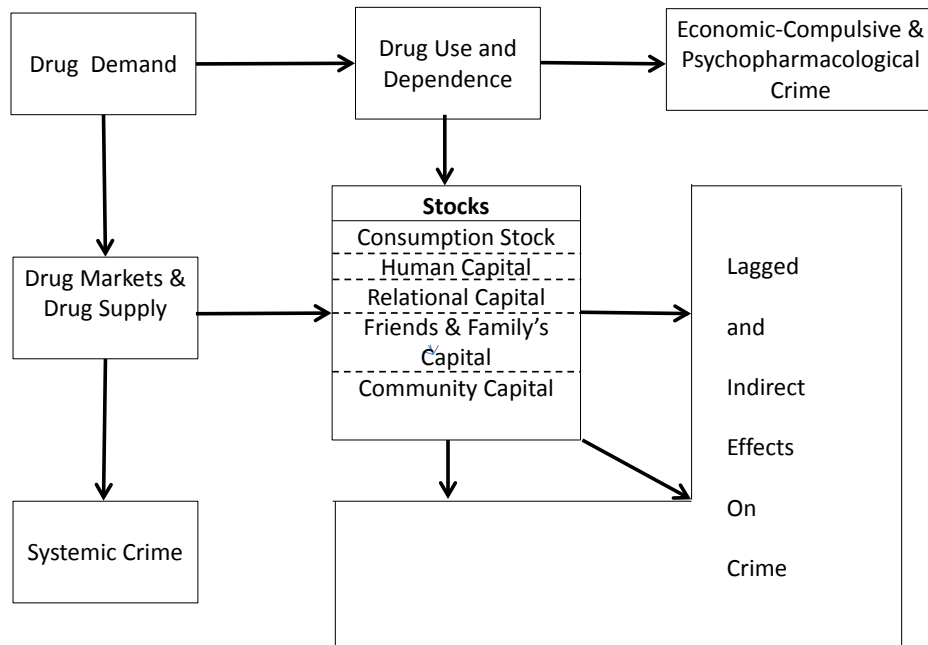
The problem may be trying to use Goldstein’s framework for something other than what it was designed to do. Goldstein’s framework starts with a crime that is known to be drug-related in a temporally proximate sense and asks, “What is the best way to characterize that drug-relatedness?” That is an entirely different exercise from looking at an offense and trying to ascertain whether drugs played some necessary role, in the sense that had the drug-activity never occurred, the crime would not have happened.

Since drug use can have broad and long-lasting effects, it can create crime through a range of indirect causes. Figure 1.2 suggests one way to think about this, namely through “stocks” of various forms of “capital” which in turn affect crime. The term “stock” in this context does not mean equities; rather, it means the current manifestation of an accumulation of prior flows, in the way that a firm’s “capital stock” is the product of its past history of investments.

The accumulated consequences of past drug use, dependence, and distribution affect crime today. We intentionally draw the box for these lagged and indirect effects on crime as large and sprawling. This is meant to convey that this diffuse range of effects may collectively be quite important. Perhaps if a careful

accounting could be achieved — which at present is not possible — they might rival in size the sum of the boxes corresponding to direct effects on crime.

Figure 1.2: Augmenting Direct with Indirect Pathways from Drug Demand to Crime and Violence



Naturally one relevant flow is drug consumption itself, and since Becker and Murphy’s seminal work (1988), economists have often thought of addiction as a consumption stock. They focus on how that stock affects the utility derived from a marginal increment in drug consumption, but it can also influence the marginal utility of other activities (Heymann, 2009), and so behaviors more generally.

We suggest, though, that effects on the user’s human capital stock may be at least as relevant for drugs-crime connections. Human capital refers to the accumulation of education, knowledge, and experience that make a person more

productive at a given task and, hence, more employable. If past drug use or drug selling makes someone un-employable, and the absence of legitimate income leads to commission of income-generating crime, that crime can be seen as caused by drugs, whether the proximate motivation was to pay for drugs or dinner.

Drug abuse can also destroy relational capital when users abuse their friends and families, either physically or “just” in terms of abusing their trust, e.g., by borrowing money and never repaying or making promises that are not kept.

Dependence can erode not only the users’ human capital, but also that of their spouses, children, or other family members. Loving someone who is struggling with addiction is not a prescription for improving concentration at work; having parents who are addicted is not a recipe for enhanced life outcomes. The child of an alcoholic, abusive parent might go on to a life of crime, perhaps ultimately because of the parent’s drug use. These damages might be substantial, as more than 10 percent of children lived with a parent who had recently abused alcohol or illicit drugs (Office of Applied Studies, 2009). That destruction is what is intended by the “Friend’s and Family Member’s Capital” box in Figure 1.2.

The last box (“Community Capital”) also refers to erosion of others’ capital, but at the collective not individual level. Drug use can adversely affect neighborhood and societal level stocks in ways that in turn promote crime. An example would be if high rates of drug use supported a flagrant, open-air drug market whose presence drove away legitimate businesses (Skogan, 1990). As a result, individuals living in that neighborhood — non-users as well as users — might have fewer legitimate work prospects and so be more likely to turn to crime.

Broken windows theory suggests that the sense of disorder created by flagrant markets can be directly criminogenic (Wilson and Kelling, 1982; Kelling and Coles, 1996; Keizer et al., 2008). Inasmuch as law enforcement depends on citizen cooperation, those markets could also undermine the effectiveness of crime-control more generally, e.g., leaving witnesses too fearful to testify, exacerbating racial tensions, or undermining citizens' confidence in the police generally.

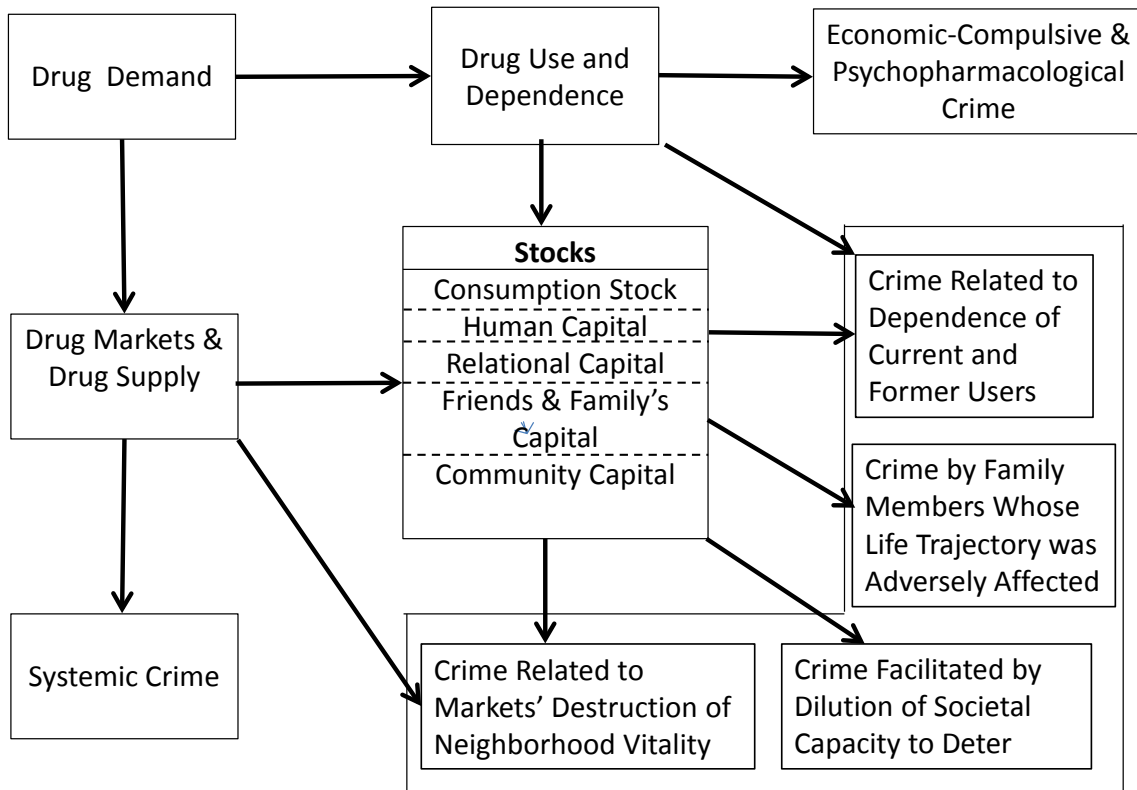
The police are most effective when they are trusted and supported by the community in various ways, including receiving tips and eye witness testimony. Drug enforcement can, in some circumstances, harm police-community relations (Maher and Dixon, 2001), and, thereby, harm crime control efforts. If street-level drug enforcement is lackadaisical, allowing flagrant drug markets to flourish, neighbors can view the police as ineffective for not having shut down the markets, or perhaps even corrupt and complicit in the operation of those markets. On the other hand, over-zealous enforcement that is pursued in an undiplomatic way can also harm police-community relations, with indiscriminate stops leading to public searches that are invasive, intrusive, and humiliating (Harris, 1997).

The relevant community can be larger than a neighborhood. The drug trade in — or more properly through — Puerto Rico contributes to the island's very high homicide rate, six times higher than the national figure, which may exacerbate the "brain drain" as some of the island's most skilled young people relocate to the mainland in search of jobs (El Nasser, 2012).

There is no standard typology for categorizing indirect and lagged effects. The literature needs another stroke of genius akin to Goldstein's (1985) tripartite

framework, but this time for describing temporally distal effects of drugs on crime. Here we identify four such categories in Figure 1.3, without claiming they are collectively exhaustive or even necessarily the four dominant forms. However, they do correspond to evocative vignettes and intuitive notions of ways that drug use can create long-run harms, including criminal offending.

Figure 1.3: Distinguishing Four Vectors Through Which Drugs Erosion of Capital Stocks Leads Indirectly to Crime and Violence



The topmost box (“Crime related to dependence of current and former users”) covers people whose long-term drug dependence left them unable to secure legal employment, so they turn to crime to finance everyday expenses, such as food

and shelter. Traditional DAFs would not count crime committed to buy food as drug-related even if they were committed by a current user who has no other source of income because of their drug use and dependence.

The box below it (“Crime by family members whose life trajectory was adversely affected”) includes intergenerational effects on the children of drug abusers. Children are hidden victims of parents’ drug dependence. The traditional DAFs might try, in theory, to capture physical abuse committed while the parent was intoxicated, although as a practical matter this form of violence does not often lead to imprisonment and so is likely under-counted in inmate surveys. But there are myriad additional mechanisms through which parental dependence can adversely affect children, including physical and emotional neglect, impoverishment, and absence of parent during incarceration. All are known risk factors for a wide range of adverse outcomes, including criminal involvement. It is thus not implausible that there are crimes that are literally caused by drug use — in the sense that the crime would not have occurred had the drug use not happened — even if the offender (the grown child of a drug dependent parent) himself or herself *never* used drugs.

The possibility that drug use can cause crime by non-users is not confined to intra-family interactions. Being the victim of violence is a risk factor for the victim committing violent offenses in the future (Shaffer and Ruback, 2002). Causality is harder to determine, since victimization and offending can be caused by common third variables, but a causal effect cannot be ruled out. To the extent that it occurs,

this dynamic provides another mechanism by which drug use can cause drug-related crime that is committed by someone other than the drug user.

The leftmost box (“Crime related to markets’ destruction of neighborhood vitality”) recognizes that the spatial concentration of flagrant retail drug distribution can turn neighborhoods into pockets of persistent and severe disadvantage. It is a reciprocal relationship. Drug markets are more likely to become established in disadvantaged neighborhoods that lack the social cohesion to resist flagrant selling. But that flagrant selling in turn drives away legitimate business and destroys community cohesion, offering bleak prospects for the remaining residents, regardless of whether those residents themselves participate directly in drug use or distribution. This effect relates to what has been studied and described as a diminished capacity for collective efficacy (Sampson et al., 1997).

The fourth box (“Crime facilitated by dilution of society’s ability to deter”) reflects societal-level effects. Rasmussen and Benson (1994) argue that aggressive drug law enforcement siphons resources away from policing and punishing other crimes, more than offsetting any direct crime suppression benefits of that drug enforcement. This is a cross-crime variant of “enforcement-swamping” (Kleiman, 1993). Rasmussen and Benson view the drug demand as fixed and blame the spillover crime promotion effects on drug enforcement. But one could instead take the drug policy as fixed and blame the drug demand for distracting law enforcement from its other valuable pursuits. Were it not for that drug demand, there would be more criminal justice resources available to control non-drug crimes.

Revised Conceptual Model: Dick Lebeau's 3-4 Defense

Goldstein's tripartite framework defines three temporally proximate mechanisms by which drug-related activity directly causes crimes: psychopharmacological, economic-compulsive, and systemic. Figure 1.3 suggests augmenting those three with four additional mechanisms through which drug use causes crime *indirectly*. These four are mediated (at least partially) through stocks, so they reflect indirect or lagged effects. Their enumeration pertains not to the motivation for the crime, but to the nature of the offender or unit of analysis: (1) the individual drug user, (2) the user's "intimates" (meaning friends and family), (3) the user's community or neighborhood, and (4) societal pathways more generally, e.g., diversion or dilution of crime control resources.

This 3-4 framework aims to prevent crimes that are actually caused by drug use from slipping through the cracks when drug-attributable crimes are counted. The four additional mechanisms catch the crimes that would otherwise have slid past a perspective dominated by Goldstein's tripartite framework.

So the drugs-crime model in Figure 1.3 is reminiscent of the 3-4 defense in the National Football League developed by Pittsburgh Steelers defensive coach Dick LeBeau. It employs three defensive linemen to guard the line of scrimmage and four linebackers who roam the field behind them. LeBeau knew that his linemen — even if he deployed four of them — could not stop every play at the line of scrimmage. So he re-allocated one of those linemen to be a linebacker to catch what the line would miss. Similarly, we suggest employing an awareness of the four indirect pathways in

order to capture the issues that slip by the three categories of Goldstein's tripartite framework.

To push the metaphor, it is as if DAFs to date have evaluated defensive performance by counting only the tackles made by linemen utterly ignoring the linebackers and, indeed, not even counting all the lineman's tackles. Current DAFs capture many but not all of the economic-compulsive and psychopharmacological pathways. We discussed above ways of improving those estimates along this axis.

However, the current DAFs generally ignore Goldstein's systemic crimes, but there is no reason why inmate surveys could not be extended to address systemic crimes. E.g., people serving time for assault or homicide could be asked questions such as, "Were you or the victim engaged in drug distribution around the time of the offense?" and/or "Did the conflict leading to the assault/murder pertain to drug production or distribution in any way?" We do not want to be Pollyanish about the precision of the resulting quantification, but it is not hard to see how one could obtain a first-order approximation; just ask the inmates, arrestees, or other population of offenders.

It is harder to imagine how one could quantify the indirect pathways even approximately. Individuals may not be self-aware as to which events altered their life course, particularly for how events in their childhood and adolescence affect the adult self. And there is truly no way any individual can know how much dysfunction in their neighborhood is attributable to past decades of drug use, or how much of today's crime it causes.

But the three-four framework suggests alternative data collection paradigms beyond inmate surveys.

For example, one might develop a count of drug-attributable “chaotic lives” — or “chaotic life years.” The rationale would be that most crime is caused by a small subset of high-rate offenders. One could look into their life history and ask whether drug-related consequences played a salient role in placing them on a dysfunctional life trajectory. Quantification and causal inference might be better done with formal longitudinal studies, but “mini-biographies” could shine light where data are darkest: outside of the criminal justice system and in the early childhood of offenders. Such studies would be expensive per person “profiled,” but making the unit of analysis the person (specifically, the high-rate offender) not the offense produces offsetting benefits.

One could then ask, “What proportion of people born into similar circumstances — but for the drug-related activity — would have ended up in a similar state of high-rate offending?” One minus that proportion would be the drug attributable fraction for chaotic or crime-prone life-years.

Presumably most people contributing to this count of drug-attributable chaotic life-years would have been drug dependent at some point, or been sharply affected by a family member’s dependence (e.g., a parent’s dependence).³ However, this count would differ from a count of the number of people who are currently dependent in two respects. Many people who are dependent lead orderly lives with little criminal involvement; indeed, such stability is one objective of opiate

³ There could be exceptions; for example if a loved one were the victim of drug-related violence (a variant on the plot of the movie *The Fisher King*).

substitution therapies (OST).⁴ Conversely there are former users whose lives are still chaotic and crime-filled even if they no longer use illegal drugs regularly — perhaps because they “traded down” to a relatively less expensive alcohol addiction.

Even if it is not realistic to quantify the four pathways through which drugs indirectly cause crime, merely articulating them has value. It reminds us that at present we have no estimate of the DAF for crime. We have a DAF for two-thirds of the front three in a 3-4 formation. They only even attempt to measure parts of the two-of-three direct mechanisms, and are altogether blind with respect to the myriad indirect pathways through which drugs cause crime. We can patch up the DAFs, improving them in various technical ways and extending them to include direct systemic drug-related violence. However, no incremental improvement to inmate-survey based methods will ever comprehend the indirect mechanisms.

In sum, we suggest thinking of drug-crime linkages in terms of a 3-4 conceptual model, with Goldstein’s (1985) traditional tripartite framework backed up by a recognition of indirect effects mediated through various stocks and manifesting via (1) the actions of current and former dependent users, (2) their friends and families, (3) neighborhoods or communities, and (4) less personal, societal level mechanisms. The first two in particular might be monitored in some fashion via new data collection strategies that focus on life course trajectories of people leading chaotic lives, specifically those that are altered for the worse by drug abuse, drug distribution, or convictions for drug-law violations.

⁴ Sometimes OST is a stepping stone toward drug-free recovery; other times the objective is simply to stabilize the patient’s life circumstances, while maintaining them indefinitely in a state of dependence on (legally prescribed) opiates.

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