

151210

C.I.

TRENDS IN HEROIN USE AMONG ARRESTEES

IN THE DRUG USE FORECASTING PROGRAM.

Bruce D. Johnson, Andrew Golub, and Mokerrom Hossain

National Development and Research Institutes, Inc.

11 Beach Street

New York, NY 10013

NCJRS

NOV 16 1994

October 1, 1992

ACQUISITIONS

Report prepared for T. Head and Company, Rockville, MD.

This research and report was primarily supported by T. Head and Company under a contract from National Institute on Drug Abuse. Additional support was provided by the National Institute of Justice (89-IJ-R-033; 1-7502-NY-IJ; 87-IJ-CX-0064), National Institute on Drug Abuse (1 R01 DA005126-03; 5 T32 DA07233-09, 1 R01 DA06615-02), and by National Development and Research Institutes.

Points of view and opinions do not necessarily reflect the position of the U.S. Government nor National Development and Research Institutes, Inc. (formerly Narcotic and Drug Research, Inc.)

151210

**U.S. Department of Justice
National Institute of Justice**

This document has been reproduced exactly as received from the person or organization originating it. Points of view or opinions stated in this document are those of the authors and do not necessarily represent the official position or policies of the National Institute of Justice.

Permission to reproduce this ~~document~~ material has been granted by

Public Domain/NLJ/NIDA
U.S. Department of Justice

to the National Criminal Justice Reference Service (NCJRS).

Further reproduction outside of the NCJRS system requires permission of the ~~document~~ owner.

TRENDS IN HEROIN USE AMONG ARRESTEES IN THE DRUG USE FORECASTING PROGRAM.

ABSTRACT

Policy makers and public health authorities are concerned about the possible impacts of greater heroin supplies, greater heroin availability, and increased purity of street heroin. This report was designed to investigate whether and how much heroin use/abuse has increased among a subpopulation at high risk for heroin abuse: persons arrested for criminal offenses.

The Drug Use Forecasting (DUF) program was specifically designed to document trends in illicit drug use among booked arrestees in several major cities. A secondary analysis was conducted with data from DUF Manhattan for 1987-91 and for 22 DUF cities combined (but unweighted) for 1988-89. The following central findings emerged:

1. Drug Use Forecasting data provide no evidence suggesting any increases or sustained upswings in heroin use among arrestees in Manhattan nor in the 22 DUF cities.
2. Drug Use Forecasting data document substantial declines in heroin use among arrestees; the nature and magnitude of these declines vary by heroin use measure, locale, and time period.
3. The DUF Manhattan findings document substantial declines in heroin use among arrestees. These declines have two parallel components: a) The proportion of arrestees detected/self-reported with any lifetime heroin use declined by 17 percent between 1987 and 1991. b) Among Manhattan arrestees reporting any lifetime heroin use, the proportions reporting heroin injection or detected as opiate positive declined by about 20 percent during 1987 to 1991. These parallel trends generated a net decline of 35 percent in heroin injection and opiate positives during this five-year period.
4. An analysis of the primary factors associated with declines in opiate positivity among DUF-Manhattan arrestees showed that a very weak "true decline" was evident when other factors were held constant. The observed decline is primarily a function of changing composition of the DUF arrestee populations by birth cohort and arrest charges, and to a lesser extent by ethnicity and primary source of income.
5. Among arrestees in the 22 DUF cities, the proportion with any reported/detected heroin use declined by 29 percent between the first half of 1988 and the second half of 1989. Yet among arrestees in these cities with some reported/detected heroin use, no reductions in heroin injection or in opiate positives was evident, perhaps slight increases occurred.
6. Heroin initiation remained relatively constant among heroin-using arrestees in Manhattan and among the 22 DUF cities, although considerable fluctuation by quarter was evident.

Overall, many important factors appear to be associated with and perhaps have brought about declines in heroin use among arrested persons. The impact of increases in supplies, availability, and purity of heroin (which may be transitory) remain to be well measured and systematically documented in the future. A variety of possible interpretations for the decline in heroin use are provided.

TRENDS IN HEROIN USE AMONG ARRESTEES IN THE DRUG USE FORECASTING PROGRAM.

Bruce D. Johnson, Andrew Golub, and Mokerrom Hossain

Introduction

In 1990-91, the Federal Drug Enforcement Administration (1991) began reporting that expanded supplies of heroin were entering the U.S.A., mainly from Asian sources. Moreover, the purity of heroin at street levels was reported to have increased substantially in several cities, including New York City.

Subsequent information from the Street Studies Unit of the New York State Division of Substance Abuse Services indicated that more persons were observed selling heroin in 1991-2 than in previous years (Frank, Galea, Simeone 1991; New York Times 1991). This report also indicated that among persons entering public drug treatment programs with heroin as a primary drug of abuse, the proportion of heroin injectors was declining.

A major concern among policy makers at both federal and state levels was that heroin may be returning as a major drug of abuse, at a time when the crack epidemic may be easing. This policy concern about heroin consists of three interrelated issues. First, greater supplies of heroin available upon the street may mean increasing numbers of and larger proportions of heroin users/abusers among drug user populations. This may, in turn, mean larger proportions of heroin abusers coming to the attention of the criminal justice system and the drug treatment systems.

Second, the availability of high purity heroin from street sellers may mean that irregular users may consume heroin via nasal inhalation ("snorting") or via vapor inhalation (heroin "smoking") and develop tolerance and physical dependency upon this opiate drug. While such heroin snorters/smokers may develop an initial dependence upon heroin and specifically intend to avoid the use of needles (due to well-grounded fears of acquiring HIV infection), they would be at high risk of becoming injectors of heroin if and when the quality of street heroin declines.

Third, a new generation of youths, especially those reaching adulthood (age 18) in the 1990s (or late 1980s) and who wish to avoid the perceived ravages of crack abuse may form a large pool of potential drug abusers who could be easily enticed to "safe" ways of using heroin. That is, if drug

sellers could convince many youths that heroin snorting and smoking were safe, and they would not contract HIV via "dangerous needles," a possible explosion in heroin addiction could occur. Another category of persons at risk for heroin use and abuse, would be the numerous crack abusers who avoided heroin during the crack era (1985-89). Additionally, individuals who may have used heroin many years ago (especially during the 1965-74 heroin era), but who gave it up because they wish to avoid injection and dependence may be enticed by the more potent heroin readily available (Johnson and Manwar 1991).

Concerned about this possible rise in heroin abuse and addiction, the Office of National Drug Control Policy asked the National Institute on Drug Abuse to commission a report analyzing heroin use trends among arrestees in the Drug Use Forecasting (DUF) program. This paper provides the results of such analyses.

Background

Each of these concerns about a new wave of heroin use and abuse is well grounded in American and world history. Heroin has been used continuously in the U.S., especially New York City, since 1900. Its popularity, however, has fluctuated over time and across regions of the U.S., as well as in other regions of the world. The senior author has written widely about marijuana, heroin, cocaine, and crack, and has recently developed a paradigm of drug eras (Johnson and Manwar 1991; Johnson and Muffler 1992; Johnson 1992), which reviews the complex history. A drug era occurs when a substance or consumption technique enters a subpopulation, increasing proportions onset to its use and regular use, and ends when the rate of onset begins to decline, plateau, or enter a steady state. In New York, four illicit drug eras have occurred: marijuana era (1964-79), heroin era (1965-74), cocaine powder era (1975-84), and crack era (1985-89). Only the heroin era, and its possible reemergence in the 1990-present time period, is addressed herein. Evidence of declines in heroin onset and current use across birth cohorts are also provided below (also see Golub, Johnson, Lewis 1992).

The Heroin Era. In the 1950s and early '60s (Malcolm X 1966; Brown 1965; Chein et al. 1965), but especially in the 1965-74 period (Boyle and Brunswick 1980; Clayton and Voss 1981; Hunt and Chambers 1976), a major epidemic of heroin use and abuse occurred in New York City and elsewhere (although with somewhat different years). Particularly among inner-city youths born

during the decade 1950-59, this "heroin era" (Johnson et al. 1990; Johnson, Manwar, Golub 1992) was marked by large proportions of inner-city youths onsetting to heroin use (particularly at ages 15-21). Typically such youths onset by "snorting" heroin, which provided a great high for a novice user. Very sizable proportions (up to 20 percent of Manhattan youths) tried heroin during 1965-74 period (Boyle and Brunswick 1980; Clayton and Voss 1981). But after they used heroin several more times, their tolerance grew and they needed much more to get high. Most progressed to "skin popping" (injecting heroin between layers of skin) and then to "mainlining" (injecting heroin directly into veins). While about half of all heroin experimenters apparently ceased or rarely used heroin after 1975, a sizable proportion became career heroin injectors and addicts (Clayton and Voss 1981; Johnson 1978; Johnson et al. 1985). Conspicuously absent during this era was the technique of heroin "smoking;" few persons would get high by smoking the highly adulterated (1-2 percent pure, almost never 10 percent pure) street heroin.

This cohort of heroin era injectors constitutes the largest pool of heroin abusers today. They have aged, so that most are in their 30s and 40s in the early 1990s. As young adults, such heroin injectors frequently shared their drugs and injecting equipment, or "rented works" at "shooting galleries" (Hanson et al. 1985; Johnson et al. 1985). As a result of such practices, such heroin injectors were among the earliest high risk groups for HIV infection. In New York City, over half of injection drug users are HIV positive (Des Jarlais et al. 1988, 1989).

Heroin Smoking. While heroin "smoking" is uncommon in America, it is a primary mode of heroin use in many Asian societies. Particularly where virtually pure heroin is available, heroin users "chase the dragon" (Hess 1965) by heating heroin until it vaporizes and then inhale the "smoke." This delivers pure heroin to the lungs where it is absorbed into the blood stream and reaches the brain as rapidly as when heroin is injected. But even in Asia, when heroin purity declines substantially, many heroin smokers begin heroin injection. In 1978-80, Britain experienced a modest epidemic of heroin smoking. Subsequently, many became heroin injectors in the 1980s (Parker, Bakx, Newcombe, 1988; Pearson 1987). The general lesson from history is that when and if heroin purity is high, heroin initiators are attracted to snorting or smoking heroin. But as their tolerance to opiates grows and/or when heroin purity become low, regular heroin snorters or smokers are at increased risk of heroin injection.

Age of Heroin Onset. A great deal has been learned about the epidemiology of drug use and abuse in the past 20 years. Almost all persons who onset to heroin have previously used other drugs (especially alcohol, marijuana, and cocaine powder). If heroin onset occurs, it typically occurs between ages 15-25; very few persons initiate heroin use after age 25 (Brunswick 1979).

Epidemiological studies based upon household and high school senior surveys document that heroin use is very rare; generally less than 2 percent in the general household and high school senior population report ever using heroin and less than 0.5 percent use heroin monthly or more often (NIDA 1991; Johnston, O'Malley, Bachman 1991).

Among criminal justice and drug treatment populations, however, heroin use and abuse is far more common. Generally 20 percent or more of arrestees self-report heroin use, and a majority of drug treatment admissions report heroin abuse at admission (Wish and Gropper 1990; Tims and Ludford 1984; Anglin and Hser 1990), although extensive variation by jurisdiction, agency, and time period is evident.

Thus, policy makers and public health officials are eager to prevent and intervene at the earliest phases of a "new" or "renewed" heroin epidemic (if it is occurring), so that a sizable proportion of youths and even older drug abusers do not become seriously involved in heroin abuse in the future. This report focuses upon trends in heroin use among a subpopulation at high risk for new patterns of heroin and illicit drug use: specifically persons who engage in behaviors defined as criminal. Analyses focus upon those arrested for felony or misdemeanor crimes and at entry to the criminal justice system as reported in the Drug Use Forecasting program in 22 American cities.

In the following sections, the strengths and limitations of the Drug Use Forecasting program are provided, followed by findings about the main trends for DUF-Manhattan and 22 DUF cities. Then a subsequent analysis of DUF-Manhattan changes are more intensively analyzed to ascertain the primary factors influencing trends in current heroin use. The concluding section provides a variety of conclusions and interpretations.

Hypotheses

This report addresses three key null hypotheses about heroin use trends among arrestees which it will systematically attempt to disprove:

Hypothesis 1: Trends in heroin use have remained constant from 1987 to 1991.

Hypothesis 2: The proportion of heroin users who inject has remained constant from 1987-1991.

Hypothesis 3: Heroin onset has remained constant from 1987-1991.

Hypothesis 4: Current heroin abuse patterns show no change, 1987-91, especially after controlling for several important factors associated with variation in DUF sample composition over this period.

Evidence for a new epidemic of heroin use/abuse would lead to the rejection of each of these hypotheses. These hypotheses would also be rejected if heroin use/abuse is declining or shifting downward.

Description of the Drug Use Forecasting Program.

The DUF program was designed by the National Institute of Justice (NIJ) to measure trends in illicit drug use among booked arrestees in selected jurisdictions. In each city, trained interviewers conduct voluntary, confidential, and anonymous interviews for 10-15 consecutive days at the facility where arrestees are booked (e.g. the arresting officer completes documentation, the initial arrest charges are formally entered into criminal justice processing, the person is fingerprinted, and pretrial interviews are conducted). A standard interview schedule developed by NIJ is administered to arrestees by a trained interviewer in as private a location as possible. At the end of the interview, the interviewer requests the subject to provide a urine specimen. Some jurisdictions provide an incentive such as cigarettes or candy, while others offer no such incentive to participate.

The DUF staff approach enough arrestees each quarter so that 225-250 males and 100 females complete the interview and provide a urine specimen. Consistently, 80-95 percent or more of all persons approached give their consent, complete the interview, and provide sufficient urine for urinalysis. The DUF coordinator in each city carefully edits all of the completed interview schedule and sends them to Aspen Systems (the contractor for NIJ) which subsequently edits and enters all interview information into a database.

All urine specimens, labeled with the same code number as the interview schedule, are sent to Pharm Chem (the DUF urinalysis contractor). Pharm Chem completes an EMIT (Enzyme immunoassay test) test for 10 different drugs (cocaine, opiates (heroin), marijuana, PCP, amphetamines, barbiturates, benzodiazepines, propoxyphene, methadone, and methaqualone). The EMIT urine test is quite accurate in detecting illicit drug use (Visher 1991), with near zero false

positives, and about 20 percent false negatives (a function of the cutting point chosen by the manufacturer). The urinalysis results are forwarded to Aspen and merged with the interview data. Data from each quarter are forwarded to the program director at each site. About two years later, the data for all sites are provided to a third contractor, Sociometrics Corporation, which cleans and prepares a standard public release data set for all cities, or for selected cities.

DUF data are very robust for conducting analysis of trends in illicit drug use within a jurisdiction. Since its inception, DUF interview procedures have been standard every quarter. The same sample sizes (about 350 subjects) have been obtained in each city, the same organizations have conducted the interviews, the instructions for selection of subjects have remained similar, and high participation rates are the rule. The DUF data provides comparable samples of arrestees quarterly and is therefore well suited for studies of time trends in drug use, both via urinalysis and self-reports.

Design of Respondent Selection.

At its inception DUF was explicitly designed to address trends with a given jurisdiction; a "statistically representative" or random sample of arrestees was not planned. Rather, the 24 DUF cities participating in 1992 were selected so as to include most large cities over a million population, as well as many smaller cities representing all regions of the U.S. These cities were not selected as part of a representative sample of cities or the USA as a whole. Note: Only 22 cities participated in DUF by 12/89 and were included in the analysis for this report.

Chaiken, Chaiken, Cavanagh (1991) provides extensive documentation about how closely the DUF samples approximate a representative sample of arrestees in selected jurisdictions (although this has not been documented for every participating jurisdiction). Three general findings seem clear: 1) The characteristics of DUF samples are very similar to all booked arrestees during that same time period. When small differences emerge, police procedures which keep arrestees away from the facility where DUF interviewers are located--rather than the selection procedures by DUF interviewers at the facility--account for many discrepancies. 2) DUF selection procedures recommend undersampling persons arrested on drug charges, but selection of all felony and many misdemeanor charges; these selection rules probably result in drug use rates which are somewhat lower than might be the case in a true random sample. 3) Jurisdictions may exhibit some variation in interpretation and compliance with DUF procedures. Such variations generally involve police/court decisions about the inclusion or exclusion of persons arrested on common misdemeanor charges (e.g. prostitution,

vagrancy, DWI, etc.), not felonies and drug sale crimes. Despite such inconsistencies, DUF samples appear to be quite representative of booked arrestees coming to the specific booking centers where DUF interviewing takes place. Future analyses by the Chaikens will contain many complex statistical and other adjustments for geographic coverage of booking facilities, distribution of arrest charges, offense characteristics, booking procedures, and other factors. This would permit combining Drug Use Forecasting data after assigning appropriate weights to reflect the volume of arrests in the participating booking facilities.

In order to have sufficient samples of female offenders for sex-specific analyses, NIJ requires 100 female interviews/quarter for most sites. Thus, females are overrepresented in DUF (about 25 percent of all subjects) when compared with the general arrest population (about 10-15 percent of all arrestees are female). In the main analysis below, male and female DUF samples are combined. Prior analyses of DUF data suggest that female arrestees may have somewhat higher levels of opiate positive urines than males (Wish, Brady, Cuadrado, Alvarado 1985; Wish and Gropper 1990), although considerable variability is evident by city in sex differences for various drugs.

Secondary analyses of DUF data.

This report presents a secondary analysis of the DUF data. The senior author is the director of the DUF-Manhattan program and receives quarterly DUF data about 3 months after data collection. DUF-Manhattan data begin in the second quarter of 1987 (henceforth abbreviated 2Q87) through 3Q91. This provides nearly a five year period, 1987-91, for Manhattan only. Due to the absence of a contract, no data were available for 3Q88. Women were not interviewed in the initial waves in 2Q87 & 3Q87. In 4Q90, the booking of female offenders was changed from the Police Department to Corrections; staff were unable to gain access and conduct interviews for this quarter. Across 17 quarters of data, over 5,600 booked arrestees were interviewed for DUF-Manhattan.

Public release data sets were obtained from Sociometrics. This data set contains data for 22 cities which had one or more quarters in the DUF program by 4Q89. This provides a short-term trend (8 quarters). The 1990 and 1991 data were not made available for public release by NIJ. Especially during 1988, many new cities were being added to the DUF program, and so do not

provide a full 8 quarters of data during these two years. Many smaller cities added during this period lack a substantial heroin problem and may contribute to the apparent "declines" in heroin use reported in the main report. DUF Manhattan data for these quarters are included in figures for the 22 cities.

The trends in heroin use reported for the 22 cities combined must be viewed with healthy skepticism. The DUF subject selection strategy results in approximately equal numbers of DUF arrestees being interviewed each quarter, so small cities like Seattle, Birmingham, and Indianapolis contribute as many cases as major cities like New York, Chicago, and Los Angeles. No efforts are made here to weight for different volumes of arrests, city size, or varied police booking procedures. The likelihood is high that arrestees in different cities have their own unique patterns and trends (some may have small increases, others large decreases, others consistently low (under 5 percent) rates of heroin use). When these different trends are combined without weighting, the overall level of heroin use is shown to decline. These trends among the 22 cities clearly necessitate reanalysis to statistically control (such as those being done by Jan Chaiken) for volume of arrest and other factors in each city, and is beyond the scope of this report.

Since sample sizes are so large (350 cases/quarter) and about 1000 (or more) annually in DUF-Manhattan and the 22 DUF cities, changes of 2-3 percent in heroin use rates would be statistically significant. The analyses below, however, focus upon changes that are more substantial than would be needed to meet the minimal criteria of statistical significance.

Demographics Characteristics

[Table 1 about here.]

Table 1 compares the demographic characteristics of persons in DUF-Manhattan (1987-91) and 22 DUF sites (1988-89). DUF selection strategies set sex ratios so that three-quarters are male and a quarter female. The distributions of ages and birth cohorts are virtually identical, with about two-thirds being 30 or younger at interview.

While the proportion of black arrestees in Manhattan and 22 cities is virtually identical (55 percent), Hispanics constitute about 30 percent of arrestees in DUF-Manhattan, but only 15 percent in the 22 cities. This reflects the large Hispanic population in Manhattan.

Table 1. Demographic Characteristics of DUF Samples from Manhattan and All National Sites

Characteristic		DUF Manhattan 1987-91	22 DUF Cities* 1988-89
Base Ns:		5,647	35,810
Sex:	Male	76	75
	Females	24	25
Age:	15-20	15	17
	21-25	24	25
	26-30	24	23
	31-35	17	16
	36 & older	20	18
Ethnicity:	Black	54	55
	White	12	29
	Hispanic	31	15
Education:	< High School	44	39
	H.S. Grad/GED	31	34
	Some college	21	25
	In school	4	2
Marital	Single/Never Married	66	58
	Married/Common Law	22	24
	Separated/Divorced	12	18
	Widowed		
Employed:	Unemployed	56	46
	Odd jobs/parttime	17	26
	Full time	27	28
Year of interview:	1987	13	
	1988	21	39
	1989	24	61
	1990	24	
	1991	19	
Year of Birth	Before 1945	6	6
	1945-1954	17	17
	1955-1964	44	43
	1965-1970	26	30
	After 1970	8	4

* Includes Manhattan, plus 21 other cities in DUF in 1988 or 1989

DUF-Manhattan subjects were some what more likely to be high school dropouts (44 percent vs. 39 percent) and less likely to have some college (21 versus 25 percent) than DUF subjects in 22 cities. While DUF-Manhattan subjects were about as likely to report being married (or common law) as in the 22 cities, a higher proportion (66 percent) of DUF-Manhattan subjects reported never being married than those in the 22 cities (58 percent). Likewise, DUF-Manhattan subjects report equivalent rates of full time employment (both above a quarter), but are more likely (56 versus 46 percent) to report being unemployed than subjects in the 22 cities.

Overall, the characteristics of the DUF samples in Manhattan and the 22 DUF cities were very similar to each other. Moreover, these characteristics are very similar to arrestees in Manhattan (Lewis, Johnson, Dunlap, and Golub 1992) and in national arrest data bases (FBI 1991).

While not a random or systematic probability sample of booked arrestees, these DUF samples appear very similar demographically and are probably quite representative of the populations of arrestees from which they were selected.

Construction of major heroin use variables.

This paper examines how heroin use has varied from 1987 to 1991 on a quarterly and annual basis and includes multiple indicators drawn from the standard DUF interview schedule:

- 1) Urinalysis results. EMIT results which were opiate positive generally provide physiological evidence of recent (past 24-48 hours) heroin or other opiate consumption. Opiate negative results, however, do not not indicate that arrestees have never used opiates because they may self-report some lifetime use or have not used heroin recently.
- 2) Self-reports of heroin use. Several items asked subjects whether they had ever used heroin or 'black tar' heroin (available in some West Coast cities) in their lifetime. If they reported any lifetime heroin use, additional followup questions were asked about use in the past 30 days, past 72 hours, frequency of use in past 30 days, age of first heroin use, dependence on heroin, and age of first use and first dependence on heroin.
- 3) Self-reported injection of drugs. Subjects were asked if they had ever injected drugs, and whether they had injected heroin, cocaine, and amphetamines. They were also asked if they shared needles with others and how AIDS had affected their needle sharing practices.

The DUF interview schedule does not ask questions about techniques of heroin consumption (although it contains a detailed question about techniques of cocaine consumption). While heroin injection is measured directly, subjects are not asked directly if they snort and/or smoke heroin. Thus, changes in heroin use techniques can only be measured indirectly as "not a heroin injector," without specifying whether such use was by snorting or smoking.

Heroin User Typology.

Using 21 different items containing information about heroin use, a typology of heroin use/abuse was constructed as defined below. The objective was to define DUF arrestees into extreme categories, as true "nonusers" of heroin, to hard-core injectors (e.g. as speedballers) as well as into several intermediate categories which could be subsequently combined. In developing this typology, persons with opiate positive results were separated from opiate negative persons.

URINE OPIATE POSITIVE

1. Hardcore speedballer: Arrestee tested positive for opiates AND reported heroin and cocaine injection within the past month AND reported weekly or daily heroin use during the past 30 days and/or dependency upon heroin.
2. Heroin injector: Arrestee tested positive for opiates AND reported ever injecting heroin, but may not report heroin use in the past 30 days or claimed less than weekly use in the past 30 days.
3. Heroin user, denies injection: Arrestee tested positive for opiates AND reported no lifetime injection of heroin BUT reported lifetime use of heroin (this may include use in the past 30 days).
4. Denies heroin use: Arrestee tested positive for opiates AND self-reported no lifetime injection and no lifetime use of heroin.

URINE OPIATE NEGATIVE

5. Current heroin injector: Arrestee tested negative for opiates AND self-reported any heroin injection AND reported several days of heroin use during the past 30 days.
6. Not current heroin injector/user: Arrestee tested negative for opiates AND self-reported heroin injection and/or heroin use, BUT denies heroin use during the past 30 days.

7. Noninjector heroin user: Arrestee tested negative for opiates AND self-reported some lifetime heroin use, BUT reported no injection of heroin.
8. Heroin nonuser: Arrestee tested negative for opiates AND was not "yes" on any questions¹ about lifetime heroin use or dependence AND reported no lifetime injection of heroin. These were true nonusers of heroin, as closely as could be measured in this data set.

Persons with some heroin use, but with missing information were classified as best as possible. For example, persons who reported heroin use and injection, but were missing information about cocaine injection or missing data about their frequency in the past 30 days were classified into category 2 if they were opiate positive, and category 6 if opiate negative. These Heroin User categories were summed into three major dependent variables analyzed below:

- . Any Heroin Use (reported/detected): This included categories 1-7 above, and consisted of persons who have at least one indicator suggesting that they had used heroin in their lifetimes or they were detected as opiate positive at arrest. Almost all heroin users self-reported some heroin use/injection; less than 15 percent were detected only by their opiate positive results (e.g. were classified in category 4 above).
- . Opiate positive: The proportion who were opiate positive (categories 1-4). This is equivalent to information routinely provided in the DUF reports (NJ 1991). This measure provided physiological evidence of heroin/opiate use in the past 24-48 hours. This is the primary evidence used that the person is a "very current heroin user."
- . Any Heroin injection (reported): Persons report some lifetime injection of heroin (categories 1+2+5+6 above).

¹Subjects were asked about a series of illicit drugs. If they answered "yes," this was recorded as "yes;" followup questions were asked (about recency, frequency, age of onset). If they answered "no" for a specific drug, this denial was not specifically recorded as "no;" if he/she did not respond or refused to answer, this was not recorded. Thus, a "no," "refused," or "no response" were placed into a "not yes" category for all drugs. If the subject refused to answer the entire drug grid, questionnaires were removed (and would be excluded from the data analyzed here).

The detailed data for these dependent variables of heroin use and the Heroin User Typology are provided in the Appended Tables A1 and A3.

Year of Heroin Onset.

Persons who self-reported any lifetime heroin use were asked for their age of first heroin use. This was added to their year of birth to provide a year of heroin onset as reported in Appended Tables A2 and A4. Persons were classified according the general drug era (Johnson, Manwar, Golub 1992) in which they first used heroin:

- k1. Pre-heroin era onset: heroin onset prior to 1965.
2. Heroin era onset: heroin onset in 1965-1974.
3. Intermediate heroin onset (during the cocaine era): heroin onset was reported in 1975-84.
4. Recent heroin onset (during the crack era): heroin onset was reported in 1985 to two years prior to interview.
5. Heroin Initiators: heroin onset in the past two years (a one year window was found to have too few cases for analytic use).
6. Some heroin use, no onset year: person reported some lifetime heroin use, but denied an age of heroin onset, did not provide an age of onset, or gave inconsistent onset age (e.g. the computed year of onset was greater than year of interview).

FINDINGS ABOUT HEROIN USE TRENDS

No Heroin Use Increases.

The central finding presented in all graphs (and detailed tables in Appendix A) presented below support one unambiguous conclusion:

The Drug Use Forecasting data provide no evidence for an increase nor for a sustained upswing in heroin use or abuse, either in Manhattan (during 1987-91) or for the 22 cities (during 1988-89).

While small increases in heroin use are occasionally evident when examining quarter-by-quarter results, these increases are generally balanced by a decrease in heroin use in either the preceding or subsequent quarters. Some possible interpretations about the lack of increase in heroin use are provided in the conclusions.

Note: The vast majority of persons detected as opiate positive self-reported some lifetime heroin use, but about two-thirds of all self-reported heroin users were opiate positive at interview. Thus, self-reports of heroin use are of considerable value in identifying the many arrestees who would not be detected as heroin users by urinalysis alone, or who had stopped heroin use altogether, or had not used recently.

The trends documented below suggest a gradual decline in heroin use/abuse, but the specific behavioral changes and magnitude of decline vary according to the measure of heroin use. Table 2 and 3 plus Graphs 1-4 document the major findings (See Appendix A--Tables A1-A4 for detailed data upon which the graphs are based).

Declines in heroin use and injection in DUF Manhattan.

Trends in heroin use among DUF-Manhattan arrestees are provided in Table 2 and also displayed in Graph 1 and 2. The quarterly trends are shown in Graphs 1A-1C and 2A-2C. Graph 1D and 2D show the annual trends. (Graphs 1-4 are based upon detailed data in Appended Tables A1-4).

[Table 2 and Graphs 1 & 2 about here.]

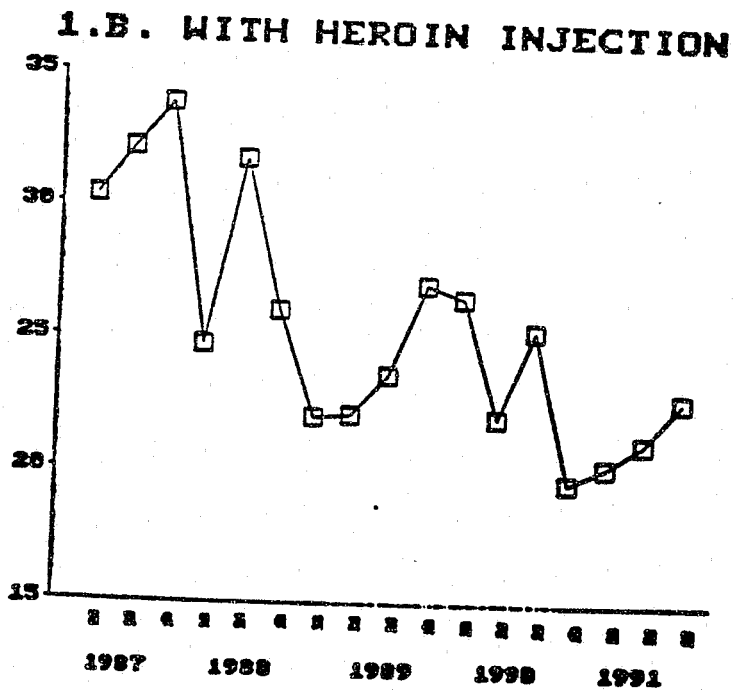
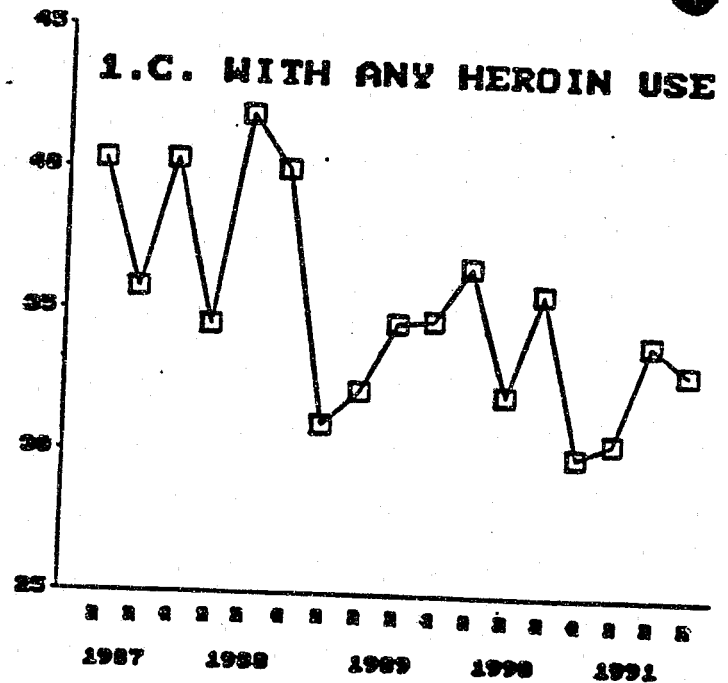
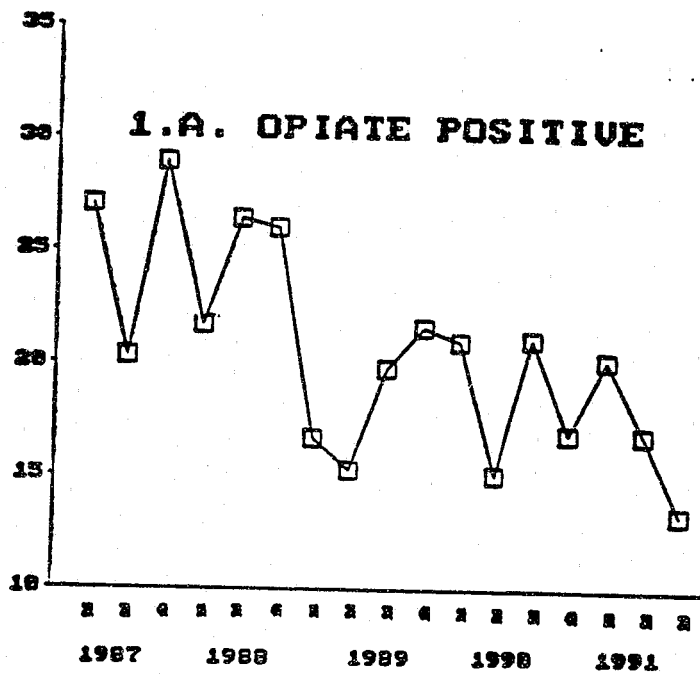
Substantial declines occurred in the proportion of Manhattan arrestees detected or who self-reported any heroin use. Almost two-fifths in 1987-88, and a third in 1989-91 of Manhattan arrestees had any heroin use reported or detected. This was a 17 percent decline in any (self-reported or detected) heroin use among arrestees between 1987 and 1991. The proportion of DUF-Manhattan arrestees who reported any lifetime heroin injection also declined from 32 percent in 1987 to 24 percent in 1989-90, and to 21 percent in 1991. This represents a 34 percent decline in heroin injection reported between 1987 and 1991. In 1987-88, about a quarter of all DUF-Manhattan arrestees tested positive for opiates; this figure was under 20 percent in 1989-90, and 17 percent in 1991; this is a 35 percent decline in heroin use detected by urinalysis between 1987 and 1991.

Table 2. Decline in Heroin Use Among DUF Manhattan Arrestees

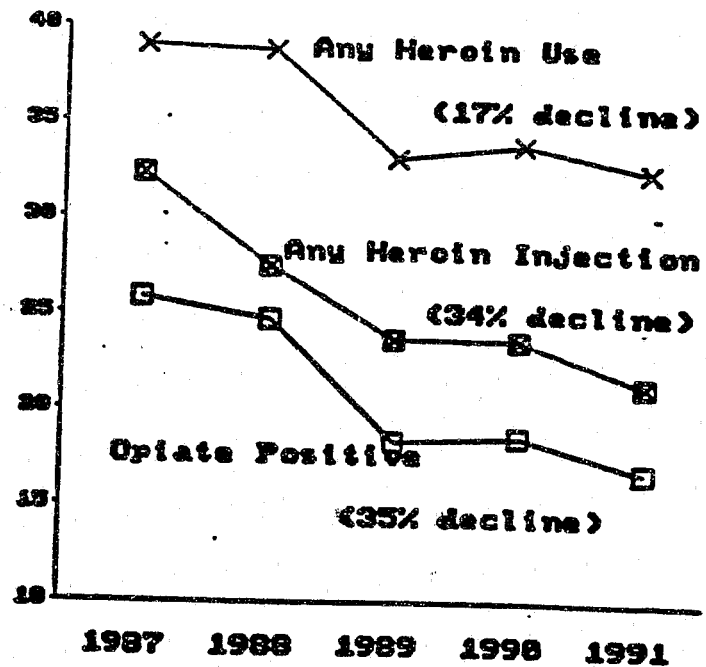
Dependent Variable(s)	Annual Percent in:		Percent change Decline (87 to 91)
	1987	1991	
Base N	728	1049	
1. Any Heroin Use (reported/detected)	39	33	17
2. Any Heroin Injection	32	21	34
3. Opiate Positive	26	17	35
Among Heroin Users: (n=)	284	340	
4. Any Heroin Injection	83	66	20
5. Opiate Positive	66	52	22
6. Heroin Initiator	6	5	NS

NS--Not significant

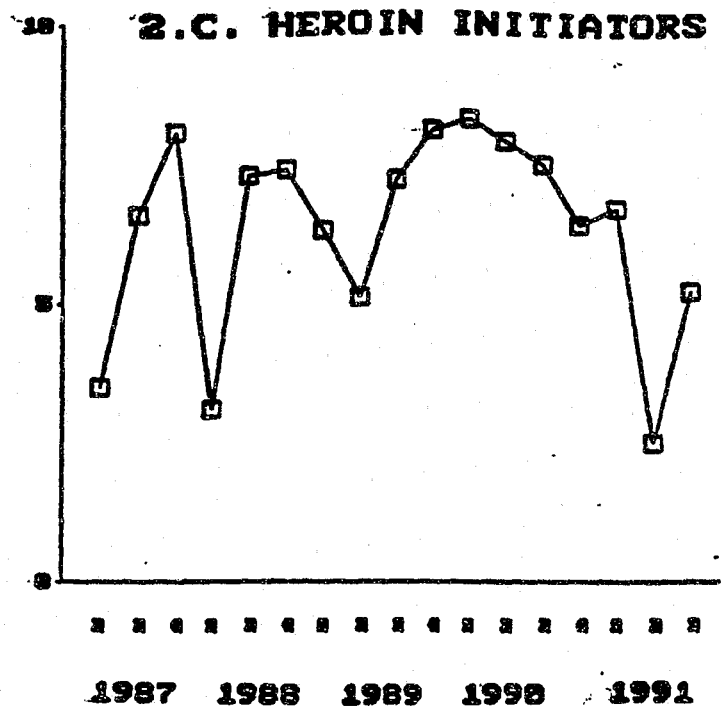
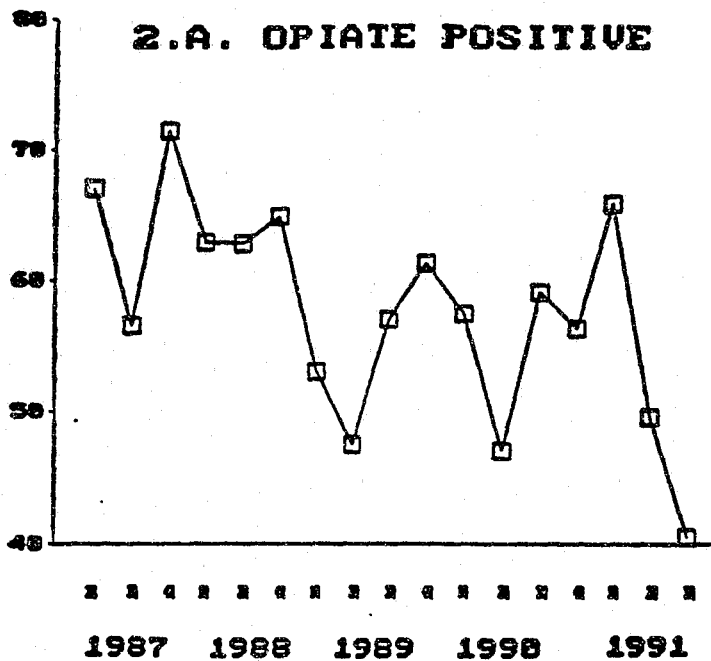
GRAPH 1. AMONG DUF-MANHATTAN ARRESTEES, PERCENT:



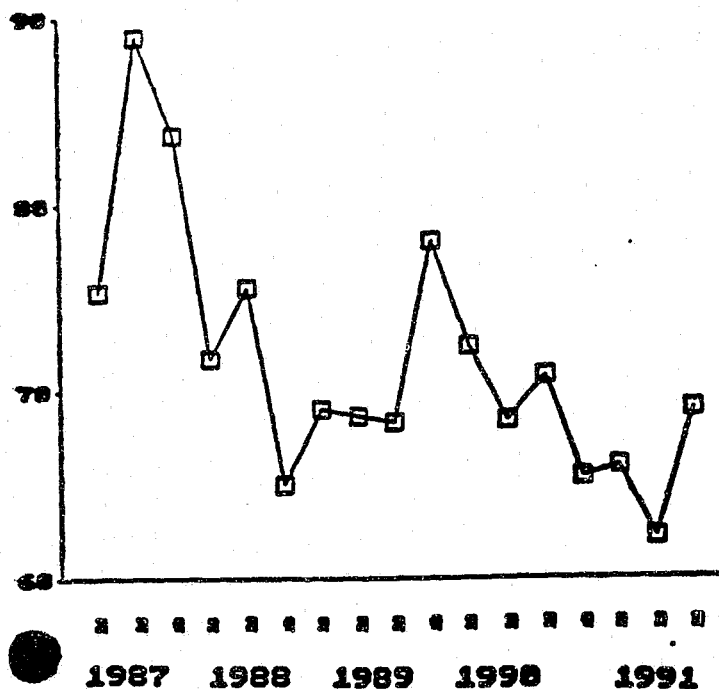
1.D. ANNUAL PERCENT:



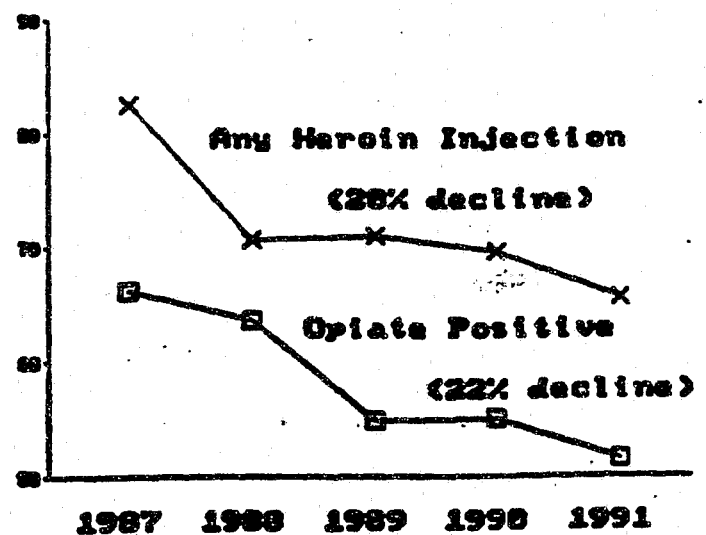
GRAPH 2. AMONG DUF MANHATTAN ARRESTEES WITH ANY HEROIN USE REPORTED/DETECTED, PERCENT:



2.B. ANY HEROIN INJECTION



2.D. ANNUAL PERCENT:



These data document a relatively sharp decline in self-reported heroin injection and current (e.g. being opiate positive) heroin use between the 1987-88 period and 1989-90 period. Whether the further smaller declines documented during 1991 in opiate positives or heroin injectors represents another significant reduction, or just a temporary dip, must await the availability of additional DUF Manhattan cycles.

An examination of each category of the heroin user typology in Appended Table A1 reveals only a few shifts among DUF Manhattan arrestees. The proportion recorded as speedballers, persons who inject cocaine and heroin mixed together, fluctuates considerable by quarter, from 7 percent (2Q90) to 15 percent (3Q90 and 4Q89), but generally within 4 percent of the grand mean (11 percent). A fairly substantial decline, from about 9 percent in 1987 to 6 percent in 1991, occurred among those who self-reported heroin injection and heroin use (but not in past 30 days) and who were opiate negative at arrest. A sharp decline from 8 percent in 1987 to 2 percent in 1991 occurred among opiate positive heroin injectors who denied current heroin use. A reduction from 7 percent in 1987 to 2 percent in 1991 occurred among persons denying all heroin use/injection, but were detected as opiate positive. Other categories (e.g. speedballers, heroin users who claim not to inject drugs) remain relatively unchanged across the five year period.

Decreases in heroin injection and opiate positives among heroin users in Manhattan.

When analyses (Table 2 and Graph 2) are restricted to the third (see Table 2) of DUF-Manhattan arrestees who were detected or self-report some heroin use in their lifetime, those reporting heroin injection decreased from 83 percent in 1987 to 70 percent in 1988-90, and then to 66 percent in 1991, a decline of 20 percent over five years. Likewise, among DUF-Manhattan heroin users, opiate positive arrestees decreased from 66 percent in 1987 to 55 percent in 1989-90, and to 52 percent in 1991, a decline of 22 percent.

As a direct result of declines in heroin injection among heroin users, the proportion reporting some heroin use (but not injection) doubled from 17 percent in 1987 to 34 percent in 1991. Whether this reflects increased heroin smoking, or only heroin snorting cannot be determined with the DUF data available.

The data (Graph 2C, Table 1, also see Table A2) shows that about 6 percent of DUF-Manhattan arrestees with any lifetime heroin use reported initiation to heroin in the prior two years. While such heroin initiation exhibits considerable fluctuation by quarter, little evidence of a substantial decline (or sustained increase) in heroin initiation among heroin users is shown for the five year period 1987-91.

Examination of the year of heroin onset (Appendix A--Table A2) shows that about two-fifths of DUF-Manhattan heroin users began such use prior to 1975, and another third during 1975-83, with little variation by quarter or year. Thus, approximately three-quarters² of heroin users had begun prior to 1984 (and 3-8 years prior to interview). Only persons who reported heroin onset during the crack era (1984-two year prior to interview) increased substantially; this probably reflects persons reaching young adulthood during this era adding heroin to their drug pattern. New heroin initiators (in past two years were relatively rare, however, and considerable variability by quarter was evident.

Declines in heroin use among 22 DUF cities.

Decreases are also shown in heroin use for the 22 DUF cities reporting by the end of 1989 (Table 3 and Graphs 3 & 4--also see Tables A3 & A4).

[Table 3 and Graphs 3 & 4 about here.]

Likewise, any heroin use reported/detected decreased from 29 percent in the first half of 1988, to 20 percent in second half of 1989, a decline of 29 percent during this period. The proportion who reported any heroin injection decreased from 21 percent in the first half of 1988 to 15 percent in second half of 1989, a decline of 26 percent. Likewise, 14 percent were detected as opiate positive in the first half of 1988, this decreased to 10 percent in the second half of 1989, a decline of 28 percent during this period.

No declines in heroin injection or opiate positives among heroin users in 22 DUF cities.

Parallel findings to those in DUF Manhattan do not emerge among heroin users for the 22 DUF cities (Table 3 and Graph 4). Among self-reported/detected heroin users in the 22 DUF cities (which include DUF Manhattan data for 88-89), about three-quarters report injecting heroin during

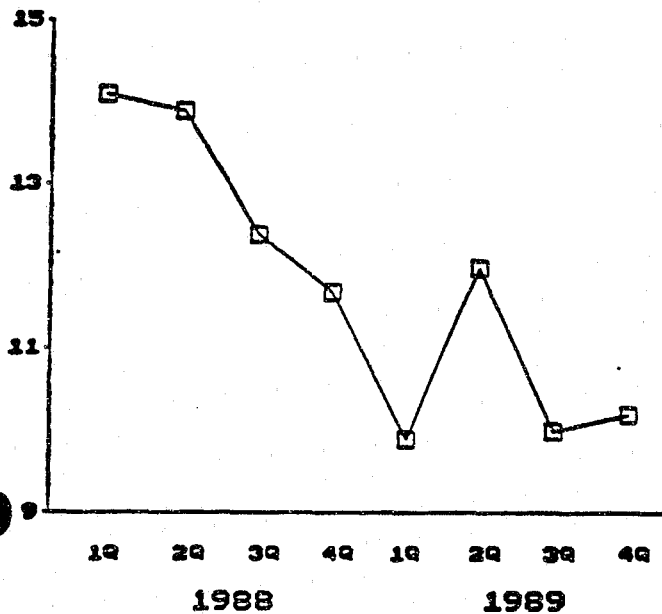
²An additional 10 percent of heroin users denied or failed to give a year of heroin initiation.

Table 3. Decline in Heroin Use Among Arrestees in 22 DUF Cities.

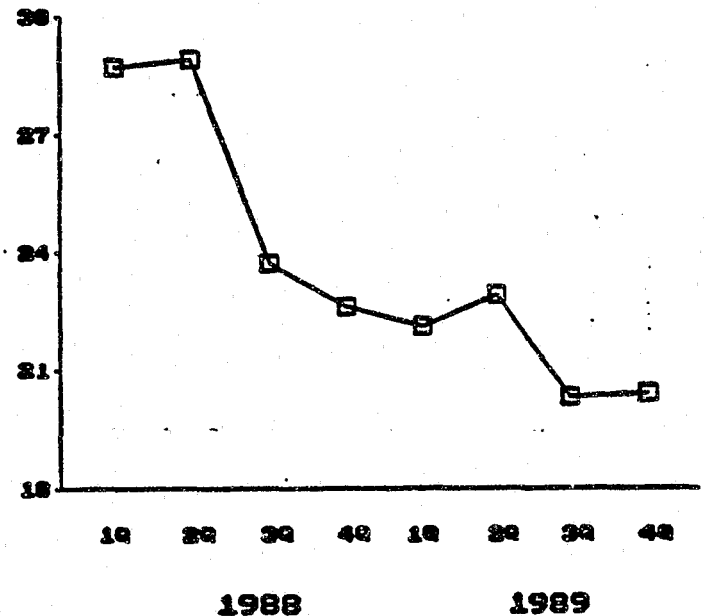
Dependent Variable(s)	Annual Percent in:		Percent change (1H88 - 2H89)
	First Half '88	Second Half '89	
Base N	6,625	12,475	
1. Any Heroin Use (reported/detected)	29	20	29
2. Any Heroin Injection	21	15	26
3. Opiate Positive	14	10	28
Among Heroin Users: (n=)	1,910	2,542	
4. Any Heroin Injection	72	76	-5
5. Opiate Positive	48	47	2
6. Heroin Initiator	8	9	-12

GRAPH 3. AMONG DUF ARRESTEES IN 22 CITIES, PERCENT:

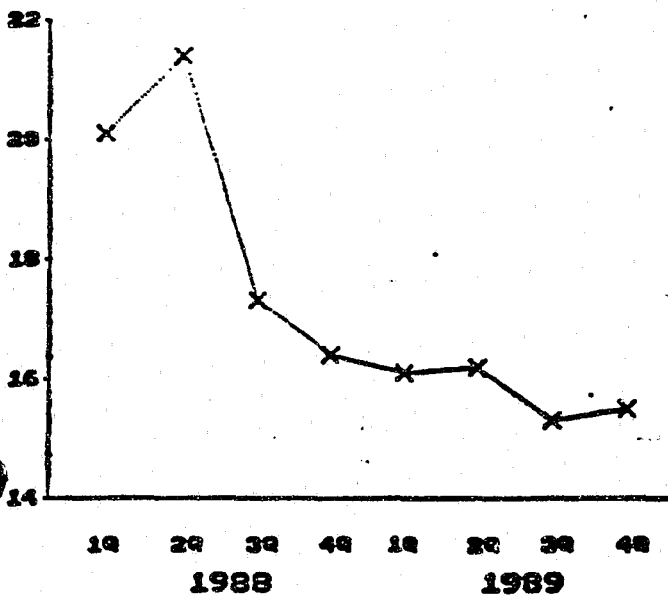
3.A. OPIATE POSITIVE



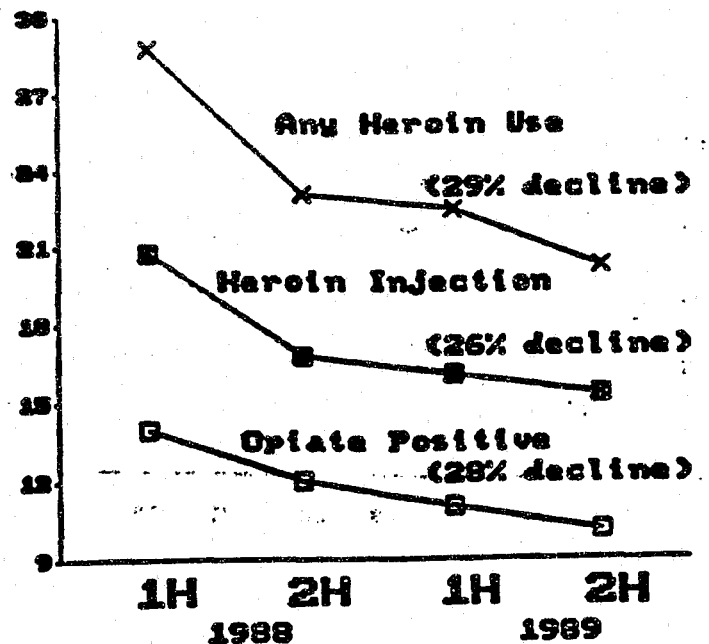
3.C. ANY HEROIN USE



3.B. ANY HEROIN INJECTION

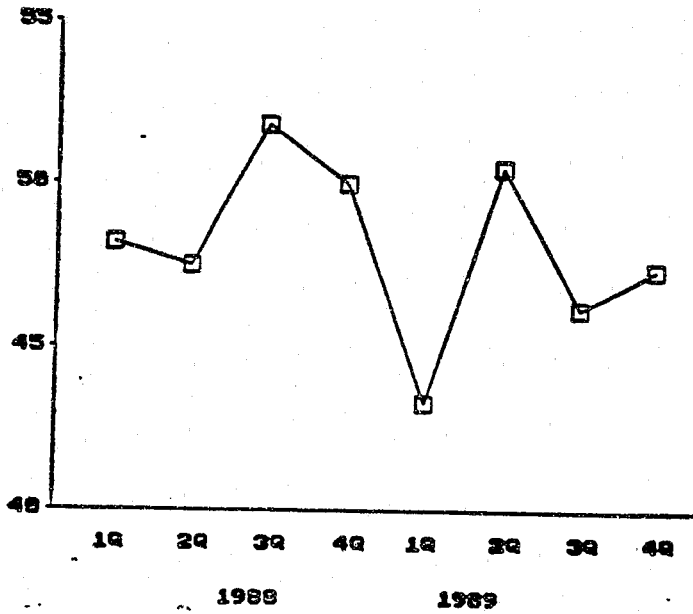


3.D. SEMIANNUAL PERCENT

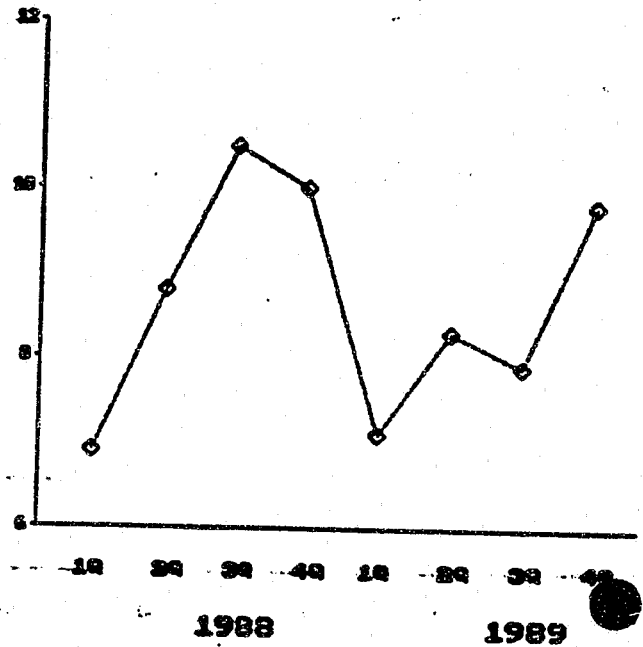


GRAPH 4. AMONG ARRESTEES IN 22 DUF CITIES WITH REPORTED/DETECTED HEROIN USE, PERCENT:

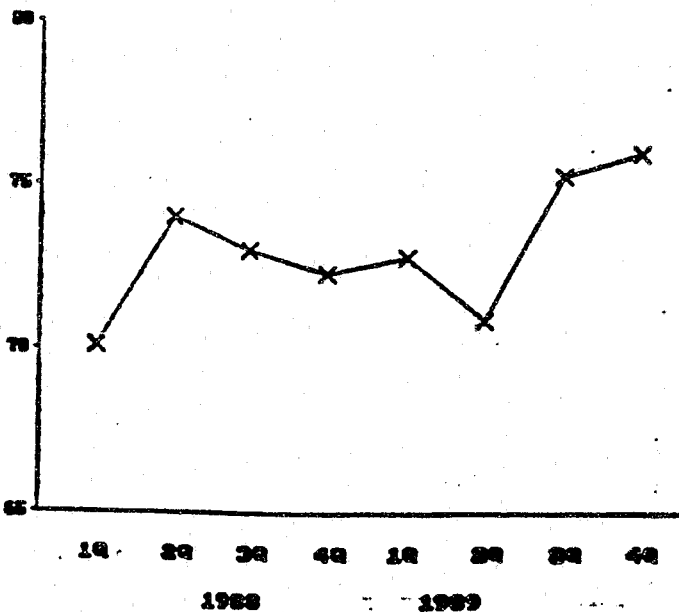
4.A. OPIATE POSITIVE



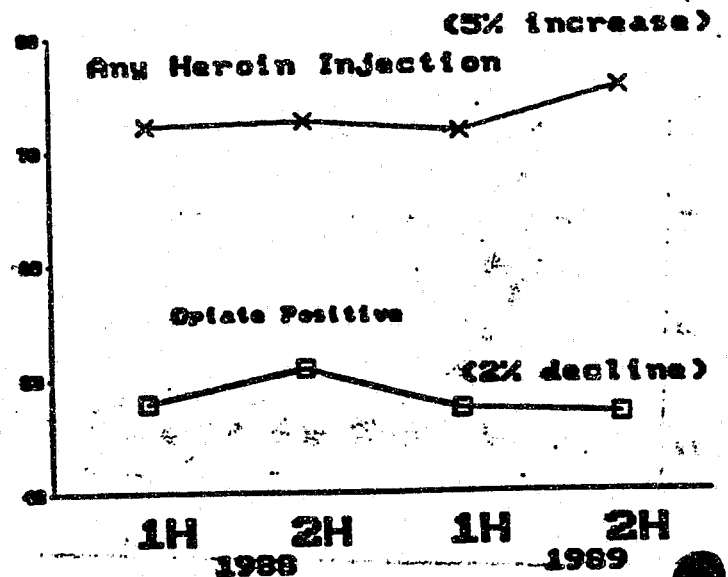
4.C. HEROIN INITIATOR



4.B. WITH HEROIN INJECTION



4.D. SEMIANNUAL PERCENT:



their lifetime, with perhaps a small increase (five percent) from 72 percent in first half 1988 to 76 percent in second half 1989 (Graph 4B & 4D). Likewise, 49 percent of the heroin users in the 22 DUF cities were detected as opiate positive at arrest (Graph 4A & 4D), a figure that remained virtually unchanged during two years. Perhaps a longer time window (including 1990 and 1991 data) would show a decline in heroin injection and opiate positives among heroin users.

Approximately 9 percent of heroin users in the 22 DUF cities reported heroin initiation during the two years prior to DUF interview, with considerable variation by quarter. But no substantial increases or decreases in heroin initiation were evident during 1988-89 period.

Heroin initiation patterns.

The data (Tables A2 and A4) shows low but variable rates of heroin initiation among arrestees in DUF-Manhattan and the 22 DUF cities. When based on the entire samples, generally less than 2 percent of DUF arrestees report initiation (first heroin use in two years prior to interview) during any given quarter. While approximately 6 percent of self-reported/detected heroin users in DUF Manhattan and 9 percent in the 22 DUF cities reported heroin initiation in a given year, no substantial increases or decreases in heroin initiation was evident.

ANALYZING THE DECLINE IN OPIATE POSITIVITY AMONG DUF-MANHATTAN ARRESTEES.

This section addresses the question: "What factors account for the declines documented above--especially declines in current heroin use as measured by being opiate positive at interview? Opiate positivity was 25.8 percent of the DUF-Manhattan sample in 1987 but 16.8 percent in 1991, a decline of 35 percent over 5 years. This analysis is limited to three major classes of factors which the Drug Use Forecasting data can address. Other factors not measured by DUF are suggested in the conclusion. These analyses are limited to the DUF-Manhattan sample and have not been reproduced for other cities.

Three major factors may account in part for the decline in opiate positivity documented above.

1. **Changing composition of DUF-Manhattan arrestee and interviewees:** "Police arrest practices and hence populations targeted for arrest may have changed over time." During this 5-year period, the NYPD instituted Tactical Narcotics Teams which made major sweeps and arrested large numbers of

crack sellers--which may have reduced somewhat the number of heroin abusers arrested.

Additionally, the procedures for DUF recruitment have changed slightly. For example, DUF has purposefully undersampled less serious offenders and persons arrested for drug felonies. A lull in drug sweeps or major roundups of pickpockets, burglars, car thieves, etc. in a given quarter could affect the percent opiate positive.

2. Changes in heroin experience of different birth cohorts. As explained at the beginning and in more detail elsewhere (Johnson, Manwar, Golub 1991; Golub, Johnson, Lewis 1992; Johnson and Muffler 1992), during the heroin era (1965-73), sizable proportions of young adults became heroin injectors, while successive cohorts may have been less apt to try heroin. These heroin era persons have died, retired, recovered, been treated, switched to crack or alcohol, or been incarcerated for long periods. Among arrested persons who have continued heroin injecting, their average age has increased so that most are in their late 30s in 1990). These factors may have reduced the proportion of heroin era persons arrested, and their heroin use may have declined. Hence, more recent DUF samples may include fewer heroin users since these older persons are forming a smaller proportion of the offending population, unless of course, heroin became popular again and more younger persons recently initiated its use.

3. An actual decline in current heroin use may have occurred. That is, independent of the other factors identified above, arrestees may be avoiding heroin and even heroin users are not using it regularly enough result in many opiate positive subjects at arrest.

To the extent that changing birth cohort membership accounts for the decline, both opiate positivity must vary substantially with birth year and the composition of the DUF-Manhattan sample by birth cohorts must vary substantially from 1987 to 1991. Similarly, to the extent that changing targets of the Manhattan police and the DUF-Manhattan program can account for decline, opiate positivity must vary substantially with any of the following individual attributes arrestees: most serious arrest charge, employment status, educational attainment, marital status, race/ethnicity, and gender. Furthermore, the composition of the DUF-Manhattan arrestees must vary with these same individual attributes over the five year period.

Changing composition of DUF-Manhattan arrestees.

[Table 4 about here.]

Table 4. Variation Over Time in Prevalence (Percent of Sample) for Covariates of Opiate Positivity

Attribute	Phi ^a	DUF Interview Year:					Average	1987-91 percent decline ^b
		87	88	89	90	91		
BIRTH COHORT	.15**							
1900-49		15.4	11.2	9.7	10.1	10.6	11.0	31
1950-54		10.9	11.7	12.0	10.9	10.7	11.3	2
1955-59		19.8	20.2	20.2	15.3	18.4	18.7	7
1960-64		26.1	26.9	25.5	25.0	23.5	25.4	10
1965-69		23.5	22.7	22.1	21.9	21.0	22.2	11
1970-77		3.8	7.1	10.3	16.2	15.7	11.2	-313
PRIMARY CHARGE	.16**							
Murder/Assault		10.2	11.4	10.8	13.9	14.4	12.2	-41
Robbery		10.9	10.6	13.0	20.7	15.6	14.5	-43
Weapons		2.2	2.7	2.3	2.6	2.8	2.5	-27
Drugs		20.2	19.4	15.3	9.7	13.9	15.2	31
Theft		25.0	24.4	26.1	25.3	24.1	25.0	4
Burglary		7.3	9.8	9.8	9.5	10.2	9.5	-40
Sex Offenses		4.7	6.4	5.5	4.4	4.3	5.1	9
Other		19.6	15.4	17.2	13.8	14.7	15.9	25
RACE/ETHNICITY	.08**							
Black		56.5	59.3	61.1	53.1	54.1	56.9	4
White		11.1	10.8	13.6	12.9	12.6	12.3	-14
Hispanic		32.4	29.9	25.3	34.0	33.4	30.7	-3
INCOME SOURCE	.45**							
No illegal work		59.8	37.1	47.5	52.5	43.9	47.4	27
Welfare/SSI		n/a	.8	10.7	11.0	17.6	8.6	
Unemployed		40.2	61.6	22.7	21.6	18.2	32.0	55
Prostitute		n/a	.5	4.1	3.9	4.4	2.8	
Drugs Sales		n/a	n/a	4.1	3.4	5.5	2.8	
Other		n/a	n/a	11.1	7.6	10.4	6.4	

^a The product-moment coefficient, phi, measures the level of association between two categorical variables in a contingency table on a scale from 0 to 1. A value of phi=1 indicates perfect congruence between two attributes.

** statistically significant $\alpha=.01$ level.

* statistically significant $\alpha=.05$ level.

^b A negative number represents an increase between 1987 and 1991.
n/a category not asked in that year of the DUF interviews.

Table 4 documents the variation for DUF-Manhattan samples in prevalence for each attribute level for each year 1987 to 1991. Birth cohort and most serious arrest charge appear to be the best candidates for explaining the decline in opiate positivity among DUF-Manhattan arrestees from 1987 to 1991. Arrestees born between 1950 and 1964--this includes three birth cohorts--exhibit the highest rates of opiate positivity. The representation in DUF-Manhattan samples for these birth cohorts declined by as much as 10% from 1987 to 1991 for the 1960-1964 cohort, although the 1950-54 cohort did not decline much (only 2%).

Regarding most serious arrest charge, the proportion arrested for drug offenses declined 32%, from 20% of the DUF-Manhattan sample in 1987 to 15% in 1991. Drug arrestees exhibit a high rate of opiate positivity and hence the overall decline in opiate positivity from 1987 to 1991 may be linked to the decline in their representation. Additionally, the prevalence of arrestees charged with murder/assault, robbery and weapons--three arrest types associated with a lower rate of opiate positivity--increased from 1987 to 1991. However, over the same period, arrests for burglary increased 40%, from 7.3% to 9.5% of the sample. Burglary arrestees exhibited an even higher rate of opiate positivity than drug arrestees, hence, this trend should partially offset the decline in opiate positivity.

The trends over time in race/ethnicity and primary source of income suggest that, individually each may not account for much of the overall decline in opiate positivity from 1987 to 1991. The proportion of black arrestees remained relatively constant level from 1987 to 1991. Hence, the decline in opiate positivity may not be attributed to a change in race/ethnicity composition. Overall, some significant changes in the composition of the DUFs-Manhattan arrestees did occur during five years. The central question is: which factors are among the most important?

Analyzing variability in opiate positivity.

[Table 5 about here]

Table 5 provides a logistic regression model documenting covariation between opiate positivity and each of the individual attributes. Logistic regression determines the best model (based on the criterion of maximum likelihood) for the simultaneous variation in a binomial dependent variable--in this case opiate positivity--with individual attributes. The simultaneity of this analysis attributes the differential amount of variation in opiate positivity to each independent variable in the model controlling for all other factors included and thus guards against the possibility of spurious

Table 5. Covariates of Opiate Positivity (Logistic Regression Analysis)

ATTRIBUTE	LEVELS	MULTIPLIER	ATTRIBUTE	LEVELS	MULTIPLIER
Odds Ratio of Opiate Positivity for Reference Population .15					
DUF INTERVIEW YEAR (Wald(4)=10.8*) ^a	@1987	1.00	QUARTER (Wald(3)=1.9)	@First	1.00
	1988	1.22		Second	.97
	1989	.83		Third	.93
	1990	.90		Fourth	1.06
	1991	.74			
BIRTH COHORT (Wald(6)=147.6**)	UNKNOWN	.01	EDUCATION (Wald(6)=5.54)	Unknown	1.09
	@1900-1949	1.00		@1	1.00
	1950-54	4.66		2	1.15
	1955-59	2.68		3	.44
	1960-64	2.03		4	1.26
	1965-69	1.34		5	1.04
	1970-77	.72		6	1.30
RACE/ETHNICITY (Wald(2)=114.4**)	@Black	1.00	GENDER (Wald(1)=1.2)	@Male	1.00
	White/Other	1.27		Female	1.05
	Hispanic	1.31			
MOST SERIOUS ARREST CHARGE WALD(7) =95.9**)	Murder/Asslt	.78	MARITAL STATUS (Wald(2)=.07)	@Single	1.00
	Robbery	.99		Married	1.01
	Weapons	.53		Sep/Wid/Div	1.01
	Drugs	1.39			
	@Theft	1.00			
	Burglary	1.69			
	Sex Offense	.71			
	Other	.84			
PRIMARY SOURCE OF INCOME (Wald(5)=68.4**)	@No Illegal	1.00			
	Welfare	.76			
	Unemployed	.82			
	Prostitute	1.80			
	Drugs	1.09			
	Other	1.44			
	Illegal				

^aThe Wald statistic indicates the extent of the variation associated with particular variable after controlling for the influence of all other variables. A Chi²-test with the degrees of freedom indicated in parentheses determines whether the variation is statistically significant.

** statistically significant $\alpha=.01$ level.

* statistically significant $\alpha=.05$ level.

@ reference level for the attribute.

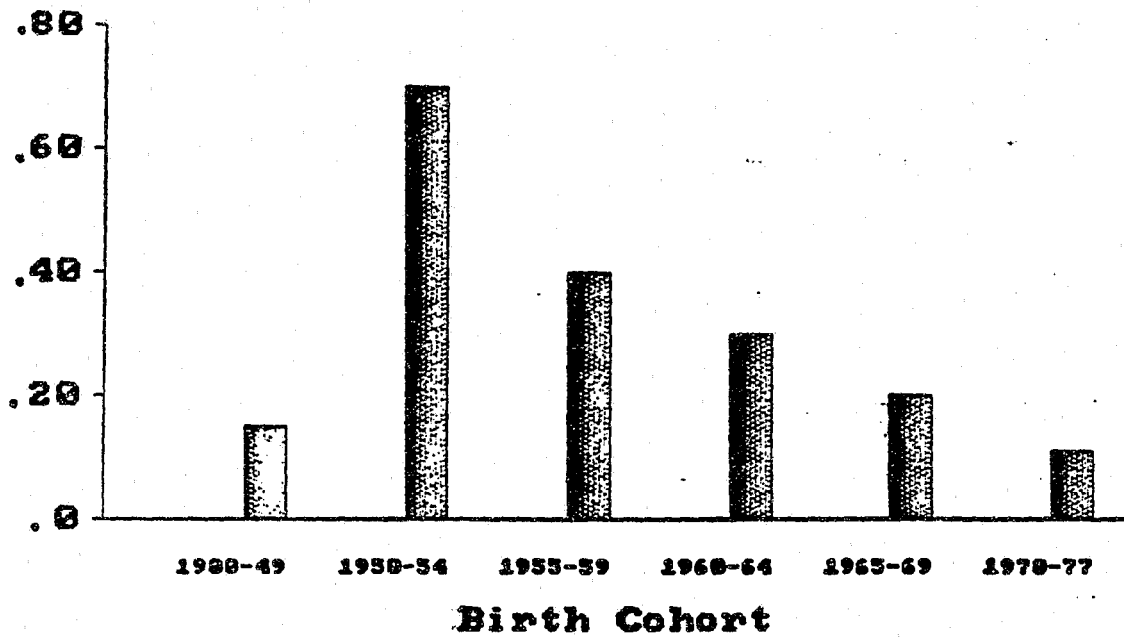
association. The logistic regression also includes DUF interview year and quarter as independent variables to identify the extent to which opiate positivity is associated with interview year (thus measuring the "true trend") after controlling for the factors and to also control for any seasonality (by quarter) in opiate positivity, respectively.

The "reference level" for each attribute included in the logistic regression model is indicated with the at "@" symbol. The reference population--persons whose attributes conform to the reference level for all variables--exhibit odds of being opiate positivity of .15 to one, hence, 15 out of every 115 or 13% exhibit opiate positivity. The multipliers associated with levels other than the reference level indicate variation in the odds of opiate positivity associated with deviation from the reference level. Due to the multiplicative nature of the logistic regression model, attribute values greater than 1.0 are associated with an increased rate of opiate positivity and those less than 1.0 with decreased odds. For example, with all other attributes held constant, arrestees born between 1950 and 1954 exhibited an increased odds of opiate positivity of 7 to 10 ($4.66 \times .15$). Table 5 further indicates that opiate positivity declines steadily with birth cohort. Members of the most recent birth cohort, those born in between 1970 and 1977 exhibited decreased odds of opiate positivity of 1 to 10 ($.72 \times .15$).

[Figure 5 about here]

Figure 5 graphs the decline in opiate positivity among persons in different birth cohorts after holding constant the other attributes. When holding constant the other attributes for these DUF-Manhattan arrestees, the odds of opiate positivity for arrestees born before 1950 is .15 to 1, while the odds increase to .70 for those born 1950-54, .40 for those born in 1955-59, .30 those born in 1960-64, .20 for 1965-69, but only .11 for those born 1970-77. In short, among the birth cohort, 1950-54, that generally onset to heroin injection in the 1965-73 heroin era, very sizable proportions were heroin positive when arrested in 1987-81. At the other extreme, arrestees born 1970-77, and entering adolescence during the crack era (1985-present) are much less likely (odds of .11 to 1) to be opiate positive when all other attributes are held constant.

The Wald statistic in Table 5 indicates the strength of the variation associated with each particular variable after controlling for the influence of all other variables. A chi-square test with the number of degrees of freedom indicated in parentheses determines whether the variation is statistically significant. Several attributes (quarter, gender, education, marital status) were not statistically

Figure: 5. Odds Ratio of Opiate Positivity by Birth Cohort**Controlling for Other Factors, BDF-Manhattan**

significant when all other attributes were held constant. The following attributes are associated with decreasing strength of variation in opiate positivity among DUF Manhattan arrestees, based on the Wald statistics from the logistic regression model:

- 1) BIRTH COHORT: Arrestees born between 1950 and 1964, exhibit higher rates of opiate positivity.
- 2) RACE/ETHNICITY: White and hispanic arrestees exhibit a 30% higher rate than black arrestees.
- 3) MOST SERIOUS ARREST CHARGE: Arrestees charged with burglary or drug charges exhibit higher rates.
- 4) EMPLOYMENT: Arrestees who reported prostitution or other illegal activity (other than drug dealing) as a primary source of income exhibit higher rates.
- 5) INTERVIEW YEAR: 1988 DUF arrestees exhibit a higher rate. Variation in interview year accounts for very little of the explained variation in opiate positivity. The border-line significance of DUF interview year--the Wald statistic is significant at the $\alpha = .05$ but not the $\alpha = .01$ level of statistical significance--suggests that almost no "true trend" in opiate positivity exists. Thus, the apparently high decline of 35 percent in opiate positivity between 1987 and 1991 may be primarily an artifact of the changing composition of the population of DUF arrestees over time.

Modeling declines in opiate positivity.

In order for an attribute to explain the decline in opiate positivity for DUF-Manhattan from 1987 to 1991, it must be associated with variation in opiate positivity and the composition for the attribute must vary across the DUF-Manhattan sample over time. The logistic regression analysis (Table 5) shows four attributes associated with variation in opiate positivity: birth cohort, race/ethnicity, most serious arrest charge, and reported primary source of income. Table 6 presents a series of models of the decline in opiate positivity as a function of individual attributes. To generate the results, each model of opiate positivity was fit using logistic regression and determined the probability that each individual was opiate positive. Since whether an individual is actually opiate positive is known, these individual estimates of opiate positivity are referred to as post-dictions as opposed to predictions. The post-dicted rate of opiate positivity in a given year equals the sum of the individual probabilities for persons interviewed in the year.

Table 6. Explanatory Models for the Decline in Opiate Positivity among DUF-Manhattan Arrestees from 1987 to 1991.

MODEL	-2LogL (dof)	Test ^a	Postdicted Opiate Positivity by DUF Interview Year:					Postdicted 87-91 Decline
			87	88	89	90	91	
(1) All Covariates	5134.5 (36)		.258	.241	.185	.186	.168	34.9%
(2) All Covariates Except DUF Interview Year	5145.5 (32)	[2 vs 1] 11.0(4)*	.236	.243	.196	.174	.180	23.7%
(3) Birth Cohort Arrest Charge	5355.8 (13)	[3 vs 2] 210.3(19)*	.215	.213	.207	.191	.195	9.3%
(4) Birth Cohort Only	5466.4 (6)	[4 vs 3] 110.6(7)**	.213	.210	.206	.194	.197	7.5%
(5) Arrest Charge Only	5568.4 (7)	[5 vs 3] 212.6(6)**	.207	.208	.206	.196	.200	3.4%

^a The difference between -2 log-likelihood of the models identified in square parentheses "[]" is asymptotically distributed χ^2 under the null hypothesis of no significant covariation with degrees of freedom identified in round parentheses "()", the difference in dof between the models. Hence, a variation that is not statistically significant suggests that the simpler model explains the data as well as the more complex model.

** statistically significant $\alpha=.01$ level.

* statistically significant $\alpha=.05$ level.

[Table 6 about here]

Model (1) in Table 6 includes all the individual attributes and the DUF interview year. Since, this model includes interview year it reproduces the decline in opiate positivity from 1987 to 1991 exactly. This model provides a basis for comparing the relative congruence to the data of those models which include fewer attributes. Model (2) includes all the independent variables except DUF interview year. This model fits the data nearly as well as the complete model even though it employs four degrees of freedom fewer. In fact a Wilk's lambda test based on twice the difference in the model's log-likelihood indicates the complete model provides only marginally more explanation of opiate positivity--the test is statistically significant at the $\alpha = .05$ level but not at the $\alpha = .01$ level. This test suggests that the decline in opiate positivity associated with interview year, after controlling for other independent variables, is only marginally significant. Furthermore, this less complete model postdicts a 24% decline in opiate positivity from 1987 to 1991. Thus, over two-thirds (24/35) of the overall decline in opiate positivity can be accounted for by differences in the composition of the DUF-Manhattan sample from 1987 to 1991. Moreover, the residual decline in opiate positivity after accounting for these attributes is not 35 percent but only 10 percent (35-25).

Model (3) includes only birth cohort and arrest charge, the two strongest individual factors associated with the decline in opiate positivity over time in an effort to model variation in opiate positivity more parsimoniously. The comparison between Models 2 and 3, however, suggest that the variation explained by the more complete Model (2) is substantial and statistically significant. The last two models examine variation attributable solely to birth cohort and arrest charge, respectively. The previous model of birth cohort and arrest charges combined accounts for a decline in opiate positivity of 9.3% from 1987 to 1991. Model 5--birth cohort alone accounts for 7.5% and Model 6--arrest charges alone--only 3.4 of the variation in opiate positivity.

In short, the 35% decline in opiate positivity for DUF-Manhattan from 1987 to 1991 can be partially attributed to each of the three explanations. A decline of 7.5%, over one-fifth of the total decline, can be attributed to an increasing proportion of DUF-Manhattan arrestees being persons born more recently who are less likely to have onset to and currently use heroin. An additional decline of 16.2% (23.7% - 7.5%), can be attributed to variation in the composition of the DUF-Manhattan

sample over time due to either changes in police targets or changes in DUF administrative procedures. This leaves only an 11.2% decline, less than one-third of the overall decline, directly attributable to less heroin use within the greater Manhattan arrestee population.

CONCLUSIONS

The data presented above document six central conclusions:

1. Drug Use Forecasting data provide no evidence suggesting any increases or sustained upswings in heroin use among arrestees in Manhattan (1987-91) nor among the 22 DUF cities (1988-89).
2. Drug Use Forecasting data document substantial declines in heroin use among arrestees; the nature and magnitude of these declines vary by heroin use measure, locale, and time period.
3. The DUF Manhattan findings document substantial declines in heroin use among arrestees. These declines have two parallel components: a) The proportion of arrestees detected/self-reported with any lifetime heroin use has declined by 17 percent between 1987 and 1991. b) Among Manhattan arrestees reporting any lifetime heroin use, the proportions reporting heroin injection or detected as opiate positive declined by about 20 percent during 1987 to 1991. These parallel trends generated a net decline of 35 percent in heroin injection and opiate positives during this five year period.
4. A special analysis of the primary factors associated with declines in opiate positivity among DUF-Manhattan arrestees showed that a very weak "true decline" was evident when other factors were held constant. The observed decline is primarily a function of changing composition of the DUF arrestee populations, in particular:
 - a) Only heroin era cohorts are likely to have very high rates of opiate positivity; more recently-born cohorts are unlikely to onset to heroin and be opiate positive;
 - b) Persons arrested on burglary charges have increased, but drug charges have declined over five years; both groups have higher rates of opiate positivity when other factors are held constant.
 - c) The proportion of Hispanics and white arrestees has increased somewhat during 1987-91 and these groups are somewhat more likely than blacks to be opiate positive.

5. Among arrestees in the 22 DUF cities, the proportion with any reported/detected heroin use declined by 29 percent between the first half of 1988 and the second half of 1989. Yet among arrestees in these cities with some reported/detected heroin use, no reductions in heroin injection or in opiate positives was evident, perhaps slight increases occurred. Thus, the proportion of heroin avoiders apparently increased, but few changes in current heroin use or injection was evident among heroin users in these 22 cities.
6. Heroin initiation remained relatively constant among heroin-using arrestees in Manhattan and the 22 DUF cities, although considerable fluctuation by quarter was evident.

INTERPRETATIONS

This section offers several informed interpretations about why no increases in heroin use have occurred among DUF arrestees, as well as identifies some possible factors associated with declining heroin use.

WHY ARE NO INCREASES IN HEROIN USE AMONG ARRESTEES OCCURRING?

Several interpretations for the lack of increased heroin use are possible:

Expanded heroin supplies and increased purity of heroin could be easily consumed by the large pool of heroin abusers.

The Drug Enforcement Administration (1991) report that new supplies of heroin may be entering America and may be reaching street sellers. Systematic evidence of such claims need to be better documented. In particular, the retail price of an unadulterated kilo of heroin remains above \$100,000. At such a price, the claim that heroin purities in street samples have increased substantially and for a sustained period of time needs better documentation than is available. While the DEA (1991) claims that samples of southeast Asian heroin seized in New York had purities of 37 percent in 1990 and 47 percent in 1991. But systematic evidence is lacking that average street heroin bags contain purities above 30 percent in several neighborhoods for long periods.

Even assuming that such supplies and high purities are materializing on the streets of New York and other cities, the availability of high quality of heroin may not create new users. In the early 1980s, the lowest cost heroin bag contained less than 2 percent pure heroin and sold for about \$10. If the price of a typical heroin bag were to remain constant, but the purity and number of pure mg. were to increase substantially (e.g. to increase by 5 times to 10 percent pure, or 20 times to 40 percent

pure), the large pool of heroin era abusers (now in their 30s and 40s) would continue to be prime customers. They could happily and easily get "more bang for the buck" by consuming much of the new supply. That is, their habit sizes would quickly expand to consume as much pure heroin as they could afford, leaving very little for other potential heroin users.

Availability and high purity of heroin may not attract new heroin initiates.

During the past 30 years, heroin has acquired a reputation which is primarily negative, even among high risk youths and street drug abusers (Boyle and Brunswick 1980; Johnson et al. 1990). Most youths and young adults know that heroin is addictive, hard to break, destructive to health, and needle use may lead to HIV and AIDS. Strong street norms have opposed the use and even sale of heroin. Most youths and young adults avoid heroin, shunning heroin users and sellers; they wish to avoid becoming a "junkie." For such heroin avoiders, high purities and lower prices will not be a strong attraction to initiate its use.

High purity heroin is unlikely to convert recreational heroin users into heroin abusers.

Another major potential pool consists of persons who use heroin recreationally, mainly on weekends. Such persons have developed tactics and strategies to limit their heroin use (only on weekends, never inject, etc.) (Zinberg 1984). Persuading such persons to use higher purity heroin may be possible, but they may remain erratic consumers, because they are committed to avoiding addiction.

Heroin smoking is not yet a well known technique (but may be an emergent practice).

Assuming that heroin purities are high enough to smoke, the little ethnographic research available suggests that heroin smoking is not commonplace. The smoking of heroin only (without crack) appears to be very rare in at the current time. On the other hand, some crack abusers (Dunlap, Hamid, personal communications) report smoking both crack and heroin together, but the extent and frequency of this behavior is unknown. Smoking crack and heroin together appears to be an innovation which may become an "emergent practice" (Johnson, Manwar, Golub 1992) among crack abusers--but does not yet appear to be widespread. If a sizable proportion of the large pool of crack abusers begin to add heroin to their crack and smoke it on a regular basis, then a new wave of heroin abuse could easily and quickly materialize. Thus the smoking of heroin (either alone or with crack)

could quickly develop into another major drug epidemic (Kleiman 1992). In the 3Q92, the DUF interview schedule has been modified to include questions about heroin smoking, both alone and in conjunction with crack smoking.

The absence of an increase in heroin use may also be a function of the factors that may be bringing about declines in heroin injection and current use documented herein.

WHY MAY DECREASES IN HEROIN USE AMONG ARRESTEES BE OCCURRING?

The central findings show that heroin use among arrestees is decreasing in DUF Manhattan and 22 DUF cities. Several factors may be strongly associated with such declines.

Use and abuse of many illicit drugs is declining; even serious drug abusers and arrestees are affected by such trends.

National and local surveys document declines in the use of a wide range of illicit drugs, from marijuana, to cocaine and heroin (NIDA 1991; Johnston, Bachman, O'Malley 1991). Cocaine and crack use among DUF arrestees, however, has remained high and shows little evidence of decline 1987-92. While heroin abusers are least likely to give up their drug-using behaviors, heroin abusers will have more difficulty functioning in a society where friends and family (as well as formal legal and social control institutions) will not tolerate their drug abuse.

Police priorities after 1985 targeted crack sellers, possibly reducing the proportion of arrests of heroin sellers and abusers.

Major police resources after 1985 were devoted to arresting crack seller and users (Belenko, Fagan, Chin 1990). This might mean proportionately fewer heroin sellers/users being targeted for arrest, and hence account for the declining proportion of heroin users in DUF Manhattan. On the other hand, the rapid expansion of police teams such as Tactical Narcotics Teams in New York and police strategies designed to "clean up" neighborhoods long controlled by heroin sellers and patronized by heroin buyers may have increased the arrest volume among heroin users. Such pressures may have disrupted networks for buying and selling heroin and other drugs (Kleiman and Smith 1990; Moore 1990; Zimmer 1987). Such shifts in the proportion of drug arrestees were shown above to be partially responsible for declines in opiate positivity.

Legal pressure has removed many active heroin users and possibly reduced their consumption.

The prison and jail systems have expanded dramatically in the 1980s. The New York State prison system has more than doubled in the 1980s, from 22,000 in 1980 to 60,000 in 1991 (NYS DCJS 1992). The New York City jail system more than doubled. Prison and jail populations expanded dramatically nationwide (Langan 1991; BJS 1991). Persons convicted of drug sales constitute a large proportion of the increased prison/jail population.

A wide variety of police "buy and bust" tactics and consistent crackdowns have been implemented in the 1980-90s. While crack sellers were the primary group targeted and removed, many of these were also heroin injectors and users. Many heroin abusers support their heroin consumption mainly by selling or helping heroin sellers; they may have increased difficulty "earning" enough to finance a large habit. Even in the early 1980s (Johnson et al. 1985), a clear majority of heroin abusers consumed less than \$50/day of heroin. Many relatively unsuccessful heroin sellers resort to "helping" with sales, but were seldom able to consume significant amounts of heroin daily. Police pressure on favored selling locations may have reduced earnings from sales work; thus, reducing the daily heroin consumption of heroin users.

Drug treatment has provided stability and exits from heroin addiction for thousands of heroin abusers.

The New York State drug treatment system still gives preference to heroin abusers. Over 28,000 slots, primarily in methadone programs, are targeted for heroin abusers (DSAS 1991; Frank, Galea, Simeone 1991). Residential and outpatient drug-free programs provide services to many heroin and other drug abusers. Shelters, foster care, income support, and other systems systematically pressure heroin and drug-abusing clients to enter and remain in treatment. In short, many social forces and pressures have been designed to continuously impinge upon heroin abusers, and upon those arrested for a variety of felony crimes. These forces are likely to be associated with declines in current heroin use (as measured by opiate positive urines) which were documented above. Death rates among active heroin abusers have been high, and increased with the advent of AIDS.

The heroin era cohort (those who initiated heroin addiction in 1965-74) had a high death rate prior to 1982. Probably one percent of active street heroin injectors died every year from homicide, alcoholism, overdose, and natural causes (Dole and Joseph 1978; DeLeon 1985). Since the mid-1980s, over half of all heroin injectors in New York City are HIV positive (Des Jarlais et al.

1988, 1989). Annual mortality from AIDS is 2-3 percent among the HIV positive; this grim reaper is killing thousands of heroin addicts annually in the 1990s (CDC 1991; Johnson et al. 1990). Such deaths may be reducing the pool of active heroin users faster than new heroin users are being added to the pool. Of course, heroin abusers removed by treatment, jail/prison, and death would not be "available" for arrest and subsequent inclusion in DUF interviews.

AIDS may contribute to declines in heroin injection and current use.

AIDS is probably a critical factor in declining heroin use. While fear of acquiring AIDS may not prevent heroin sniffers from injecting heroin (Des Jarlais, Friedman, Casriel, Kott 1987), it is likely that would-be heroin users may choose to avoid heroin completely. In addition, new cohorts of heroin injectors were less likely to have shared syringes at initiation than earlier cohorts (Neaigus et al. 1992). Heavy public education and street intervention programs have helped long-term injectors to no longer share works or to give up injection (Des Jarlais and Friedman 1987; Des Jarlais et al. 1989). Equally or more important is that most heroin injectors have seen family members or friends either become ill with symptoms of HIV or die of AIDS.

The heroin era cohort is aging and the pool of active heroin abusers may be shrinking.

Data in Table 5 and Figure 5 show important differences in current opiate positivity among cohort born in different years, several other factors held constant. Over a third of all DUF arrestees (see Tables A2 & A4) who report heroin onset did so prior to 1975. They initiated as teenagers and in their early 20s, before or during the heroin era (1965-74) (Johnson, Manwar, Golub 1992). Many others who onset to heroin use during these years ceased use (Clayton and Voss 1981; Boyle and Brunswick 1980), have entered treatment and remain abstinent (or remain on methadone maintenance). Heroin era veterans who have survived until 1992 are an average age of 40. Although many may be current heroin abusers, they may be less active than when younger. In short, the pool of current heroin abusers from the heroin era appears to be shrinking from all these causes. This would result in fewer arrests of older heroin abusers, declines in heroin injection, and possibly lower rates of detection of opiate use via urinalysis in the past 24-48 hours.

Overall, many important factors appear to be associated with and perhaps have brought about the declines in heroin use among arrested persons reported above. In Manhattan, concern about AIDS may be especially associated with declines in self-reported heroin injection among heroin users

and detection as opiate positive via urinalysis. The impact of increases in supplies, availability, and purity of heroin (which may be transitory) remain to be well measured and systematically documented in the future. Only by continuously monitoring a variety of populations and indicators, including booked arrestees in the DUF program, can the direction of the problem of heroin and other drugs-of-abuse be accurately gauged.

REFERENCES

- Anglin, M. Douglas and Yih-Ing Hser. 1990. Treatment of drug abuse. Pp. 393-460 in Michael Tonry and James Q. Wilson (Eds.) *Drugs and Crime*, Chicago: University of Chicago Press. Crime and Justice Series, V. 13.
- Belenko, Steven, Jeffrey A. Fagan, and Ko-lin Chin. 1991. Criminal justice responds to crack. *Journal of Research in Crime and Delinquency* 28(1): 55-74.
- Boyle, John, and A.F. Brunswick. 1980. What happened in Harlem? Analysis of a decline in heroin use among a generation unit of urban black youth. *Journal of Drug Issues* 10(1):109-130.
- Brown, Claude. 1965. *Manchild in a Promised Land*. New York: Macmillian.
- Brunswick, Ann F. 1979. Black youths and drug-use behaviour. In G. Beschner and A. Friedman, (eds.) *Youth and Drug Use: Problems, Issues and Treatment*. Lexington, Mass: Lexington Books.
- Bureau of Justice Statistics. 1991. *Prisoners in 1990. Jail Inmates, 1990*. Washington, D.C.: BJS Bulletins.
- Chaiken, Jan, Marcia R. Chaiken, and David Cavanagh. 1991. *Conceptual Design: Analyzing and improving the Drug Use Forecasting sampling plan*. Lincoln, Mass: Linc. Report to National Institute of Justice.
- Centers for Disease Control. 1992. *HIV/AIDS Surveillance Report*. January: 1-22.
- Chein, Isidor, Donald L. Gerard, Robert S. Lee, and Eva Rosenfeld. 1965. *The Road to H*. New York: Basic Books.
- Clayton, Richard R., and Harwin L. Voss. 1981. *Young Men and Drugs in Manhattan: A Causal Analysis*. Rockville, MD: National Institute on Drug Abuse.
- Des Jarlais, Don C., Samuel R. Friedman, David Novick, Jo L. Southeran, S.R. Yancovich, D. Mildvan, J. Weber, Mary Jane Kreek, R. Maslansky, T. Spira, P. Thomas, and Michael Marmor. 1989. HIV-1 infection among among intravenous drug users entering treatment in Manhattan, New York City 1978-87. *Journal of the American Medical Association* 261:1008-12.
- Des Jarlais, Don C. et al. 1987. *AIDS and Preventing Initiation into Intravenous (IV) Drug Use, Psychology and Health*, Vol. 1.
- Des Jarlais, Don C., Samuel R. Friedman, Jo L. Southeran, Rand L. Stoneburner. 1988. The sharing of drug injection equipment and the AIDS epidemic in New York City. Pp. 160-175 in Robert J. Battjes and Roy L. Pickens (eds.), *Needle Sharing among Intravenous Drug Abusers: National and International Perspectives*. Research Monograph 80. Rockville, Md.: National Institute on Drug Abuse.
- Des Jark Don C., Samuel R. Friedman, Cathy Casriel, Alan Kott. 1987. *AIDS and preventing initiation into intravenous (IV) drug use. Psychology and Health*. 1:179-194.
- Division of Substance Abuse Services. 1991. *State Plan Update*. Albany.
- Drug Enforcement Administration. 1991. *The Supply of Illicit Drugs to the United States*. Washington, D.C.: National Narcotics Intelligence Consumers Committee.
- Dunlap, Eloise. 1992. *Personal communication*.
- Dole, Vincent, and Herman Joseph. 1978. Long term outcome of patients with methadone maintenance. *Annals of the New York Academy of Sciences* 311: 181-89.

- DeLeon, George. 1985. *The Therapeutic Community: Study of Effectiveness*. Rockville, Maryland: National Institute on Drug Abuse.
- Federal Bureau of Investigation. 1991. *Uniform Crime Reports*. Washington, D.C.: Washington, D.C.: U.S. Government Printing Office.
- Frank, Blanche, John Galea, Ronald Simeone. 1991. *Current Drug Use Trends in New York City*. New York: Division of Substance Abuse Services.
- Golub, Andrew, Bruce D. Johnson, and Carla Lewis. 1992a. Cohort differences in drug use pathways to crack among current crack abuser in New York City. New York: National Development and Research Institutes, working paper.
- Golub, Andrew, Bruce D. Johnson, and Carla Lewis. 1992b. Modeling the epidemic of onset to crack abuse. New York: National Development and Research Institutes, working paper.
- Hamid, Ansley. 1992. Personal communication.
- Hanson, Bill., George Beschner, James M. Walters, and Elliot Bovelle. 1985. *Life With Heroin: Voices from the Inner City*. Lexington, Mass: Lexington Books.
- Hess, Albert. 1965. *Chasing the Dragon: A Report on Drug Addiction in Hong Kong*. Amsterdam: North-Holland Publishing Co.
- Hunt, Leon G. and Carl Chambers. 1976. *The Heroin Epidemics: A Study of Heroin Use in the U.S., 1965-75*, Holliswood, New York: Spectrum.
- Johnson, Bruce D. 1978. Once an addict, seldom an addict. *Contemporary Drug Problems* 7(1):35-53.
- Johnson, Bruce D. 1991. Crack in New York City. *Addiction and Recovery* (May/June): 24-27.
- Johnson, Bruce D., Paul J. Goldstein, Edward Preble, James Schmeidler, Douglas S. Lipton, Barry Spunt, Thomas Miller. 1985. *Taking Care of Business: The Economics of Crime by Heroin Abusers*. Lexington, Mass.: Lexington Books.
- Johnson, Bruce, Terry Williams, Kojo Dei, and Harry Sanabria. 1990. Drug abuse and the inner city: Impact on hard drug users and the community. Pp. 9-67 in Michael Tonry and James Q. Wilson (Eds.) *Drugs and Crime*, Chicago: University of Chicago Press. Crime and Justice Series, V. 13. .
- Johnson, Bruce D. and Ali Manwar. 1991. Towards a paradigm of drug eras: Previous drug eras help to model the crack epidemic in New York City during the 1990s. Paper presented at the American Criminology Society, San Francisco.
- Johnson, Bruce D. Ali Manwar, and Andrew Golub. 1992. Towards a paradigm of drug eras: Previous drug eras help to model the crack epidemic in New York City during the 1990s. Revised paper. New York: National Development and Research Institutes.
- Johnson, Bruce D. and John Muffler. 1992. Sociocultural aspects of drug use and abuse in the 1990s. Pp. 118-135 in Joyce Lowinson, Pedro Ruiz, Ronald Millman, and John Langrod (Eds.) *Substance Abuse Treatment*. Baltimore: Wilkins and Wilkins. Second edition.
- Johnston, Lloyd D., Patrick M. O'Malley, and Jerald G. Backman. 1991. *Drug Use Among American High School Senior, College Students, and Young Adults, 1975-1990*. Rockville, Md.: National Institute on Drug Abuse.
- Kleiman, Mark A. R. 1992. *Heroin situation assessment: A working paper done for the Office of National Drug Control Policy*. Cambridge, Mass.: BOTEC Analysis Corporation.

- Kleiman, Mark A. R., Kerry D. Smith. 1990. State and local drug enforcement: In search of a strategy. Pp. 69-108 in Michael Tonry and James Q. Wilson (Eds.) *Drugs and Crime*, Chicago: University of Chicago Press. Crime and Justice Series, V. 13.
- Langan, Patrick A. 1991. America's soaring prison population. *Science* 251:1568-73.
- Lewis, Carla, Bruce D. Johnson, Eloise Dunlap, Andrew Golub. 1992. Studying crack abusers: Strategies for recruiting the right tail of an ill-defined population. *Journal of Psychoactive Drugs* 24(3) (in press).
- Malcolm X and Alex Hawley. 1966. *The Autobiography of Malcolm X*. New York:
- Moore, Mark H. 1990. Supply reduction and drug law enforcement. Pp. 109-157 in Michael Tonry and James Q. Wilson (Eds.) *Drugs and Crime*, Chicago: University of Chicago Press. Crime and Justice Series, V. 13.
- New York Times. 1991. Increased supplies of heroin in New York. October.
- National Institute on Drug Abuse. 1991. National Household Survey of Drug Abuse 1991. Press Release.
- National Institute on Drug Abuse. 1991. A Longitudinal Perspective on Heroin Abuse in the United States. Rockville, Maryland. (Draft report).
- National Institute of Justice. 1991. Drug Use Forecasting 1990. *Drugs and Crime 1990*. Washington, D.C.: National Institute of Justice.
- New York State Division of Criminal Justice Services. 1991. 1990 Crime and Justice Report. Albany.
- Parker, Howard, Keith Bakx, Russell Newcombe. 1988. *Living With Heroin: The Impact Of A 'Drugs' Epidemic On An English Community*. Philadelphia: Open University Press.
- Pearson, Geoffrey. 1987. *The New Heroin Users*. New York: Basis Blackwell.
- Tims, Frank M. and Jacqueline P. Ludford (Eds.) 1984. *Drug Abuse treatment Evaluation: Strategies, Progress, and Prospects*. Research monograph 51. Rockville, Maryland: National Institute on Drug Abuse
- Visher, Christy. 1991. Comparison of urinalysis technologies for drug testing and criminal justice. Washington, D.C.: National Institute of Justice.
- Wish, Eric D., Elizabeth Brady, Mary Cuadrado, L. Alvarado. 1985. Female arrestees: The most serious drug abusers? Paper presented at the annual meeting of the American Society of Criminology. San Diego.
- Wish, Eric D., and Bernard A. Gropper. 1990. Drug testing by the criminal justice system: Methods, research, and application. Pp. 321-391 in Michael Tonry and James Q. Wilson (Eds.) *Drugs and Crime*, Chicago: University of Chicago Press. Crime and Justice Series, V. 13.
- Zimmer, Lynn. 1987. *Operation Pressure Point: The Disruption of Street-Level Trade on New York's Lower East Side*. Occasional papers from the Center for Research in Crime and Justice. New York: New York University School of Law.
- Zinberg, Norman E. 1984. *Drug, Set, and Setting: The Social Basis of Controlled Drug Use*. New Haven, CT: Yale University Press.

Table A1. Percent with Any Heroin Use, Any Heroin Injection, Opiate Positive, and Classified According to Heroin User/Abuser Typology in DUF Manhattan, 1987-91.

Variable	Quarter:	Year: 1987			1988			1989				1990				1991			Total	Annual Rates					87-91
		2Q	3Q	4Q	1Q	2Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q		1987	1988	1989	1990	1991	
Base Ns in Quarter		**	**											**					728	1086	1458	1326	1049	Dec-line	
Percent opiate positive		27	20	29	22	26	26	17	15	20	22	21	15	21	17	20	17	13	20	26	25	18	19	17	35
Percent with heroin use reported or detected		40	36	40	35	42	40	31	32	35	35	37	32	36	30	31	34	33	35	39	39	33	34	33	17
Percent with any heroin injection reported		30	32	34	25	32	26	22	22	24	27	27	22	25	20	20	21	23	25	32	27	24	24	21	34
Heroin User/Abuser Typology																									
URINE OPIATE POSITIVE																									
Hardcore speedballer (Inject her+coke now)		11	9	12	8	14	14	10	8	12	15	13	7	15	11	12	9	9	11	11	12	11	12	10	8
Heroin injector/not regular heroin user		6	7	11	8	5	3	3	3	3	3	4	4	1	1	1	3	2	4	8	5	3	2	2	76
Heroin user/denies injection of heroin		a	a	a	2	4	4	3	1	2	1	2	3	2	3	3	3	1	2	a	3	2	2	2	29
Denies all heroin use or injection		10	4	7	4	4	5	1	3	3	3	2	1	4	2	4	2	2	3	7	4	2	2	2	64
URINE OPIATE NEGATIVE																									
Injects and uses heroin in past 30 days		2	8	4	3	4	4	2	5	4	3	3	5	5	4	3	5	4	4	4	4	4	4	4	10
Injects and uses heroin, but not in past 30 days		11	8	8	6	9	5	7	6	5	6	7	6	5	4	4	4	9	6	9	7	6	5	6	38
Some heroin use, but denies injecting it		a	a	a	4	3	5	5	6	6	4	6	6	5	5	4	8	7	5	a	4	5	6	6	-66
Never any heroin use, or heroin injection		60	64	60	66	58	60	69	68	65	65	63	68	64	70	70	66	67	65	61	61	67	66	67	-11
Total		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	

* No DUF interviews conducted in Manhattan for third Quarter 1988.

** Only males interviewed this quarter.

a Questions about injection of heroin were not asked in 1987.

P. 43

Table A2. Among DUF-Manhattan Arrestees with Any Indications of Heroin Use, Percent Reporting Any Heroin Injection, Opiate Positive, and Classified by Year of Heroin Onset, by Quarter and Year, 1987-91.

Variable	Quarter:	Year: 1987			1988			1989				1990				1991			Total	Annual Rates						87-91
		2Q	3Q	4Q	1Q	2Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q		1987	1988	1989	1990	1991		
All Subjects--Base N		**	**									**							728	1086	1458	1326	1049			
Among Those with Detected or Reported Heroin Use, (Base n for below)		85	76	123	127	151	146	111	117	125	124	132	114	120	78	105	119	116	1966	284	424	477	444	340	Decline	
Percent opiate positive		67	57	72	63	63	65	53	48	57	61	58	47	59	56	66	50	41	58	66	64	55	55	52	22	
Percent reporting heroin injection		75	89	84	72	76	65	69	69	68	78	72	68	71	65	66	62	69	72	83	71	71	70	66	20	
Percent using, but not injecting heroin		25	11	16	28	25	35	31	31	32	22	28	32	29	35	34	38	31	29	17	29	29	30	34	-99	
Percent reporting heroin onset in:																										
Pre-heroin era onset '24-64		9	5	5	7	7	5	6	5	3	6	8	6	4	6	5	5	7	6	6	6	5	6	6	12	
Heroin era onset '65-74		29	37	27	31	29	24	31	43	34	28	27	34	37	39	25	34	37	32	30	28	34	33	32	-6	
Cocaine era heroin onset '75-83		29	37	39	39	34	43	42	26	35	42	38	34	28	24	31	30	29	35	36	39	36	32	30	16	
Crack era heroin onset '84-		4	4	5	9	13	9	12	12	11	10	13	13	13	19	21	23	17	12	4	10	11	14	20	-382	
New heroin initiator (in prior 2 yrs)		4	7	8	3	7	7	6	5	7	8	8	8	8	6	7	3	5	6	6	6	7	8	5	25	
Some heroin use, but deny heroin onset		25	11	16	11	10	12	3	9	10	7	6	4	11	5	12	6	4	9	17	11	7	7	7	57	
Total		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100		

* No DUF interviews conducted in Manhattan for third Quarter 1988.

** Only males interviewed this quarter.

Table A3. Percent with Any Heroin Use, Any Heroin Injection, Opiate Positive, and Classified According to Heroin User Typology at National* DUF Sites, Quarterly and Annually, 1988-1989.

Variable	Year:	Quarterly Rates								Total	Semiannual Rates				1H88 to 2H89
	Quarter:	1988				1989					1H88	2H88	1H89	2H89	
		1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q						
Base Ns in Quarter		3023	3602	3329	3861	4332	5188	6159	6316	35810	6625	7190	9520	12475	Percent decline
Percent opiate positive		14	14	12	12	10	12	10	10	11	14	12	11	10	28
Percent with heroin use reported or detected		29	29	24	23	22	23	20	20	23	29	23	23	20	29
Percent with any heroin injection reported		20	21	17	16	16	16	15	16	17	21	17	16	15	26
Heroin User/Abuser Typology															
URINE OPIATE POSITIVE															
Hardcore speedballer (Inject her+coke now)		6	5	5	5	4	4	4	4	4	5	5	4	4	30
Heroin injector/not regular heroin user		4	4	3	3	2	3	3	2	3	4	3	3	2	38
Heroin user/denies injection of heroin		2	1	1	1	1	1	1	1	1	1	1	1	1	51
Denies all heroin use or injection		3	4	4	3	3	4	3	3	3	3	3	3	3	18
URINE OPIATE NEGATIVE															
Injects and uses heroin in past 30 days		1	2	1	1	1	2	2	2	2	2	1	2	2	-13
Injects & uses heroin, but not in past 30 days		9	11	8	8	9	7	8	7	8	10	8	8	7	25
Some heroin use, but denies injecting it		4	3	2	2	2	2	2	2	2	4	2	2	2	54
Never any heroin use, or heroin injection		71	71	76	77	78	77	80	80	77	71	77	77	80	-12
Total		100	100	100	100	100	100	100	100	100	100	100	100	100	

* Includes Manhattan, plus 21 other cities.

Table A4. Among National* DUF Arrestees in 1988-89 with Any Indications of Heroin Use, Percent with Any Heroin Injection, Opiate Positive, and Classified According to Their Year of Heroin Onset, Quarterly and Semiannually, 1988-1989.

Variable	Year: Quarter:	Quarterly Rates								Total	Semiannual Rates				1H88 to 2H89
		1988				1989					1H8	2H8	1H8	2H89	
		1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q						
All Subjects—Base N		3023	3602	3329	3861	4332	5188	6159	6316	35810	6625	7190	9520	12475	
Among Those with Detected or Reported Heroin Use, (Base N for below)		869	1041	788	874	958	1189	1252	1290	8261	1910	1662	2147	2542	Percent decline
Percent opiate positive		48	48	52	50	43	51	46	47	49	48	51	47	47	2
Percent reporting heroin injection		70	74	73	72	73	71	75	76	73	72	73	72	76	-5
Percent using, but not injecting heroin		30	26	27	28	27	29	25	24	27	28	27	28	24	12
Percent reporting heroin onset in:															
Pre-heroin era onset '24-64		6	5	6	5	6	5	4	4	5	5	5	5	4	24
Heroin era onset '65-74		32	29	27	29	27	28	30	28	29	30	28	27	29	5
Cocaine era heroin onset '75-83		34	33	27	32	30	25	27	28	29	34	29	27	28	18
Crack era heroin onset '84-		9	9	11	8	13	12	10	11	10	9	9	12	10	-16
New heroin initiator (in prior 2 yrs)		7	9	11	10	7	8	8	10	9	8	10	8	9	-12
Some heroin use, but deny heroin onset		12	15	19	16	17	22	20	20	18	14	17	20	20	-48
Total		100	100	100	100	100	100	100	100	100	100	100	100	100	

*Includes Manhattan, plus 21 other cities.