HIV TRANSMISSION AND RISK BEHAVIOR AMONG DRUG USERS IN LOS ANGELES COUNTY

1991 UPDATE

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Drug Abuse Research Center
Neuropsychiatric Institute
University of California, Los Angeles
1100 Glendon Avenue, Suite 763
Los Angeles, CA 90024
(310) 825-9057

Paper prepared for the AIDS Program Office
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EXECUTIVE SUMMARY

INTRODUCTION

Transmission of human immunodeficiency virus (HIV) can occur when drug users share HIV-infected needles or other drug injection paraphernalia such as the cooker and cotton ball. Noninjection drug use is also a source of HIV risk. People who have sex while under the influence of drugs or alcohol are more likely to engage in unsafe sex if their judgment is impaired or their inhibitions lowered. In particular, unsafe sex is reportedly widespread among people who smoke crack cocaine.

In December 1990, we completed a report on HIV transmission risks among Los Angeles County drug users (Longshore and Anglin 1990). That report reviewed all serological and behavioral studies available at the time. Some crucial questions were answered in those studies; other questions could not be resolved. In this update we return to unresolved questions by reviewing studies and data that became available in 1991.

- The possibility of increasing HIV transmission among Los Angeles injection drug users was cited in the 1990 report. This update reevaluates that possibility in light of new data.

- The 1990 report described trends in risk behaviors from 1987 to early 1990. This update extends the trend lines through mid 1991.

- The 1990 report cited a lack of evidence regarding HIV risk and cocaine injection. This update summarizes new analyses to determine whether HIV transmission or risk behavior is more prevalent among Los Angeles drug users whose preferred injection drug is cocaine.

- Analyses in the 1990 report suggested that crack cocaine use is associated with higher sex-related HIV risk. This update, using more comprehensive analyses, assesses the importance of crack use as a unique marker for HIV risk.

HIV TRANSMISSION

A possible increase in HIV transmission among Los Angeles injection drug users was not confirmed. Seroprevalence has not increased in 1991, and seroconversion has been extremely low. It appears that the rate of HIV infection is no higher than 3% for injection opiate users in methadone maintenance/detoxification treatment and no higher than 7% among injection drug users not in treatment. When treatment and nontreatment estimates are weighted by the likely proportion of users in treatment, the overall rate of HIV infection among Los Angeles injection drug users is estimated at 6%. However, infection rates may

be higher in some populations, such as homeless injection drug users living on Skid Row downtown (pages 3-8).

BEHAVIOR TRENDS

Last year's report described trends in drug- and sex-related risk behavior based on four to seven data points covering 1987 to early 1990. Trends described in this update are based on nine to twelve data points through mid 1991.

Los Angeles injection drug users have attempted to reduce their risk of HIV transmission. A majority of those who share needles now report using bleach as a needle disinfectant. Trends also show a significant increase in the percentage of users who report recent attempts to stop sharing needles. However, it appears difficult for most drug users to avoid needle sharing over the long term. Trends do not show any change in the percentage of users who report no needle sharing for as long as one year. Trends in sex-related HIV transmission risks are similarly mixed. A majority of injection drug users who are nonmonogamous now use condoms. But there has been no change in the percentage of users who report sex with multiple partners in the past year (pages 9-18).

HIV RISK AND COCAINE INJECTION

In some cities, seroprevalence and behavioral risks are higher among drug users whose preferred injection drug is cocaine rather than opiates. However, we found no evidence that cocaine injection is associated with higher risk among drug users in Los Angeles. HIV infection rates observed among cocaine injectors are similar to rates observed among opiate injectors. Moreover, drug preference is unrelated to needle sharing overall, needle sharing with strangers, needle sharing at shooting galleries, or failing to use bleach as a needle disinfectant (pages 19-26).

SEXUAL BEHAVIOR AND CRACK COCAINE

Los Angeles arrestees who smoke crack have more sex partners than arrestees who do not smoke crack. The relationship is stronger for women than for men but is significant for both. Men who smoke crack are less likely to use condoms than men who do not smoke crack. These findings persist after demographic differences between crack smokers and nonsmokers are controlled. The findings also persist after several other lifestyle/risk markers are controlled. Thus, crack use appears to be a unique and important marker for sex-related HIV risk (pages 27-42).

CONCLUSIONS AND RECOMMENDATIONS

MONITORING HIV INFECTION

If the collection of seroprevalence data were suspended or sample sizes reduced, change in seroprevalence will become more difficult to detect. Any change that does occur will be more difficult to interpret (page 43).

#1 We recommend that HIV seroprevalence studies among County injection drug users be continued with no change in sampling procedures, sample sizes, or data collection intervals.

Overall seroprevalence data obscure the possible existence of local "hot spots" where there is reason to believe that the virus might be spreading more rapidly than elsewhere in the County (page 43).

#2 We recommend that special monitoring/outreach efforts be mounted in possible HIV hot spots, such as Skid Row, the surrounding downtown area, and other County areas where injection drug use is prevalent.

Seroprevalence monitoring and seroconversion monitoring in combination are much more valuable than either by itself. The need for seroconversion studies is perhaps most urgent in possible hot spots (page 44).

#3 We recommend that a subsample of injection drug users who participate in "hot spot" seroprevalence studies be asked to enroll in smaller seroconversion studies that will monitor their antibody status twice yearly for at least the next two years.

PROMOTING FURTHER REDUCTIONS IN RISK BEHAVIOR

Outreach projects to promote drug- and sex-related risk reduction are already underway in Los Angeles. Some of these projects offer intensive training and ongoing support for risk reduction through, for example, repeated small-group sessions attended by drug users and their sex partners (pages 45-46).

#4 We recommend that Los Angeles County formally establish a study group for the purpose of observing the progress of local risk-reduction outreach to drug users. This study group, comprised of County and outreach project representatives, should meet at regular intervals to discuss innovative outreach methods, review project findings, and identify opportunities for collaboration in the study and delivery of risk-reduction services.

Trends indicate the persistence of occasional needle sharing, often with strangers, despite mass-media and street-based outreach in which the danger of needle sharing is continually emphasized. We believe that a second outreach strategy should be given careful consideration in the effort to reduce needle sharing. That strategy is needle exchange, which operates with apparent success in other U.S. and European cities. Needle exchange in Los Angeles would probably broaden the range of drug users who are reached by intervention efforts, bring into treatment many users who otherwise would not seek it, and contribute uniquely to the reduction of HIV risks among local drug users. However, we do not believe that needle exchange can be adopted, or allowed to operate, without first enlisting the support of neighborhood residents and conducting a careful pilot test of the local effects of needle exchange (page 46).

#5 We recommend that a needle exchange program of limited scale and duration be established in a County "hot spot" where HIV infection and drug use are relatively widespread and where residents have first had an opportunity to comment. This program should begin only after evaluation criteria and procedures have been determined.

MONITORING THE RELATIONSHIP BETWEEN RISK AND PREFERRED DRUG

Many studies of local seroprevalence and/or risk behavior have been completed recently or are still in progress. Data from those studies should be analyzed to detect differences in HIV infection rates or risk behavior between users whose preferred injection drug is cocaine and users whose preferred drug is opiates. Some local studies may be able to improve current knowledge of the relationship between drug preference and HIV transmission risk by creating continuous measures of drug preference and risk behavior (page 47).

#6 We recommend that future seroprevalence reports prepared by Los Angeles County focus in part on drug preference as a predictor of serostatus.

#7 We recommend that the County ask representatives of all drug-user studies conducted in Los Angeles to collaborate on research assessing risk behavior by drug preference.

TARGETING OUTREACH AND TREATMENT PROGRAMS

In Los Angeles, as in other U.S. cities, most community outreach projects are now targeted to injection drug users and their sex partners. But noninjection use of crack cocaine appears to be a unique and important marker for sex-related risk. This finding is not confined to crack users who are dependent on the drug or who exchange sex for crack (page 48).

#8 We recommend that, wherever possible, outreach projects in Los Angeles widen their scope to target crack-using men and women, regardless of whether they use other drugs by injection and regardless of whether they trade sex for crack.

The emergence of crack as a unique risk marker also suggests the importance of placing more crack users in drug abuse treatment. Dramatic progress is unlikely until treatment for crack dependence becomes more widely available through subsidized slots. An interim step in this direction is to ensure that crack users who seek treatment are referred promptly to existing slots. Another important step is to augment the availability of low-cost informal treatment alternatives such as Cocaine Anonymous, other self-help approaches, and recovery assistance based in religious institutions (pages 48-49).

#9 We recommend that the County take steps to ensure that (a) appropriate treatment slots are promptly available to crack users who seek treatment and (b) the County referral system is equipped to provide immediate and complete information on all appropriate treatment options, formal and informal.

CLOSING

Seroprevalence rates rose quickly in New York City in the early 1980s, roughly doubling every year before reaching a plateau of 50% to 60%. This occurred before the risk of AIDS was widely recognized. In San Francisco, seroprevalence doubled in the span of one year, from 6% in 1986 to 13% 1987, even though by that time the risk of AIDS was widely known. In Los Angeles, though HIV transmission is apparently occurring very slowly, many injection drug users remain at high risk. Thus, as noted in the December 1990 report, an increase in HIV transmission is still quite possible in Los Angeles. Stopping the further spread of HIV in Los Angeles will require continued monitoring and outreach to prevent possible regression to high risk behaviors and to augment the limited change seen thus far.

ACKNOWLEDGEMENTS

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Kiku Annon directs the Drug Use Forecasting Program in Los Angeles. Shih-chao Hsieh conducted data analysis for this report. Renee Pitts provided graphics support.

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SECTION 1: BACKGROUND

Among people who use illicit drugs, the risk of human immunodeficiency virus (HIV) transmission is related not only to drug use but also to unsafe sex. HIV may be transmitted when virus-contaminated needles or other injection paraphernalia are shared. People unwilling or unable to eliminate their drug use are therefore advised to stop sharing injection paraphernalia or to disinfect them before injection. In addition, people under the influence of illicit drugs or alcohol are more likely to engage in unsafe sexual practices as a result of impaired judgment or lowered inhibitions. This source of AIDS risk is thought to be especially high among heavy crack cocaine users, who may engage in frequent unsafe sex to obtain the drug.

In December 1990, at the request of the Los Angeles County AIDS Program Office, we completed a report on HIV risks among drug users in the Los Angeles area (Longshore and Anglin 1990). That report summarized studies of HIV seroprevalence and risk behavior such as needle sharing and condom use. The report also identified demographic and lifestyle characteristics associated with higher risks of HIV transmission.

Though some important questions were answered in the report, others could not be answered on the basis of the studies available at that time. The County AIDS Program Office asked us to revisit those questions in an update based on studies that continued or began in 1991.

- The possibility of increasing HIV transmission among injection drug users was cited in the 1990 report. Section 2 of this update reevaluates that possibility in light of new seroprevalence and seroconversion data.

- Behavior trends in the 1990 report were identified tentatively because trend lines were based on only four to seven data points covering 1987 to early 1990. Section 3 adds five new data points and extends the trend lines through mid 1991.

- The 1990 report cited a lack of evidence regarding injection drug users whose preferred drug is cocaine. Section 4 summarizes new analyses to determine whether cocaine injection is associated with serostatus or HIV risk among Los Angeles injection drug users.

- Analyses in the 1990 report suggested that crack cocaine use is associated with higher sex-related HIV risk. Section 5 of this update, using more comprehensive analyses, assesses the importance of crack use as a unique marker for sex-related HIV risk.

The 1990 report cited a need for more information on risk behaviors among injection drug users who are homeless and among high-risk juveniles. Data that we were able to collect on those topics in 1991 are sparse and do not provide any basis for strengthening or extending conclusions we reached in the 1990 report. We therefore do not address those topics in this update.

METHODS

As we did for last year's report, we used computerized search services to identify recent serological and behavioral studies based either entirely or partly on data collected from Los Angeles drug users. We also reviewed abstracts from the 1991 International Conference on AIDS and attended professional meetings that featured recent or ongoing studies of drug abuse prevention/treatment services and HIV prevention efforts targeted to drug users. Finally, we identified studies as yet unpublished or in progress through a "snowball" procedure in which data sources we already knew were asked to refer us to others. Several sources provided partial findings based on the data they have collected thus far. Those sources are identified under Acknowledgements.

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SECTION 2: HIV TRANSMISSION

INTRODUCTION

Four longitudinal studies cited in last year's report have continued to recruit injection drug users for serotesting in 1991. Two are based at methadone maintenance/detoxification clinics; another two, at clinics offering services other than drug abuse treatment. A fifth study, not available for last year's report, has tracked HIV transmission in the same sample of injection drug users over time. In Section 2 we use these five studies to reassess the possibility, raised in last year's report, that HIV transmission has increased among local injection drug users. We also report new data from a street-based seroprevalence study in downtown Los Angeles and a study which monitors serostatus among drug users in residential treatment.

BACKGROUND

Before presenting new findings, we briefly review three distinctions in the types of study to be cited. First, studies of seroprevalence test random cross-sections, or samples, drawn from the same population at repeated intervals over time. Trends in the percentage of antibody-positives across samples may approximate actual trends in the population. Usually, however, it is not known how many cases drawn in earlier samples are still in the population when later samples are drawn, and this introduces some degree of hidden error in tracking transmission over time. New infections may still be occurring even if seroprevalence rates in the serial cross-sections show no change (Selwyn 1990). Seroconversion studies test and retest the same sample over time. Hence they are not subject to this sort of error. On the other hand, restricted by high cost, such studies usually work with small samples. This limitation can lower the reliability of seroconversion rates estimated for the population from which the sample was drawn. In short, seroconversion and seroprevalence studies are subject to different sources of error. If both are used to monitor HIV transmission, the strengths of each can compensate for weaknesses of the other.

Second, some studies cited in this section have recruited samples of drug users from drug abuse treatment clinics, while others recruit from nontreatment locations such as sexually transmitted disease (STD) clinics. This distinction is crucial because HIV transmission risks, both drug- and sex-related, appear lower among drug users in treatment (Mascola et al. 1989) than among those not in treatment. Drug injection is often eliminated or reduced soon after entry into a treatment program (Ball et al. 1988). Even among clients who continue to use drugs, needles are typically shared less often and disinfected more often (Ball et al. 1988; Flynn et al. 1988; Longshore et al. 1991a). Additionally, drug users enrolled in treatment incur lower sex-related HIV risk because they have fewer sex partners than users not in treatment. The longer they stay in treatment, the greater the decrease in their number of sex partners (Longshore et al. 1991b). These differences have been shown

to persist after statistical adjustment for gender, age, and other factors that might have accounted for them.

Finally, most studies we review here are "blinded." Such studies do not attempt to link blood test results to code numbers or other information identifying the people whose blood was drawn. On the other hand, "nonblinded" studies do link test results with participants--on a confidential basis--partly for the purpose of offering person-specific risk assessments and counseling. The importance of this distinction lies in the fact that many people join nonblinded studies specifically because they have engaged in high-risk activity and fear that they may be infected (Kegebein and Zack 1990). Joining a nonblinded study is one way to find out their serostatus and obtain information, counseling, or referrals for HIV-related services. Thus, HIV infection rates found in nonblinded studies of injection drug users may overestimate the actual degree of infection in the drug-injector population as a whole.

Each of these distinctions is relevant to the studies covered in this section and will be considered below.

SEROPREVALENCE

PREVIOUS FINDINGS

In last year's report we summarized findings from twelve seroprevalence studies conducted between 1986 and 1990 in clinics offering methadone maintenance/detoxification treatment. HIV infection rates varied only slightly from 1% to 3%. Findings did not differ between blinded and nonblinded studies. Because opiates are the primary drug of abuse for clients treated with methadone, the conclusion suggested by these findings is that, as of 1990, seroprevalence was probably no higher than 3% among opiate users in methadone maintenance/detoxification treatment.

Last year we also summarized ten studies conducted between 1988 and 1990 in nontreatment locations such as alternative test sites, STD clinics, and public parks. Seroprevalence varied from 4% to 10% and was higher in samples who sought nonblinded (confidential) testing at alternative test sites and a County health clinic. The highest seroprevalence rate found in a blinded nontreatment study was 8%. We concluded that, as of 1990, seroprevalence was probably no higher than 8% among drug injectors not in drug abuse treatment.

Five of these twenty-two studies, using the same procedure each time, conducted antibody testing at repeated intervals between 1986 and 1990. Findings from those five longitudinal studies showed a <u>possible</u> recent increase in seroprevalence. HIV infection rates found in one of two treatment studies were slightly higher in 1989 than in 1988. (The most recent data available from this study had been collected in 1989.) Similarly, infection rates found

in two of three nontreatment studies were higher in 1990 and 1989. We argued that no conclusion, however tentative, could be drawn regarding any trend. But the importance of continued monitoring was self-evident.

UPDATED FINDINGS

Four longitudinal studies have continued to recruit injection drug users for serotesting. Two are treatment-based. The Los Angeles County Department of Health Services has conducted antibody testing for 3,448 drug users entering methadone maintenance/detox clinics during 1991. Of this total, 1,969 were blinded and 1,749 were nonblinded. The National Institute on Drug Abuse (NIDA) also conducts a nonblinded study in Los Angeles methadone maintenance/detox clinics. In 1990 (the most recent year for which NIDA data are available), 508 injection drug users were tested (Battjes et al. 1991).

Another two ongoing studies are based outside drug abuse treatment clinics. Blinded tests are conducted by the County Department of Health Services in STD clinics. Among those tested through September 1991, the number of self-reported injection drug users is 390. Antibody testing is also done on a nonblinded (confidential) basis at County alternative test sites, where 770 self-reported injection drug users have been seen as of October 1991.

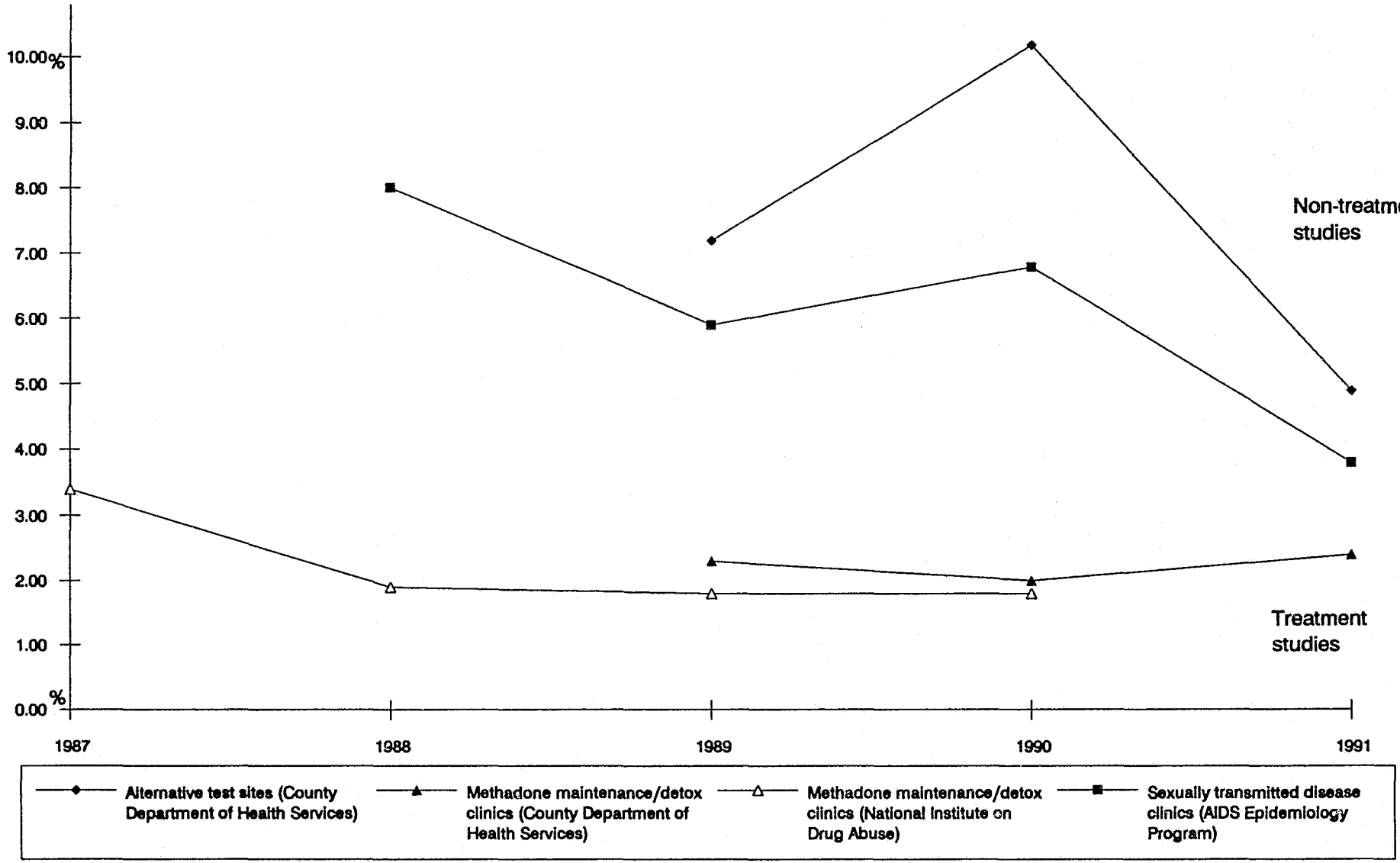
We obtained new seroprevalence data from each of these studies and, where necessary, updated 1990 data that were not complete in last year's report. Figure 2.1 displays data from each year of these studies.

Seroprevalence in the County Department of Health Services treatment-based study has risen slightly from 2.0% in 1990 to 2.4% in the first nine months of 1991. This is the only study in which an increase has occurred. (Even this increase is slight and does not meaningfully surpass the 1989 rate of 2.3%. Pre-1991 rates shown in Figure 2.1 are from blinded studies. Both the blinded and the nonblinded study in 1991 find 2.4% seroprevalence.) The second treatment study, conducted by NIDA, shows no change. With 1989 data now complete, 1.8% seroprevalence is indicated. This rate is matched in the 1990 data, which are also complete.

Seroprevalence in both of the nontreatment studies has declined. In 1990, 10.2% of injection drug users tested on a nonblinded basis at the County's alternative test sites were antibody-positive. In the first ten months of 1991, the comparable rate is 4.9%. Similarly, 6.8% of injection drug users tested on a blinded basis in County STD clinics were antibody-positive in 1990; only 3.8% have tested positive through the first nine months of 1991.

In summary, the pattern of increase in these studies between 1988 and 1990 has not persisted in 1991. We can only speculate on possible reasons for the earlier hint of increasing seroprevalence. There may have been some fluctuation over time in the degree of HIV risk characterizing injection drug users who sought nonblinded testing, or accepted

FIGURE 2.1
HIV SEROPREVALENCE STUDIES, LOS ANGELES COUNTY, 1987-1991



longshore:rrecs2_1.xlc/dlslide2ws.xls

blinded testing, in these studies. If people who were tested in 1989 and 1990 were, on average, at higher risk than those who sought testing earlier or later, that difference could account for the up-and-down pattern in Figure 2.1. On the other hand, earlier increases were not large, and shifts over time could reflect minor and meaningless fluctuation in sample composition from year to year.

Last year we cited a lack of seroprevalence data on drug users in residential treatment. The only such data available at that time were from a 1987 sample of 292 injection drug users enrolled in residential drug-free programs. The seropositive rate in this sample was 4.8%--higher than rates found in any other treatment sample. We can now report new findings based on 543 drug users who received confidential testing in County residential programs during the first nine months of 1991. The seropositive rate is only 0.9%. These new findings are consistent with the view that seroprevalence is low and stable among drug users in Los Angeles. It should be noted, however, that we do not know how many users in this new residential sample were injection drug users.

Last year we also cited the need for further seroprevalence research conducted on the streets rather than in community-health or drug treatment clinics. A street-based study conducted in Long Beach between 1988 and 1990 found 6% seroprevalence overall, but no such study had yet been done in Los Angeles. Between April and July 1991, the County Department of Health Services provided confidential serotesting for 338 injection drug users in the downtown area. A seropositive rate of 8.9% was detected. Among 223 users tested near downtown's Skid Row, the seropositive rate was somewhat higher at 11.7%.

SEROCONVERSION

In 1989 the UCLA Drug Abuse Research Center began recontacting injection drug users whose serostatus was already known because they had participated in one of three County seroprevalence studies in 1986 and 1987. The three study samples totaled 1,506 cases, all of whom were drawn from methadone maintenance/detox or residential drug-free programs.

We selected a random sample of 465 cases. When recontacted, these cases were asked to enroll in a new study monitoring their antibody status and risk behavior annually for three years. By November 1991, we had traced 398 (90%) of the 440 cases who were antibody-negative in 1986-87. This total includes 33 cases who have died and seven who refused to participate. We have detected two seroconversions. If the 30 deceased cases and nine refusals are excluded from the denominator, the seroconversion rate is 0.56% over roughly a four-year period (2/358), or 0.14% per year. We have reviewed death certificates for all deceased cases and found no indication that their deaths were HIV-related. Thus, actual seroconversion may be slightly lower than these rates suggest (Longshore and Anglin 1992).

Higher seroconversion rates have been reported among injection drug users in cities of the eastern and midwest United States--for example, 9.7% per person year in Chicago (Ouellet et al. 1991b) and 5.5% in Newark and Jersey City (Iguchi et al. 1991). Across 13 cities tracking seroconversion in the National AIDS Demonstration Research (NADR) program, 1.1% of injection drug users seroconverted between the initial contact and the six-month follow-up (Friedman et al. 1991). The lower rate in this Los Angeles sample suggests that new infections have occurred more slowly here than in other U.S. cities.

DISCUSSION

Seroprevalence studies can be used to monitor the overall rate of HIV infection across serial samples of a population but may miss the rate at which new infections occur. Seroconversion studies serve a complementary purpose by tracking the spread of HIV within the same sample over time. Both types of study reviewed in this section indicate that seroprevalence has remained stable, and seroconversion rare, among Los Angeles injection drug users. Rates are probably no higher than 3% among injection drug users enrolled in either residential or outpatient treatment and no higher than 7% among those not in treatment. If it is assumed that 10-20% of injection drug users are enrolled in treatment at any given time, a weighted average of these two rates indicates that seroprevalence is probably near 6% overall.

We wish to raise three cautionary points. First, NADR program data do not show a close correspondence between the levels of overall seroprevalence in NADR cities and the rate at which further HIV transmission occurs (Friedman et al. 1991; see also Blower 1991). One unidentified city, for example, reported a seroconversion rate in excess of 2% despite a seroprevalence rate quite similar to that in Los Angeles, about 6%. Thus, low and stable seroprevalence does not preclude the possibility of rapid new HIV transmission.

Second, all cases in our seroconversion study were originally recruited from drug abuse treatment programs. About one-third of the still-active users were in treatment when recontacted. Study findings therefore may not reflect the overall seroconversion rate among the County's injection drug users.

Third, the 1991 street-based survey in downtown Los Angeles detected roughly 12% seroprevalence among injection users on Skid Row. This figure is almost matched by the 10% found among homeless injection drug users who received serotesting at a health clinic in the same area in 1990 (Longshore and Anglin 1990: 9). It is conceivable, then, that low and stable infection rates overall are masking small "hot spots" of rapid seroconversion. Skid Row is one possible spot. There may be others, emerging where a large number of people at high risk of infection live in close proximity to each other.

SECTION 3: BEHAVIOR TRENDS AMONG INJECTION DRUG USERS

INTRODUCTION

The Drug Use Forecasting (DUF) Program, funded by the National Institute of Justice since 1987, monitors drug-use trends in over twenty U.S. cities, including Los Angeles. On a quarterly basis, random samples of adult arrestees are asked to describe their lifetime and recent drug use patterns (e.g., types of drug used and frequency of use) and to provide urine specimens by which their self-reported recent drug use can be verified. Interviews follow a standard protocol. In 1988 the Los Angeles DUF began supplementing this standard protocol with additional questions concerning involvement in behavior such as sharing needles and engaging in unprotected sex.

About 450 adult arrestees are interviewed in Los Angeles city and county jails each quarter. A history of illicit drug use by injection is typically reported by about 135 arrestees (30% of the total), and two-thirds of these lifetime users report having injected drugs within the past year. Thus, typically about 90 arrestees (20% of the total sample each quarter) report recent injection drug use.

Section 3 of last year's report described trends in HIV risk among recent injection drug users interviewed between October 1987 to January 1990. The trend lines were based on four to seven quarters--depending on whether supplemental questions were asked and allowing for the loss of some quarters when DUF was suspended. These few data points limited the statistical power of trend analyses, so our conclusions were in some cases very tentative. The same trend lines can now be extended across another five DUF quarters covering April 1990 to April 1991, providing a total of nine to twelve data points overall. Thus, conclusions can be drawn from current trend data with greater confidence than before.

Last year we noted that trends seen among drug-using arrestees sampled in DUF are probably an accurate reflection of trends occurring in the county's overall population of injection drug users. We continue to believe this to be the case. First, there has been little variability across quarters in the demographic composition of DUF arrestees who report recent injection drug use. (Demographic indicators that we have examined include ethnicity, age, gender, income, and education.) It therefore seems unlikely that DUF trends have been influenced by any underlying fluctuation in the characteristics of arrestees interviewed each quarter. Second, whenever possible, we have compared DUF data for any given year with data from cross-sectional studies conducted in the same year among injection drug users recruited from places other than jails. The similarity of findings across studies is, in most cases, striking (see Longshore and Anglin 1990: 15).

Section 3 reviews trends in drug- and sex-related behavior reported by the subsample of DUF arrestees who admitting using illicit drugs by injection during the year before their interview. These trends are based on the percentage of arrestees who reported:

- having shared a needle in the past year,
- having stopped needle sharing (not necessarily throughout the past year),
- having shared a needle with strangers in the past year,
- having shared a needle at shooting galleries in the past year,
- having used bleach to disinfect needles in the past year (sharers only),
- having always used bleach to disinfect needles in the past year (sharers only),
- having had oral, vaginal, or anal sex with two or more partners in the past year,
- having had oral, vaginal, or anal sex with five or more partners in the past year,
- having used condoms in the past year (nonmonogamous cases only).

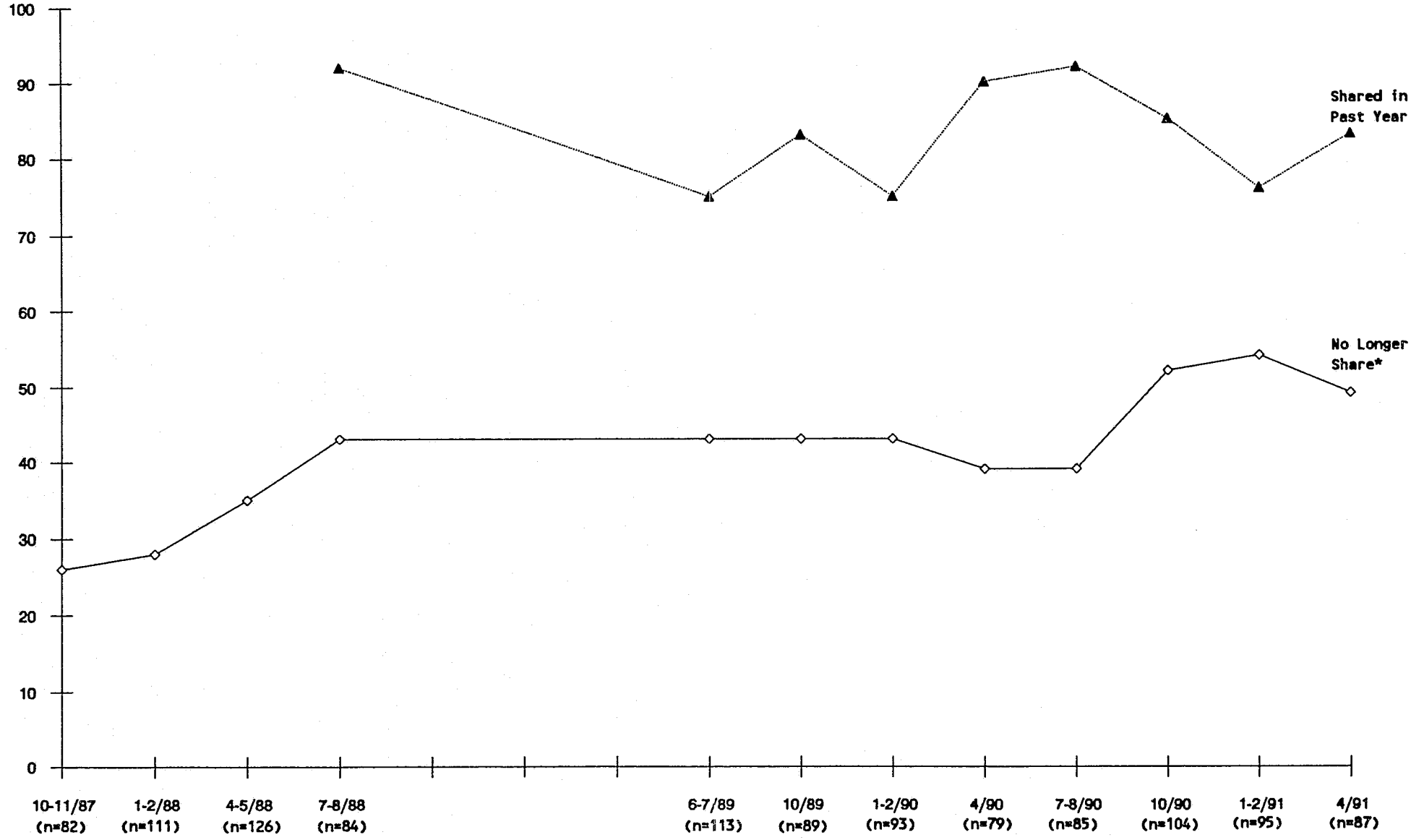
DRUG-RELATED BEHAVIORS

NEEDLE SHARING

Since 1988 the supplemental DUF interview in Los Angeles has included this question: "Have you shared needles in the past year?" We restricted our analysis of this question to users who reported having ever shared a needle, so that reports of no sharing in the past year would represent an effort to reduce one's risk. Almost all users (92%) reported sharing needles at some time in the year preceding the mid-1988 interview; see the upper trend line of Figure 3.1. Sharing later declined to a low of 75% in early 1990 but increased again thereafter. In late 1990, sharing was reported by 92%, duplicating the peak percentage of 1988. These findings do not necessarily mean that injection drug users have made no effort to reduce the risk associated with needle sharing; they may share less often now or share with fewer people. DUF data provide no basis for commenting on these possibilities. But it is clear that a great majority of users continue to share needles on at least some occasions. Through April 1991, no downward trend is discernable in this source of HIV risk.

Since 1987 the standard (nationwide) DUF protocol has asked: "How often do you share?" There has been a marked increase in the percentage of users who answer that they no longer share needles at all. (This trend is not necessarily in contradiction to that based on the previous question. Users may have shared sometime in the past year, then stopped.) As shown in the lower trend line of Figure 3.1, 26% of users interviewed during October

FIGURE 3.1
TRENDS IN SHARING AMONG INJECTION DRUG USERS, LOS ANGELES COUNTY DRUG USE FORECASTING PROGRAM ARRESTEES
(cases who ever shared needles)



* Trend significant, p <0.0001

LONGSHORE FIG1.XLC

1987 answered that they no longer share. By early 1990 this percentage leveled off at 43%. We noted in last year's report that the increase was statistically significant ($p=0.005$); there is very little chance that the change from 1987 to 1990 was due simply to random fluctuation across samples. However, we also noted that the increase might have been due to a mid-1989 change in the wording of the question. We can now report that this increase was probably not an artifact of the changed wording. After 1989, the percentage who say that they no longer share continued to rise, peaking at 54% in early 1991. The overall trend from 1987 to 1991 is statistically significant ($p<0.0001$).

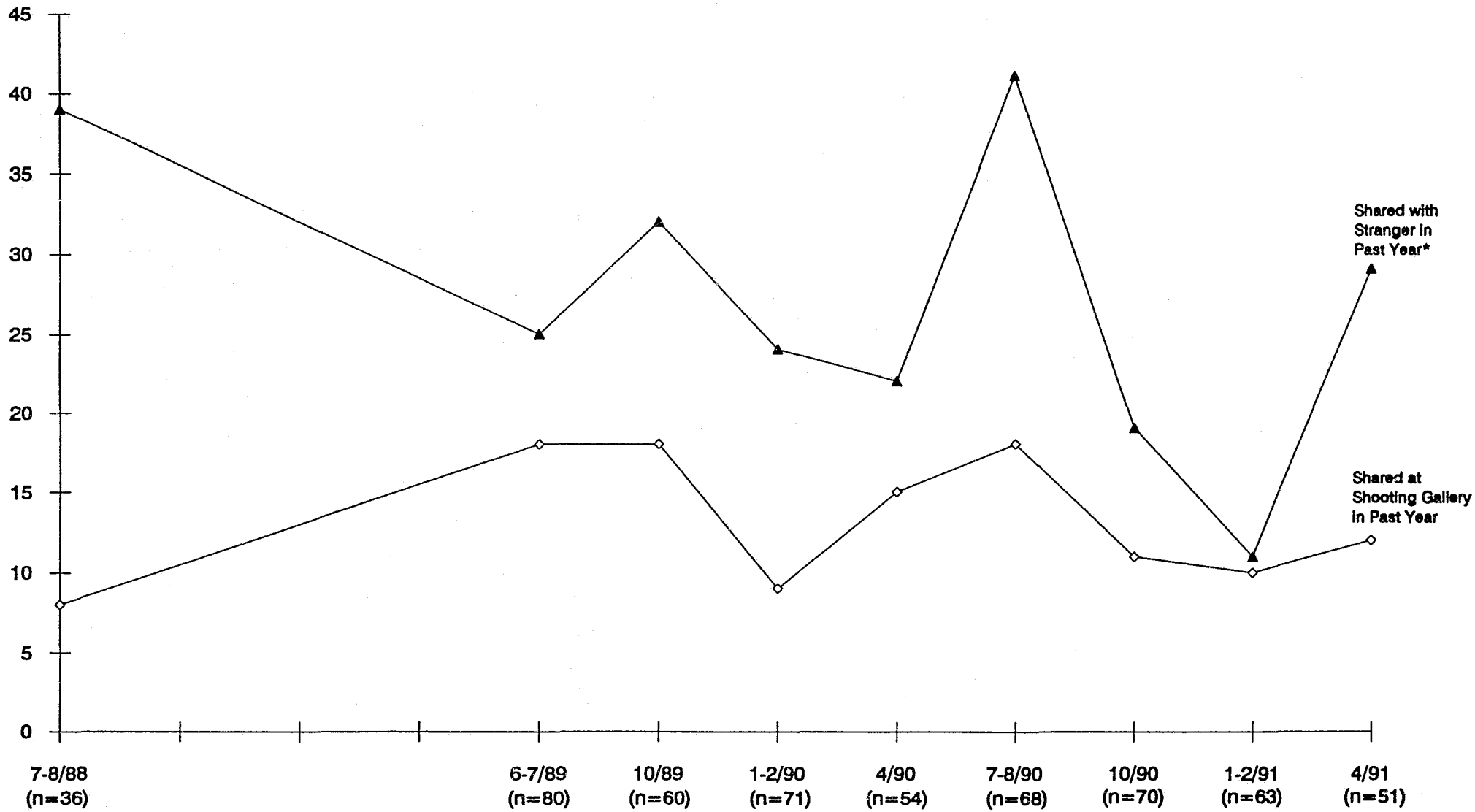
Why is risk reduction indicated for this second question but not the first? There are two possible answers. First, in any survey concerning undesirable or dangerous behavior, respondents are liable to under-report. This problem could affect answers to either question in the DUF survey but may bear more heavily on the second. Users may honestly report past-year sharing without much hesitation; such sharing could have occurred several months before the interview. However, the same users might be more reluctant to admit that they currently share needles. With no means of corroborating self-reports, we cannot rule out the possibility that the two trend lines in Figure 3.1 are subject to question-specific differences in the rate at which users under-report sharing.

We believe, however, that a second explanation is more plausible. Under this explanation the difference in trend lines can be reconciled without assuming that under-reporting affects one trend line more than the other. Specifically, we believe that more users over time have managed to stop sharing at some point <u>during</u> the year (the lower trend line) but have not necessarily been able to sustain that change for an entire year (the upper line). Why is this interpretation more plausible that the first? A close examination of the two trend lines shows that, beginning with the first quarter of 1990, changes in each line are mirrored in the other. When an increase occurs in the percentage who shared in the past year, a corresponding decrease occurs in the percentage who no longer share, and vice versa. Thus, the variation in risk, as indicated by both questions, has become consistent <u>within quarters</u>. We believe that this consistency can be taken as evidence for a substantive interpretation of the two trend lines, rather than a methodological one. Not yet in evidence is the same sort of consistency <u>across quarters</u>, i.e., a steady decline over time in the percentage of users who say that they no longer share <u>and</u> that they have not done so for at least one year.

Users who report needle sharing are also asked whether they have shared in the past year with strangers or at shooting galleries. In low-seroprevalence regions like Los Angeles, the risk of HIV infection/transmission is probably greater under these circumstances than otherwise (Battjes and Pickens 1988).

Among users who shared in the past year, there has no been confirmable reduction in the degree of risk incurred by sharing with strangers; see the upper trend line of Figure 3.2. The percentage who reported sharing with strangers in the past year has fluctuated widely--from 39% in 1988, down to 22% in early 1990, back to 41% in mid 1990, and finally 29%

FIGURE 3.2
TRENDS IN SHARING WITH STRANGERS AND AT SHOOTING GALLERIES AMONG INJECTION DRUG USERS,
LOS ANGELES COUNTY DRUG USE FORECASTING PROGRAM ARRESTEES
(cases who shared needles in the past year)



* Trend nearly significant, $p<0.1$

LONGSHORE FIG2.XLC

in the latest available quarter. Averaged across quarters, the percentage who reported sharing with strangers in the past year is about 30%. The p-value is low enough to suggest that this source of risk may actually have declined (i.e., that the trend is not just a sampling artifact), but at $p=0.10$ it is higher than the usual criterion for statistical significance ($p \leq 0.05$). Moreover, if the trend is actual, it is also very unstable. We therefore conclude that a reduction in this source of risk cannot be confirmed at this time.

Similarly, there has been no apparent decline in the percentage of needle sharers who reported having engaged in this practice at shooting galleries; see the lower trend line of Figure 3.2. The data points are scattered, averaging about 13% across quarters though never exceeding 18%.

BLEACH USE

Drug users who share needles are asked whether they have, in the past year, disinfected their needles with household bleach--the agent considered most effective against HIV (Newmeyer 1988). Unlike trends in needle sharing, trends in the percentage reporting bleach use indicate considerable reduction of risk; see Figure 3.3. In 1988, 24% of sharers said they disinfected their needles with bleach at least occasionally (upper trend line), though only 3% said that they always did so (lower trend line). Increases since then have been fairly steady. By 1991, over 70% of all sharers reported using bleach at least occasionally, and over one-third reported using bleach always. Both trends are statistically significant ($p < 0.0001$).

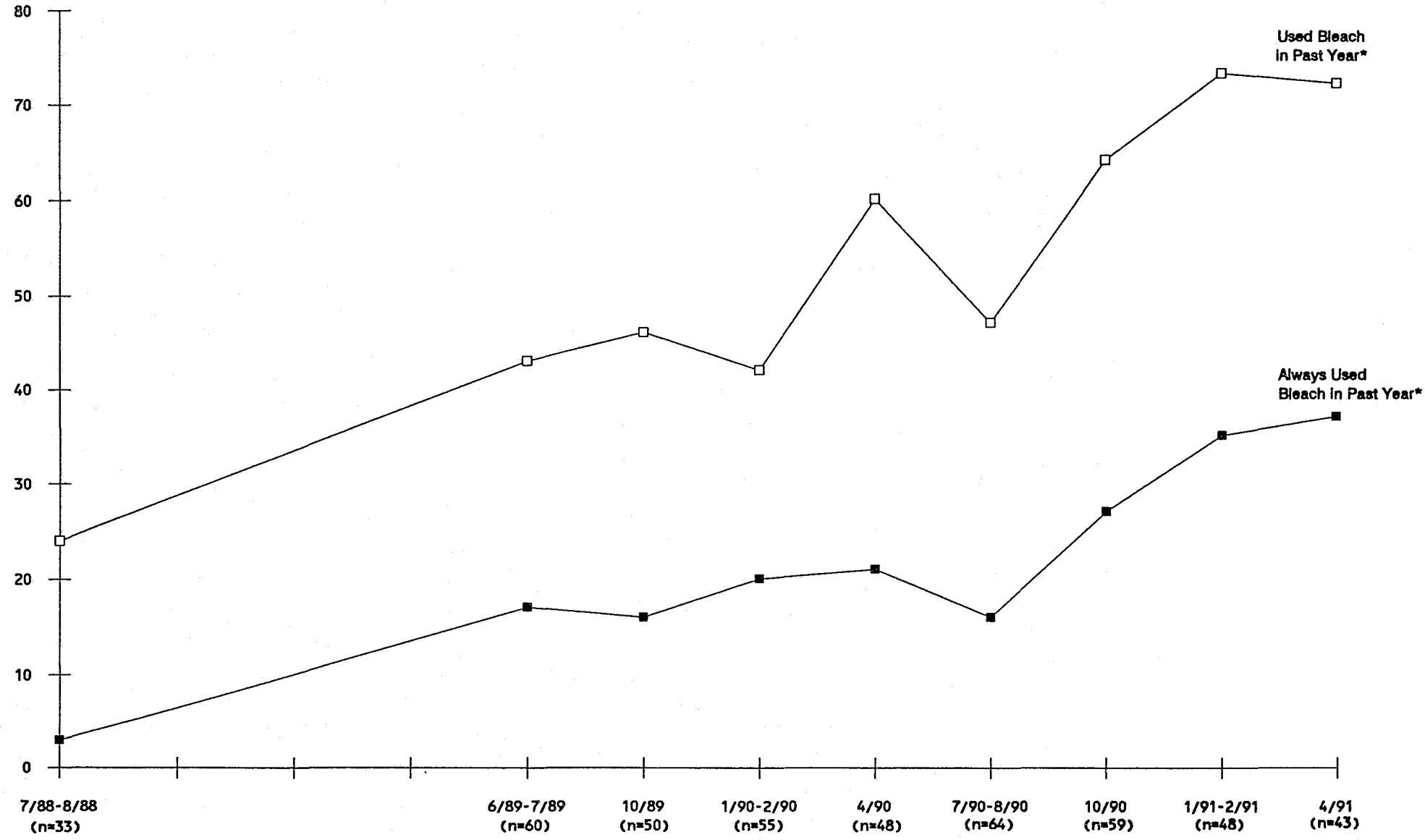
SEX-RELATED BEHAVIORS

NUMBER OF SEX PARTNERS

Users are asked to estimate the number of people, men or women, with whom they have had sex in the past year. We have analyzed responses to this question by, first, calculating the percentage who reported two or more partners. Because most users have reported sex with at least two partners, we also created a second, more restrictive measure of HIV risk: the percentage who reported sex with five or more partners.

As shown in the uppermost trend line of Figure 3.4, there has been no consistent change from 1988 to 1991 in the rate at which users report nonmonogamous sex (two or more partners). The lowest quarterly percentage was 62% in mid 1989; the highest, 70% in mid 1990. Our more restrictive measure of risk, sex with five or more partners, is shown in the bottom line of Figure 3.4. This measure too varies only slightly from a low of 33% in mid 1989 to a high of 41% in early 1990. As with our findings for past-year needle sharing, the

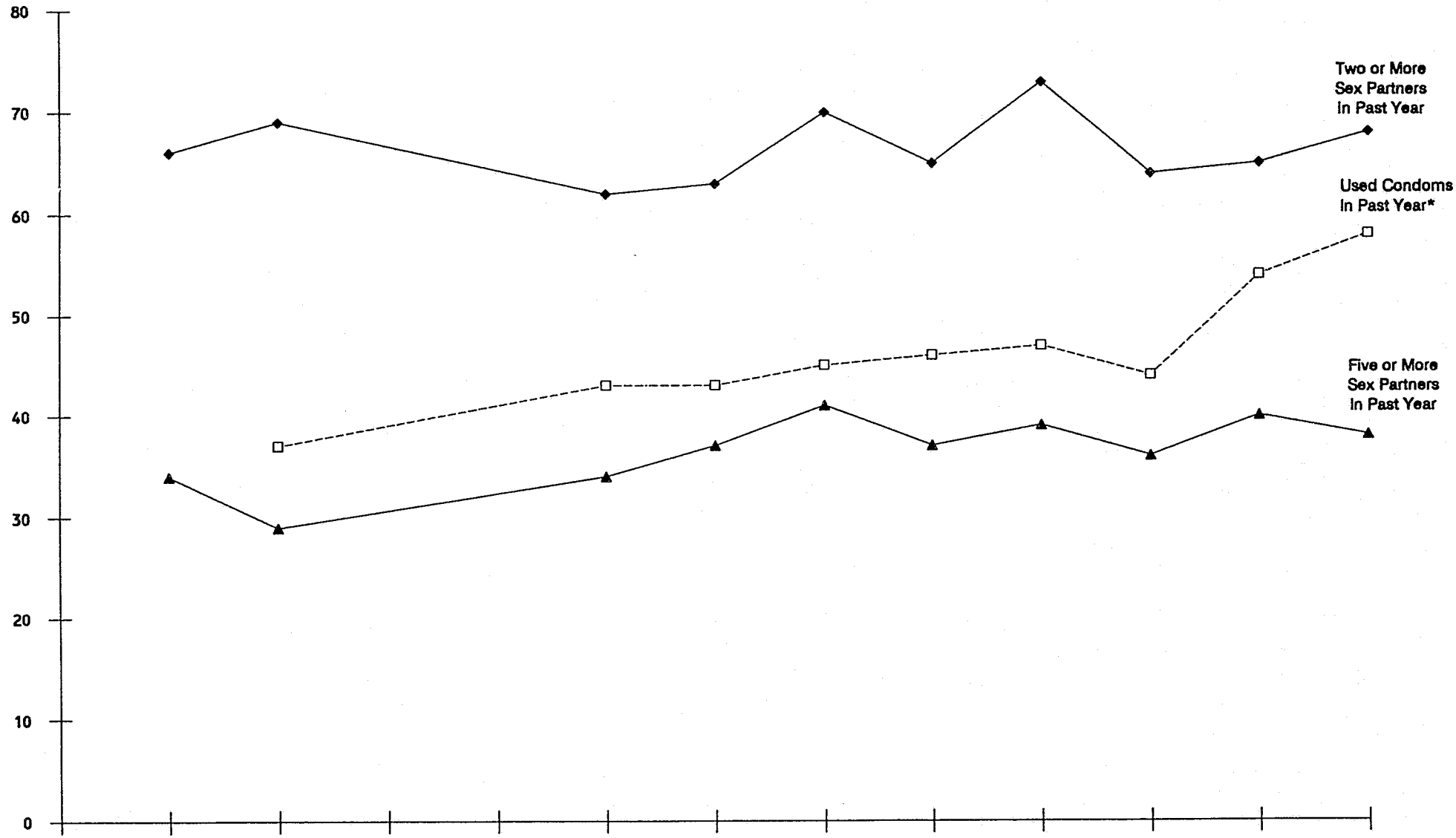
FIGURE 3.3
TRENDS IN BLEACH USE AMONG INJECTION DRUG USERS, LOS ANGELES COUNTY DRUG USE FORECASTING PROGRAM ARRESTEES
(cases who shared needles in the past year)



* Trend significant, p<0.0001

LONGSHORE FIG3.XLC

FIGURE 3.4
SEX-RELATED TRENDS AMONG INJECTION DRUG USERS, LOS ANGELES COUNTY DRUG USE FORECASTING PROGRAM ARRESTEES



* Trend Significant, p<0.02

LONGSHORE FIG4.XLC

flat trend lines for past-year sex partners do not necessarily mean that users have not reduced their risk in other ways, e.g., choosing partners more carefully or having sex less often. Nonetheless, it is clear that most users continue to have sex outside the context of monogamous relationships. Through April 1991, no reduction has been detected in this source of risk.

CONDOM USE

The middle trend line in Figure 3.4 shows the quarterly percentage of nonmonogamous users who reported using condoms at least occasionally in the past year. Condom use has steadily increased between 1988 and 1991 except for the minor decrease in October 1990. By mid 1991, 58% of nonmonogamous users reported some use of condoms. This trend reaches statistical significance ($p < 0.02$).

DISCUSSION

Because all of these risk measures are self-reported, they may be affected to some degree by random error (e.g., inaccuracy due to faulty memory) or deliberate distortion (e.g., under-reporting of dangerous or stigmatized behavior). As noted above, rates of current risk probably are subject to under-reporting. It is not likely, however, that this problem has influenced self-reports from any one quarter noticeably more than those from any other. Thus, while the absolute level of risk in each quarter may have been under-reported, we believe that trends across quarters may still accurately reflect change in the relative level of risk over time.

Findings on sex-related risks can be summarized briefly. We found no indication in the Los Angeles DUF data that injection drug users are reducing their HIV risk by staying monogamous or having sex with fewer partners. On the other hand, condoms seem to have entered the sexual repertoire of a majority of those users who are not monogamous. More users now recognize the risk of unprotected sex and, at least occasionally, take the precaution of condom use.

Though DUF data do not address this issue, it is likely that condoms are used more often with casual or paying partners than with primary partners (see Miller et al. 1990). Preliminary data from an ongoing study in Los Angeles show that drug-injecting women used condoms more often with nonprimary sex partners than with primary partners. On the other hand, fully 70% had engaged in unprotected sex with a nonprimary partner within the past six months (Nyamathi 1991). In short, though the risk of sex with nonprimary partners seems more easily recognized and managed, it is clear that condoms are not used <u>whenever</u> sex occurs with a nonprimary partner. Furthermore, it is important to note that infection can occur through unprotected sex between primary partners if either has had unprotected sex with a nonprimary partner. This source of risk may be especially troublesome for

primary partners because raising the option of condom use is often taken as a sign of distrust or as an impediment to intimacy (this point is reviewed in detail in Longshore 1992).

Regarding drug-related trends, the Los Angeles DUF data suggest that injection drug users are increasingly making efforts to reduce their risk of HIV infection. Bleach has entered the repertoire of a majority of users who share needles; this change probably reflects both the spontaneous response of drug users to their risk of HIV infection and the influence of organized outreach to drug users in the County. Another favorable indicator is that more users now manage to avoid needle sharing for some period of time. However, there has been no confirmable decrease in the percentage who manage to avoid needle sharing for as long as one full year, the percentage who share with strangers, or the percentage who share needles at shooting galleries.

In addition, fewer than half of the drug users who share needles always use bleach. Organized efforts to promote bleach use will probably have to be intensified in order to maximize both the prevalence and the frequency of bleach use. As with condom use, the promotion of bleach use may be most difficult when the drug user's sharing partner is a spouse or "running buddy" because introducing bleach into their drug-use routine may be taken as a sign of distrust.

Why do so many users manage to stop sharing needles for perhaps several weeks or months at a time but then lapse, and why do some users continue to share in highly risky circumstances? The answer, we believe, is that needle sharing and related risks are difficult for many users to avoid entirely. This is surely the case for drug-dependent users who are subject to symptoms of withdrawal or craving. But many users, whether dependent or not, wish to conceal the fact of their use from spouses and other household members. This may limit or preclude drug use at home. In addition, possessing injection paraphernalia without a prescription is illegal in California. Hence it is risky to carry one's own injection paraphernalia to places where drugs can be bought or used. Because it is also risky to possess an illegal drug, many users take it as soon after "copping" as possible even if this means they must split their portion, or share needles, with another user. Finally, people who have been injecting drugs for some years may have deep or collapsed veins and so require the help of someone who is adept at finding veins still usable. Such help is often available at shooting galleries. (For more details on shooting galleries see Ouellet et al. [1991b] and Waldorf et al. [1991].) These factors probably account for occasional needle sharing even by the user who has resolved to avoid it. They probably account as well for the persistence of occasional drug use with strangers or at shooting galleries. Such risks may never be fully eliminated, and again this is especially true for users experiencing symptoms of withdrawal or craving. Anxious to avoid those symptoms, they may see unsafe drug use as their only immediate alternative.

SECTION 4: HIV RISK AND COCAINE INJECTION

INTRODUCTION

Some research has indicated that the risk of HIV transmission may be particularly high among users whose preferred injection drug is cocaine. The higher risk associated with cocaine, as compared to opiates, has been reflected in more frequent risk behavior, such as needle sharing or failing to use bleach, and in higher rates of seroprevalence. However, other research has not found any notable difference in risk behavior or seroprevalence in relation to primary drug of abuse.

In this section we employ 1988-91 Drug Use Forecasting data to test the association between drug preference and HIV risk behavior in a sample of drug-using arrestees in Los Angeles. We also update last year's comparison of local seroprevalence rates by primary drug of abuse.

BACKGROUND

Studies have shown that seroprevalence is related positively to cocaine injection among drug users in cities such as Chicago (Wiebel et al. 1990), New York (Nemoto et al. 1990), Newark (Iguchi et al. 1990), and San Francisco (Chaisson et al. 1989; Watters 1988). Some of these studies found HIV infection be higher specifically among drug injectors whose primary drug is cocaine, but the possibly greater risk of cocaine use is not confined to primary cocaine users. Other studies have found a positive relationship between frequency of cocaine injection and seropositive status among polydrug injectors who use opiates more commonly than cocaine.

At least two explanations may account for these findings. First, people enrolled in drug abuse treatment may be at lower risk of HIV transmission (Chaisson et al. 1989; National Institute on Drug Abuse 1988), and opiate users appear more likely than nonopiate users to enter treatment (Longshore et al. 1992). This relationship between treatment and risk is probably due to lower frequencies of drug injection among treatment clients who continue to use drugs. It may also reflect behavioral risk reduction--less needle sharing, more bleach use--prompted by the influence of other treatment clients or by AIDS-education received in treatment. Second, cocaine use often occurs in binges during which the drug is injected repeatedly; ten to twenty injections per day are said to be common. With more frequent injection may come more frequent needle sharing. Some studies have found in fact that cocaine users more often share needles (Chaisson et al. 1989; Clark et al. 1990; Guydish et al. 1990), more often use drugs at shooting galleries (Chaisson et al. 1989), and less often disinfect their needles with bleach (Margolis et al. 1990).

Last year's report cited a lack of evidence regarding HIV transmission risk among injection drug users whose preferred drug is cocaine. Only two Los Angeles seroprevalence studies reported infection rates for users of different drug types; neither found a difference between opiate and cocaine injectors (Longshore and Anglin 1990: 70). The report also examined two drug-related risk behaviors, sharing needles and failing to use bleach. Risk was compared between drug users who reported more cocaine use than opiate use in the past year and users who reported equal or greater use of opiates. Drug preference was not related to sharing needles or failing to use bleach in the past year. However, our measure of drug preference--based on duration rather than intensity of use--may have missed an important difference between cocaine users and opiate users. Also, limited by sample size (n=260), we were not able to run multivariate analyses of two lower-incidence risk behaviors, sharing needles with strangers and sharing needles at shooting galleries.

UPDATED FINDINGS

SEROPREVALENCE

We have found no new evidence to suggest that seroprevalence might be higher in Los Angeles drug users who prefer cocaine to opiates. Data provided by the AIDS Research & Education Project at California State University, Long Beach, show no difference in 1990 rates of infection among daily cocaine injectors (4.1%, n=145), daily heroin injectors (4.3%, n=415), and daily speedball injectors (4.8%, n=313). (Speedballs are cocaine/heroin combinations.)

The 1989-91 UCLA Cocaine Treatment Evaluation, which studied the effects of inpatient, outpatient, and mixed-modality treatment, included 85 cases with a history of cocaine use by injection. The seropositive rate among them was 5.9%--somewhat higher than the 3% found among opiate users in County outpatient programs. But that figure is not significantly higher than the 5% found among opiate users in a 1988 residential treatment study (Longshore and Anglin 1990: 70) or the probable 6% infection rate among Los Angeles injection drug users overall (see Section 2).

In the Long Beach study, it is likely that many daily users of one drug were daily or nondaily users of another, so the distinction between heroin and cocaine users in that study may not be sharp. A similar point can be made concerning the Cocaine Treatment Evaluation; over 40% of cases had also used heroin (Khalsa et al. 1991). However, data from another study enable us to distinguish drug preference more clearly. The UCLA Nursing Study includes 159 women with a history of injection drug use. Of this total, 80 reported having used cocaine, and two (2.5%) were antibody-positive. Among 69 women who had not used cocaine, four (5.8%) were antibody-positive. This difference runs counter to the expectation that noncocaine users are more likely to be infected.

BEHAVIOR

Findings in this section are based on Drug Use Forecasting (DUF) Program data collected among drug-using arrestees in Los Angeles from 1988 to 1991. See Section 3 for a discussion of DUF procedures and the generalizability of findings from the DUF sample of drug-injecting arrestees to the overall population of Los Angeles injection drug users.

These analyses overcome two limitations of analyses done last year. First, new analyses are based on a larger sample. Only 260 cases had complete data last year--a sample size that precluded analyses of low-incidence behavior such as sharing with strangers and at shooting galleries. Data are now complete for 573 cases, making it possible to examine those behaviors and to improve the statistical power of the previous analyses of needle sharing and failing to use bleach.

Second, last year's measure of drug preference was, as noted already, based on duration of use (number of months in which either drug was injected in past year). We have since created a second measure based on intensity of use (number of injections of each drug in the past month). Analyses in this section employ both measures.

It is also important to note a persistent limitation of the DUF data. Our measures of risk behavior are dichotomous (yes/no), not continuous, for one of two reasons. Some DUF questions ask only for yes/no answers. Other questions ask arrestees to report risk-behavior frequencies, which might have been used to create continuous measures of risk. But the distribution of answers to some of these questions was highly skewed; we therefore recoded answers simply as yes or no.

Methods

Because the behavior measures are dichotomous (yes/no), we employed logistic regression techniques (Afifi and Clark 1984). Two dummy variables for drug preference were used in predicting these behaviors. A preference for cocaine was assumed among users who reported a longer period of cocaine injection than of heroin injection in the past year. Those users were coded 1. All other users, i.e., those preferring heroin and those with no preference on this measure, were coded 0. Similarly, a preference for cocaine was assumed if that drug was injected more often in the past month than heroin. Users reporting more frequent cocaine injection were coded 1; all others were coded 0. Prediction equations also included age, education, ethnicity, and gender so that any demographic differences associated with drug preference could be taken into account. (Coding for demographic predictors is shown in the tables.)

Findings

Neither measure of drug preference was significantly related to past-year needle sharing, needle sharing with strangers, needle sharing at shooting galleries, or failure to use bleach. Tables 4.1 to 4.4 present the results of logistic regressions using the drug-preference measure based on duration of use. Results for the intensity measure are virtually the same and shown in footnotes only.

The only variable consistently related to these behaviors is gender, though relationships are not always in the same direction. Women are significantly more likely to have shared needles in the past year (odds ratio=1.73, $p<0.05$) but less likely to have done so with strangers (odds ratio=0.51, $p<0.005$) or at shooting galleries (odds ratio=0.51, $p<0.05$). In addition, women are less likely to have reported never using bleach to clean their needles (odds ratio=0.65, $p<0.05$). We believe that the gender difference in sharing patterns may reflect the fact that many women who inject drugs do so mainly with their husbands or lovers (Hser et al. 1987; Tucker 1982). If so, they may incur a lower risk of HIV transmission, but by the same token they may be harder to identify and influence through outreach.

DISCUSSION

In some cities, seroprevalence and behavioral risks are higher among drug users whose preferred injection drug is cocaine rather than opiates. However, we found no evidence that cocaine injection is associated with higher risk among drug users in Los Angeles. HIV infection rates observed among cocaine injectors are similar to rates observed among opiate injectors. Moreover, drug preference is unrelated to needle sharing overall, needle sharing with strangers, needle sharing at shooting galleries, or failing to use bleach as a needle disinfectant.

It remains possible that a preference for cocaine injection is in fact associated with drug-related HIV transmission risks in Los Angeles. Seroprevalence data can be analyzed by drug of abuse in only a few studies, and the comparisons we were able to make were imprecise. Moreover, because the risk measures available for our analyses are dichotomous (yes/no), we were not able to determine whether sharing occurs more often, or bleach use less often, among drug injectors who prefer cocaine to opiates or among those whose frequency of drug injection is greater.

Table 4.1

Likelihood of Needle Sharing by Injection Drug Users in the Past Year,
Los Angeles Drug Use Forecasting Program Arrestees
(n=573)

Predictor	Predictor Category	Adjusted odds ratio (95% CI)
African American ethnicity	No	1.00
	Yes	0.85 (0.47, 1.54)
Hispanic ethnicity	No	1.00
	Yes	0.90 (0.54, 1.51)
Age	Under 28	1.00
	28 or older	1.26 (0.77, 2.05)
Gender	Men	1.00
	Women	1.73 (1.06, 2.83)*
Years of education	Under 12	1.00
	12 or more	0.65 (0.40, 1.07)
Preferred drug[1]	Opiates	1.00
	Cocaine	1.17 (0.64, 2.16)
Hosmer-Lemeshow chi square		9.26 (p=0.32)

*$p < 0.05$

[1] 0=months of opiate use in past year equal to or greater than months of cocaine use, 1=months of cocaine use in past year greater than months of opiate use. Coding for an alternative measure was as follows: 0=days of opiate use in past month equal to or greater than days of cocaine use, 1=days of cocaine use in past month greater than days of opiate use. Adjusted odds ratio for this second measure=0.91 (p=0.73).

Table 4.2

Likelihood of Needle Sharing with Strangers by Injection Drug Users in the Past Year, Los Angeles Drug Use Forecasting Program Arrestees (n=553)

Predictor	Predictor Category	Adjusted odds ratio (95% CI)
African American ethnicity	No	1.00
	Yes	0.94 (0.55, 1.58)
Hispanic ethnicity	No	1.00
	Yes	0.70 (0.44, 1.09)
Age	Under 28	1.00
	28 or older	1.26 (0.82, 1.93)
Gender	Men	1.00
	Women	0.51 (0.34, 0.79)*
Years of education	Under 12	1.00
	12 or more	0.76 (0.51, 1.15)
Preferred drug[1]	Opiates	1.00
	Cocaine	1.19 (0.71, 1.97)
Hosmer-Lemeshow chi square		14.49 (p=0.07)

*p < 0.005

[1] 0 = months of opiate use in past year equal to or greater than months of cocaine use, 1 = months of cocaine use in past year greater than months of opiate use. Coding for an alternative measure was as follows: 0 = days of opiate use in past month equal to or greater than days of cocaine use, 1 = days of cocaine use in past month greater than days of opiate use. Adjusted odds ratio for this second measure = 1.36 (p = 0.23).

Table 4.3

Likelihood of Needle Sharing at Shooting Galleries by Injection Drug Users in the Past Year, Los Angeles Drug Use Forecasting Program Arrestees
(n = 541)

Predictor	Predictor Category	Adjusted odds ratio (95% CI)
African American ethnicity	No	1.00
	Yes	1.53 (0.79, 2.92)
Hispanic ethnicity	No	1.00
	Yes	0.96 (0.51, 1.80)
Age	Under 28	1.00
	28 or older	1.92 (1.01, 3.67)*
Gender	Men	1.00
	Women	0.51 (0.28, 0.94)*
Years of education	Under 12	1.00
	12 or more	0.65 (0.38, 1.11)
Preferred drug[1]	Opiates	1.00
	Cocaine	0.75 (0.35, 1.60)
Hosmer-Lemeshow chi square		7.58 (p = 0.48)

*p < 0.05

[1] 0 = months of opiate use in past year equal to or greater than months of cocaine use, 1 = months of cocaine use in past year greater than months of opiate use. Coding for an alternative measure was as follows: 0 = days of opiate use in past month equal to or greater than days of cocaine use, 1 = days of cocaine use in past month greater than days of opiate use. Adjusted odds ratio for this second measure = 1.00 (p = 0.99).

Table 4.4

Likelihood of Failure to Use Bleach by Injection Drug Users Who Shared Needles in the Past Year, Los Angeles Drug Use Forecasting Program Arrestees
(n=472)

Predictor	Predictor Category	Adjusted odds ratio (95% CI)
African American ethnicity	No	1.00
	Yes	0.99 (0.58, 1.68)
Hispanic ethnicity	No	1.00
	Yes	1.43 (0.93, 2.20)
Age	Under 28	1.00
	28 or older	0.55 (0.36, 0.83)**
Gender	Men	1.00
	Women	0.65 (0.44, 0.97)*
Years of education	Under 12	1.00
	12 or more	1.18 (0.80, 1.75)
Preferred drug[1]	Opiates	1.00
	Cocaine	1.10 (0.66, 1.82)
Hosmer-Lemeshow chi square		8.65 (p=0.37)

*p<0.05
**p<0.005

[1] 0=months of opiate use in past year equal to or greater than months of cocaine use, 1=months of cocaine use in past year greater than months of opiate use. Coding for an alternative measure was as follows: 0=days of opiate use in past month equal to or greater than days of cocaine use, 1=days of cocaine use in past month greater than days of opiate use. Adjusted odds ratio for this second measure=1.26 (p=0.37).

SECTION 5: SEXUAL BEHAVIOR OF CRACK COCAINE USERS

INTRODUCTION

The risk of HIV transmission through unprotected sex is reportedly high among people who smoke crack cocaine. This risk may be highest among those who, dependent on the drug, exchange sex for crack. But people who are not crack-dependent have been shown to engage in unprotected sex more often than users of other illicit drugs. Not yet known is whether crack use represents a unique marker for HIV risk. That is, after other background and lifestyle characteristics of crack users are taken into account, is crack use itself uniquely associated with higher HIV transmission risk?

The question is important in determining how best to spend resources for drug abuse treatment and preventive education. If risk is particularly high among crack-dependent persons who trade sex for crack, but not among crack users overall, then available resources can and should be targeted to the subgroup of users who are trading sex to feed their habit. Users who meet that description might be given priority on treatment waiting lists. Or, as has already occurred in some U.S. cities, outreach might focus on encouraging "crack house" operators to post materials on AIDS prevention and to let outreach workers use the crack house as a recruitment base for interventions. If, on the other hand, sex risk is significantly higher among crack users overall, then focusing resources too narrowly would be a mistake. Enhanced treatment and prevention efforts should instead target a wider range of crack users, regardless of the level or circumstances of their use.

This section summarizes new analyses of survey data from the Los Angeles portion of the Drug Use Forecasting (DUF) Program, which conducts quarterly interviews with arrestees held in local jails (see Section 3). While only 410 crack-using cases were available for last year's report, this year's update is based on a current total of 1,769 cases, providing more statistical power for tests of the relationship between crack use and sexual behavior. In addition, new analyses incorporate two lifestyle/risk markers--alcohol use and marijuana use--that were not in the original analyses. The predictive value of these risk markers must be taken into account before we can conclude that crack is or is not a unique marker for HIV transmission risk in Los Angeles.

BACKGROUND

When crack cocaine is smoked, it reaches the brain in less than fifteen seconds and produces a strong euphoria often described in sexual terms. The sensation is brief, however, and may be followed by a "crash," during which crack users feel acutely depressed and crave more of the drug. This rapid cycle from euphoria to craving makes crack a powerful reinforcer and helps to explain why users can become dependent on it so quickly (Gawin and Ellinwood 1988; McCoy and Miles 1991).

Some crack smokers use sexual intercourse as a noncash method of payment for the drug. People who trade sex for crack are mostly but not only women; the form of intercourse in the transaction can be oral, vaginal, or anal (Boyle and Anglin 1991; Inciardi 1991). Some female crack users become "house girls" who repeatedly have sex in the exchange for crack at "crack houses," also called "smoke houses," where people buy and use the drug (Inciardi 1992; McCoy and Miles 1991; Mieczkowski 1990, Ouellet et al. 1991a). It has been reported that "sex is readily available" at crack houses, "often in almost any form" (Wiebel and Ouellet 1990: 6).

Early reports of the "sex for crack" phenomenon focused on the presumed hypersexuality of women and men under the influence of crack. For example, Bowser (1988) recounted this description from an informant in a San Francisco neighborhood where crack use was reportedly heavy. "These girls used to have boyfriends of sorts. Now, with this crack thing, they'll do anybody, anytime and anywhere. All they want is that dope and sex, dope and sex" (Bowser 1988: 1).

Later it became apparent that "sex for crack" is an economic and interpersonal phenomenon more than a sexual one. Boyle and Anglin (1991) conducted in-depth interviews with 61 crack users in Los Angeles, 32 of whom were women. "For almost every woman, there was a lack of interest in sex when high on crack" (Boyle and Anglin 1991: 15). Intercourse was merely a noncash method of payment for the drug. Among men in this study, sexual arousal was reportedly enhanced with occasional use of crack but decreased greatly soon after they began smoking it with some frequency. Impotence was typical of men who used crack on a regular basis. Similar findings have emerged from several other U.S. cities (see, e.g., Bourgois 1991; Feldman et al. 1991; Inciardi 1991; Koester and Schwartz 1991; Ouellet et al. 1991a). However, even when crack diminishes their sexual arousal, some men still have sex with "house girls" because they enjoy the sexual domination of women (Koester and Schwartz 1991; McCoy and Miles 1991). In short, many women who are dependent on crack have intercourse in exchange for the drug for economic, not sexual, motives. Among many men as well, the value of the "sex for crack" exchange may be more emotional than sexual.

The proportion of crack smokers who engage in sex for crack is not known, but information is available on related behaviors. In a San Francisco sample of 205 African American crack users, all of whom were 13 to 19 years old, about half reported having sex while high on crack (Fullilove et al. 1990a), and 25% reported having had sex for drugs or money (Fullilove et al. 1990b). In a Miami sample of 289 women who use crack, 34% had traded sex for drugs (McCoy and Miles 1991). A much larger sample is available from the National AIDS Demonstration Research (NADR) Program, which interviewed 6,880 female drug users or sexual partners of drug users in twenty-three U.S. cities during 1988-1990. About one-third of the 2,502 women who used crack regularly (at least once per week during the preceding six months) said that they had traded sex for drugs during that time (Weissman et al. 1990). Overall, one-fourth to one-third of the crack users in these studies reported trading sex for drugs and/or money. The studies do not indicate how many people

actually traded sex for crack, however; partners were not necessarily anonymous, and the drug of exchange was not necessarily crack.

It is nonetheless clear that HIV transmission risk can be quite elevated during "sex for crack" exchanges. "When such a trade is struck, users are at the height of their desire to repeat the drug's rush and, in this state, more willing to accommodate a partner's demands" (Ouellet et al. 1991a: 15). People who trade sex for crack are, in the words of one Los Angeles informant, willing to "do anything, any sexual thing, to get that hit" (Boyle and Anglin 1990: 21). One informant in a Denver study said, "I'm talking about any kind of sexual activity. You know, not just straight screwing. It can be oral, it can be in the behind, just something humiliating, just something degrading... things you normally wouldn't probably do" (Koester and Schwartz 1991: 8). Condom use is unlikely under these circumstances--a fact that is especially troubling in light of reports that anal sex occurs frequently in crack houses. Even oral intercourse poses serious risk because crack smokers can develop oral lesions that facilitate HIV transmission through semen (Inciardi 1991). Accordingly, recent attention has focused on the need for intensive AIDS-prevention outreach to people who trade sex for crack (e.g., Hasbrouck et al. 1990; Sterk-Elifson et al. 1991).

What is the level of HIV risk incurred by crack smokers overall, regardless of whether they are crack-dependent or trade sex for crack? In NADR surveys, the frequency of unprotected oral and vaginal intercourse was higher among women who reported regular use of crack than among those who reported none (Weissman et al. 1990). Regular users reported, on average, 34 instances of unprotected vaginal sex per month, while nonusers reported 26. Regular users reported 18 instances of unprotected oral sex per month, compared to 12 for nonusers. (Anal sex frequencies did not differ; users and non-users both reported about two instances of anal sex per month.) Given these high rates of unprotected sex, it is reasonable to expect a higher rate of sexually transmitted disease (STD) among crack users. STD and HIV infection rates in New York City are, in fact, higher among crack users than among nonusers (DeHovitz et al. 1991). A similar pattern of STD infection has been found among male crack users in Los Angeles (Scribner et al. 1990). While San Francisco continues to report that 12% to 15% of injection drug users are HIV-infected (Longshore and Anglin 1990), the infection rate among heavy crack users in that city may be just as high; Abramowitz et al. (1991) have reported an infection rate of 16%.

While alarming, these findings do not necessarily mean than crack represents a unique marker for sex-related HIV risk. First, there is no consistent evidence bearing directly on the relationship between crack and condom use. In a study of Long Beach women at risk of HIV infection through sex with injection drug users, rates of condom use were similar among women who smoked crack and those who did not (Corby et al. 1991). McCoy and Miles (1991) found that high-risk women who smoked crack reported more condom use than those who did not smoke crack. In other words, though crack users may have unprotected sex more often, they may also have protected sex more often, or at least no less often, than nonusers.

Second, crack use is only one of several traits associated with risky sexual behavior; the relationship between crack use and sex risk could be due largely or entirely to these other traits. Young adults, for example, are more likely to use crack than older adults (Weissman et al. 1990), and young adults typically have more sex partners. Age might therefore explain the relationship between crack use and number of partners. Other demographic traits that might account for the higher degree of sex risk among crack users include ethnicity, gender, and education (Abramowitz et al. 1991; Corby et al. 1991; Nemoto et al. 1990; Needle et al. 1991; Scribner et al. 1990; Weissman et al. 1990). A number of lifestyle characteristics have, moreover, been shown to represent "risk markers" for HIV transmission. Engaging in sex for money is more common among women who smoke crack than among women who do not (Chitwood 1991; Corby et al. 1991; Des Jarlais et al. 1991). Other potential explanatory lifestyle characteristics include frequency of engaging in sex while high, heavy alcohol use, and heavy marijuana use (Chitwood 1991; Fullilove et al. 1990b).

Last year's report included analyses of sex-related HIV risk among adult men and women who were interviewed for the Los Angeles Drug Use Forecasting (DUF) Program between 1988 and 1990 and who reported a history of illicit drug use. Analyses showed that sex risk was higher when crack smoking was part of a person's drug use history. Crack smokers reported more sex partners and less condom use during vaginal or anal sex--even after we adjusted for other demographic and lifestyle factors such as age, ethnicity, and history of engaging in sex for money (Longshore and Anglin 1990: 40-48). However, last year's report was limited in two ways. First, because only 410 cases had complete data, the sample was not large enough to provide reliable results when risk behaviors were analyzed for men and women separately. Second, our analyses did not include two risk markers, frequency of alcohol use and frequency of marijuana use, recently found to bear a strong association with both crack use and sexual behavior (Chitwood 1991; Fullilove et al. 1990a).

We have continued to add cases to the Los Angeles DUF sample. As a result, we now have more statistical power for tests of the relationship between crack and HIV risk. We can also determine whether that relationship varies within subgroups of crack users--when women are compared to men, for example. Finally, alcohol use and marijuana use can be added to the set of predictor variables. The predictive value of these two risk markers must be taken into account before it can be concluded that crack use itself is or is not a unique marker for risk.

SEXUAL BEHAVIOR AMONG LOS ANGELES CRACK USERS

The Drug Use Forecasting Program completed interviews with 2,591 Los Angeles arrestees between July 1988 and April 1991. Data required for these new analyses are complete for 1,769 of those cases. The drop-off in available cases is due mainly to the fact that interviews occur in segments; only some arrestees are asked to complete all segments. Among these 1,769 available cases, 920 reported using crack at some time in their lives, while 849 reported no crack use.

We deal primarily with two measures of HIV risk as reported by arrestees for the year preceding their DUF interview: number of sex partners, and likelihood of condom use during vaginal or anal sex. (We combined vaginal and anal sex into one measure because the reported incidence of anal sex was too low for separate analysis.) We later summarize findings for a third risk measure, condom use during oral sex. Analyses were conducted separately for men and women. Analyses of condom use are restricted to arrestees who reported sex with two or more partners during the past year.

METHODS

We begin by assessing bivariate relationships between crack use and sexual behavior, then turn to multivariate analyses that adjust for the influence of demographic and lifestyle/risk markers. Because the number of sex partners is a continuous measure of risk, bivariate analyses compare crack users and nonusers on the basis of the average number of partners they reported. Multivariate analyses employ linear regression to measure the unique relationship between each predictor and number of partners. (To create the necessary normal distribution for number of partners, raw scores were recoded as follows: no partner, one, two to four partners, five to twenty, and over twenty.) Because our measure of condom use is dichotomous (any use versus none), we assessed the relationship between crack use and condom use through logistic regression.

BIVARIATE RESULTS

As shown in Table 5.1, significantly more sex partners are reported by crack users than by nonusers. Men with a history of crack use had an average of 3.40 partners in the previous year, compared to 2.98 partners reported by male nonusers. Similarly, women who used crack averaged 3.84 partners, compared to 2.88 for female nonusers. Both differences are statistically significant.

Results for condom use, shown in Table 5.2, differ by gender. The likelihood of condom use during acts of vaginal/anal sex in the past year is significantly lower for men who reported ever smoking crack than for men who did not (odds ratio=0.61, $p=0.003$). This finding is reversed among women, however. Female crack-users were more likely to report some condom use during vaginal/anal sex than women who had never smoked crack (odds ratio=1.81, $p<0.05$).

Table 5.1

Past-year Sex Partners,
Los Angeles Drug Use Forecasting Program Arrestees

Crack use, lifetime	Mean Number of Sex Partners, Past Year	
	Men (n=1,151)	Women (n=618)
No	2.98	2.88
Yes	3.40	3.84
	p=0.0001	p=0.0001

Table 5.2

Condom Use, Nonmonogamous Arrestees
in Los Angeles Drug Use Forecasting Program

Men (n=830)

Predictor	Predictor Category	Raw odds ratio (95% CI)
Crack use	No	1.00
	Yes	0.61 (0.45, 0.84)**

Women (n=441)

Crack use	No	1.00
	Yes	1.81 (1.00, 3.29)*

*p<0.05
**p<0.01

MULTIVARIATE RESULTS: DEMOGRAPHICS

The next step is to adjust for demographic differences that might be obscuring the true relationship between crack use and sexual behavior. In the Los Angeles DUF, for example, arrestees who are younger or African American report more sex partners and a greater likelihood of crack use (analysis not shown). Thus, age or ethnicity could account for the relationship between crack use and number of partners.

Each behavior measure has been regressed on age and ethnicity, as well as education, income, and crack use. (The coding for predictors is indicated in each table.) After statistical adjustment for these other traits, the number of past-year sex partners remains higher for both male and female crack users, compared to nonusers. The regression coefficients in Table 5.3 ($b=0.20$ for men, $b=0.35$ for women) indicate a stronger relationship among female arrestees, but even among the men this relationship is statistically significant.

As shown in Table 5.4, condom use remains less likely for men who have smoked crack than for men who have not (odds ratio=0.50, $p=0.0001$). Among women, the positive relationship between crack and condom use is no longer significant (odds ratio=1.60, $p=0.15$). Findings show that older women are less likely to use condoms (odds ratio=0.54, $p=0.05$), while African-American women are more likely to do so (odds ratio=2.17, $p=0.04$). The bivariate relationship in Table 5.2 is apparently due to the fact that crack-using women in our sample are disproportionately African American.

To summarize results thus far, the greater number of sex partners among crack users is apparently not just an artifact of demographic differences between users and nonusers. Among women, crack is associated with higher risk from sex with multiple partners but not with condom use during vaginal/anal sex. Among men, crack is associated with higher risk both from sex with multiple partners and from the failure to use condoms during vaginal/anal sex. These results confirm the value of crack as a marker for HIV risk regardless of the intensity or circumstances of crack use. But this confirmation is only partial; we have not determined that crack represents a unique marker for HIV risk.

MULTIVARIATE RESULTS: LIFESTYLE/RISK MARKERS

The final step is to adjust for lifestyle differences between crack users and nonusers. We have already noted the unsurprising fact that women who engage in sex for money have more partners than other women; they are also more likely to smoke crack. This fact may entirely explain the association between crack use and number of partners. Five lifestyle/risk markers, all pertaining to behavior in the past year, were used as predictors for number of partners: engaging in sex for money, alcohol use, marijuana use, having sex while high on drugs or alcohol, and living arrangement (single or married/cohabiting). These five risk markers, along with number of partners, were used to predict vaginal/anal condom use.

Table 5.3

Past-Year Sex Partners Predicted by Crack Use and Demographic Traits, Los Angeles Drug Use Forecasting Program Arrestees

	Men (n = 1,151)	Women (n = 618)
Predictor	Standardized regression coefficient	Standardized regression coefficient
Crack use[1]	0.20****	0.35****
African American ethnicity[1]	0.20****	-0.08*
Hispanic ethnicity[1]	0.04	-0.10**
Age	-0.09**	-0.11***
Years of formal education	0.02	-0.05
Income[2]	0.05	0.30****
Adjusted R^2	0.08****	0.27****

*p < 0.05
**p < 0.01
***p < 0.001
****p < 0.0001

[1] 0 = no, 1 = yes
[2] 1 = < $7,501, 2 = $7,501-15,000, 3 = $15,001-25,000, 4 = $25,001-35,000, 5 = $35,001-50,000, 6 = > $50,000

Table 5.4

Condom Use Predicted by Crack Use and Demographic Traits,
Nonmonogamous Arrestees in Los Angeles Drug Use Forecasting Program

		Men (n=830)	Women (n=441)
Predictor	Predictor Category	Adjusted odds ratio (95% CI)	Adjusted odds ratio (95% CI)
Crack use	No	1.00	1.00
	Yes	0.50 (0.36, 0.69)***	1.60 (0.87, 2.94)
African American ethnicity	No	1.00	1.00
	Yes	2.90 (1.86, 4.57)***	2.17 (1.07, 4.44)*
Hispanic ethnicity	No	1.00	1.00
	Yes	1.03 (0.66, 1.62)	0.75 (0.34, 1.63)
Age	Under 28	1.00	1.00
	28 or older	0.72 (0.51, 1.02)	0.54 (0.29, 0.99)*
Years of education	Under 12	1.00	1.00
	12 or more	1.62 (1.14, 2.29)**	0.71 (0.36, 1.39)
Income	$0-15,000	1.00	1.00
	Over $15,000	0.67 (0.46, 0.97)*	1.76 (0.88, 3.49)
Hosmer-Lemeshow chi square		5.48 (p=0.71)	6.69 (p=0.57)

*p<0.05
**p<0.01
***p<0.0001

(Since condom analyses were restricted to arrestees with multiple partners, the minimum value for number of partners was 2.)

Each sexual behavior measure was regressed on crack use and these other demographic and lifestyle/risk characteristics. As shown in Table 5.5, crack remains associated with number of sex partners. The standardized coefficients indicate that crack use is a more important predictor of sex partners among women ($b=0.27$, $p=0.0001$) than among men ($b=0.07$, $p=0.02$), but the relationships are statistically significant in both cases. As shown in Table 5.6, crack continues to be associated with a lower likelihood of condom use among men (odds ratio $=0.65$, $p=0.03$) but not among women.

Though demographic predictors are of secondary interest here, findings for those predictors can be summarized as follows. Number of partners in the past year is negatively related to age, and positively related to income, among both men and women. Condom use is negatively related to income, and positively to education, among men. African American men reported more sex partners than did other men, while African American and Hispanic women reported fewer partners than did Anglo women. Net of other predictors, African American men and women both reported more condom use.

Aside from crack use, four lifestyle characteristics emerged as independent risk markers for number of sex partners in the past year. Arrestees who were married or living with a primary partner had fewer sex partners than arrestees who were single. Number of partners is also positively associated with frequency of alcohol use (among men but not women), engaging in sex for money (among women but not men), and frequency of sex while high (among both). Two risk markers in addition to crack emerged for condom use: frequency of sex while high, which is negatively related to condom use among men; and number of sex partners, which predicts a greater likelihood of condom use among women.

These analyses indicate that crack use is, in fact, a unique marker for sex-related HIV risk. Men who use crack report a significantly greater number of past-year sex partners and are significantly less likely to have used condoms during vaginal/anal sex. Women who use crack are neither more nor less likely to use condoms but, like men, report a significantly greater number of sex partners. These findings are not an artifact of demographic differences between arrestees who have smoked crack and those who have not. Nor are these findings attributable to other lifestyle characteristics associated with crack use. It is important to note, however, that crack use and other risk markers, such as having sex while high and number of sex partners, are highly interrelated; see Table 5.7. Thus, while crack use seems to represent an independent source of HIV risk, it is also part of a cluster of several high-risk activities. This clustering of crack use with other risk markers has been found in other cities, for example New York (Des Jarlais et al. 1991) and New Orleans (Ray et al. 1990).

Table 5.5

Past-Year Sex Partners Predicted by Crack Use, Demographic Traits, and Lifestyle/Risk Markers, Los Angeles Drug Use Forecasting Program Arrestees

	Men (n=1,151)	Women (n=618)
Predictor	Standardized regression coefficient	Standardized regression coefficient
Crack use[1]	0.07*	0.27****
African American ethnicity[1]	0.20****	-0.08*
Hispanic ethnicity[1]	0.06	-0.10**
Age	-0.10***	-0.13***
Years of formal education	0.02	-0.05
Income[2]	0.07*	0.25****
Living arrangement[3]	-0.20****	-0.08*
Number of paying sex partners in past year	0.05	0.09**
Frequency of sex while high in past year[4]	0.19****	0.21****
Days of alcohol use in past month	0.09**	0.03
Days of marijuana use in past month	0.04	0.03
Adjusted R^2	0.17****	0.32****

*p<0.05
**p<0.01
***p<0.001
****p<0.0001

[1] 0=no, 1=yes
[2] 1=<$7,501, 2=$7,501-15,000, 3=$15,001-25,000, 4=$25,001-35,000, 5=$35,001-50,000, 6=>$50,000
[3] 0=single, 1=married or cohabiting
[4] 0=sometimes, seldom, or never; 1=always or almost always

Table 5.6

Condom Use Predicted by Crack Use, Demographic Traits, and Lifestyle/Risk Markers, Nonmonogamous Arrestees in Los Angeles Drug Use Forecasting Program

		Men (n = 830)	Women (n = 441)
Predictor	Predictor Category	Adjusted odds ratio (95% CI)	Adjusted odds ratio (95% CI)
Crack use	No	1.00	1.00
	Yes	0.65 (0.45, 0.94)*	1.21 (0.59, 2.46)
African American ethnicity	No	1.00	1.00
	Yes	2.63 (1.65,4.22)***	2.70 (1.28, 5.64)*
Hispanic ethnicity	No	1.00	1.00
	Yes	0.93 (0.58, 1.48)	1.10 (0.46, 2.59)
Age	Under 28	1.00	1.00
	28 or older	0.81 (0.56, 1.17)	0.57 (0.30, 1.08)
Years of education	Under 12	1.00	1.00
	12 or more	1.57 (1.08, 2.27)*	0.86 (0.42, 1.75)
Income	$0-15,000	1.00	1.00
	Over $15,000	0.68 (0.46, 0.99)*	1.20 (0.57, 2.51)
Living arrangement	Single	1.00	1.00
	Married or cohabiting	0.83 (0.57, 1.20)	1.15 (0.55, 2.41)
Received money for sex in past year	No	1.00	1.00
	Yes	0.97 (0.56, 1.68)	1.63 (0.66, 4.01)
Sex partners in the past year	Under 5	1.00	1.00
	5 or more	1.37 (0.96, 1.93)	5.92 (2.36, 14.88)**
Always or almost always high during sex in past year	No	1.00	1.00
	Yes	0.48 (0.33, 0.70)***	0.53 (0.26, 1.11)
Days of alcohol use in past month	Under 15	1.00	1.00
	15 or more	0.85 (0.60, 1.21)	1.18 (0.63, 2.61)
Marijuana use in past month	No	1.00	1.00
	Yes	0.89 (0.63, 1.27)	0.69 (0.35, 1.34)
Hosmer-Lemeshow chi square		7.63 (p = 0.47)	12.24 (p = 0.14)

*p < 0.05 **p < 0.01 ***p < 0.0001

Table 5.7

Correlations of Lifestyle/Risk Markers with Crack Use
Los Angeles Drug Use Forecasting Program Arrestees

Lifestyle/ risk marker	Pearson's r
Frequency of sex while high in past year	.35*
Frequency of alcohol use in past 30 days	.26*
Number of sex partners in past year	.28*
Number of paying sex partners in past year	.26*

*$p < 0.0001$

FURTHER ANALYSES

We considered the possibility that our results might have differed if analyses had been done in other ways. First, results in Tables 5.1 to 5.6 are based on a comparison of arrestees who reported any crack use to arrestees who reported none. These results would be misleading if the greater risk found among crack users overall is merely a reflection of high-risk habits specific to a subset of heavier users, such as those who have actually been dependent on crack or those who have used it on a daily basis. We found, though, that the risk represented by crack is not confined to heavy users. Relationships between crack and risk did not change materially when (a) nonusers were compared only to users who reported having been dependent on crack, (b) nonusers were compared only to users who reported smoking crack every day for at least the past thirty days, and (c) dependent or daily users were excluded so that nonusers were compared only to nondependent users or nondaily users.

Second, while the results shown above concerned condom use during vaginal/anal sex, research cited at the beginning of this section indicated that the form of intercourse often involved in the "sex for crack" exchange is oral. Arrestees in DUF are not asked whether they have ever exchanged sex for crack, but they are asked whether they have used condoms during oral sex. We found in bivariate analyses that crack and condom use during oral sex are unrelated for men and positively related for women. These results for women duplicate the bivariate results for condom use during vaginal/anal sex. However, after other demographic and lifestyle predictors were considered, crack no longer bore any independent relationship with condom use during oral sex for either gender.

DISCUSSION

Prior research has documented the high level of HIV risk incurred by persons who exchange sex for crack, especially in "crack houses." But prior research has not established that HIV risk is higher among crack users overall--regardless of the level or circumstances of their use. Moreover, because crack use is only one of several behaviors associated with high-risk lifestyles, it cannot be concluded from prior research that crack use represents a unique marker for risk.

We sought to determine whether crack use might serve as a risk marker for targeting local drug abuse treatment and HIV prevention in Los Angeles. With a sample size of 1,769 arrestees, we were able to assess crack as a risk marker separately for men and women. Results indicated that the degree of HIV risk incurred through sex with multiple partners is higher among crack users than among nonusers, regardless of gender. Results also indicated that HIV risk through failure to use condoms is more likely among men who have smoked crack than among men who have not. (The nonrelationship among women may be a fluke of sampling but is consistent with other research on condom use among high-risk women in Los Angeles County [Corby et al. 1991]. In any case, there is apparently not

much overlap between the local population of men who smoke crack and the local population of men who have sex with women who smoke crack.) None of these relationships was explained by other demographic or lifestyle characteristics that we were able to test. Moreover, most relationships were strong; the statistical significance of our findings is not due simply to the large sample size. Crack therefore appears to represent a unique and important marker for HIV risk. The findings do not prove that crack use causes higher risk; some other characteristic, not measured here, might account for the relationship between crack and risk. Nevertheless, crack is uniquely and strongly associated with HIV risk, whatever the underlying causal mechanism might be.

As in other cities, crack users in Los Angeles are more likely than nonusers to have multiple sex partners, to engage in sex for money, and to have sex while high. Services targeted to crack users will therefore be likely to capture a great many people who incur HIV risk in these other ways.

The predictive value of certain demographic characteristics has further implications for targeting risk-reduction efforts. Arrestees with higher incomes reported a greater number of sex partners and a lower likelihood of condom use. African American men reported more sex partners but also reported more condom use. It may be that people with low incomes and African Americans are more cognizant of their HIV risk than are people with moderate incomes and people not of African background. If so, this greater awareness is an encouraging sign that at least some crack users will be readily accessible to outreach efforts that offer to teach skills for further risk reduction. At the same time, higher risk in other segments of the crack-using population suggests that outreach will have to be intensive and repetitive if it is to have much impact.

SECTION 6: CONCLUSIONS AND RECOMMENDATIONS

HIV TRANSMISSION

Seroprevalence studies can be used to monitor the overall rate of HIV infection across serial samples of a population but may miss the rate at which new infections occur. Seroconversion studies serve a complementary purpose by tracking the spread of HIV within the same sample over time. Studies reviewed in this report indicate that seroprevalence among Los Angeles injection drug users did not increase in 1991 and that seroconversions have been rare.

Seroprevalence rates are probably no higher than 3% among injection drug users enrolled in either residential or outpatient treatment and no higher than 7% among injection drug users not in treatment. If we assume that between 10% and 20% of injection drug users are in treatment at any given time, a weighted average of these two rates indicates that seroprevalence is probably near 6% overall. However, HIV transmission may be occurring rapidly in local "hot spots" such as the Skid Row area of downtown Los Angeles, where seroprevalence is reportedly almost 12%.

RECOMMENDATIONS

Los Angeles County continues to monitor seroprevalence in drug abuse treatment programs, outpatient as well as residential, and in nontreatment clinical settings. Some readers may infer from the findings in this report that County-wide seroprevalence studies have become less important. However, the usefulness of trend data will be seriously undermined if such studies are suspended or sample sizes reduced. Any future change in seroprevalence will become more difficult to detect and interpret.

#1 **We recommend that HIV seroprevalence studies among County injection drug users be continued with no change in sampling procedures, sample sizes, or data collection intervals.**

Seroprevalence data based on injection drug users throughout Los Angeles obscure the possible existence of local "hot spots" where HIV transmission is occurring more rapidly than elsewhere in the County. Possible hot spots require intensive monitoring through recruitment of larger sample sizes and more frequent data collection in those areas. Such monitoring should occur in tandem with outreach designed to reduce high-risk behavior.

#2 **We recommend that special monitoring/outreach efforts be mounted in possible HIV hot spots, such as Skid Row, the surrounding downtown area, and other County areas where injection drug use is prevalent.**

It may seem especially tempting to suspend seroconversion studies because of their higher cost. As a simple example, the resources required to test 500 injection drug users annually for three years could be spent instead to test three times as many users once. Seroconversion studies must also spend resources to minimize sample attrition, which is not a concern in seroprevalence studies. However, both studies in combination are more valuable than either by itself because the strengths of each study offset weaknesses of the other. And, as we have seen in the multicity National AIDS Demonstration Research program, the two types of study may produce a different view of HIV transmission. The need for seroconversion studies is perhaps most urgent in possible local "hot spots," where there is some reason to believe that the virus is spreading more rapidly. In these areas, seroconversion studies can provide a more precise estimate of the rate of virus transmission and identify the lifestyle or behavioral factors accounting for it.

#3 **We recommend that a subsample of injection drug users who participate in "hot spot" seroprevalence studies be asked to enroll in smaller seroconversion studies that will monitor their antibody status twice yearly for at least the next two years.**

Los Angeles has received funds from the Centers for Disease Control to support a three- to five-year evaluation of the County's existing program of street-based outreach in areas of high drug-use prevalence. This major new project represents an opportunity to conduct "hot spot" seroconversion studies. If such studies are not feasible under that project, however, other opportunities should be found.

The unique value of seroconversion studies is diminished as more participants are lost during followup. This problem looms large for studies done in areas such as Skid Row because the population there is highly transient. However, sample attrition can be minimized if sufficient background information is collected from participants (e.g., social security number, previous addresses, and prior contact with criminal-justice or social-service agencies) and if enough time and resources are available for followup. In our seroconversion study, for example, we were able to trace 90% of the injection drug users originally enrolled three years before. "Hot spot" seroconversion studies should, accordingly, collect extensive background information on all participants and continue efforts to trace them for at least six months beyond their final scheduled followup date. In addition, study staff should attempt to collect as much information as possible on the demographic and lifestyle characteristics of people who refuse to enroll in the study. Such information, when combined with similar information on participants lost to followup, would serve as a basis for identifying possible bias resulting from differences between persons who complete the study and those who do not.

BEHAVIOR TRENDS

We found no indication that injection drug users in Los Angeles have reduced their HIV risk by remaining monogamous or having sex with fewer partners. On the other hand, more and more users now recognize the risk of unprotected sex and, at least occasionally, take the precaution of condom use.

Injection drug users are making efforts to reduce the risk of HIV infection through drug use. Bleach has entered the repertoire of a majority of users who share needles, and more users now manage to avoid needle sharing for some period of time. However, we found no reliable evidence of a decrease in the percentage who manage to avoid needle sharing for as long as one full year, the percentage who share with strangers, or the percentage who share needles at shooting galleries. In addition, fewer than half of the drug users who share needles always use bleach.

RECOMMENDATIONS

Outreach projects to promote drug- and sex-related risk reduction are already underway in Los Angeles. Some of these projects offer intensive training and ongoing support for risk reduction through, for example, repeated small-group sessions attended by drug users and their sex partners. Among these more intensive local projects are the Women and AIDS Risk Network, UCLA AIDS Nursing Network, and AIDS Research & Education Project.[1]

It is too early to know how effective these outreach projects will ultimately be. But it is not too early to establish a mechanism by which successful outreach strategies can be identified as they emerge in these or other projects.

#4 **We recommend that Los Angeles County formally establish a study group for the purpose of observing the progress of local risk-reduction outreach to drug users. This study group, comprised of County and outreach project representatives, should meet at regular intervals to discuss innovative outreach methods, review project findings, and identify opportunities for collaboration in the study and delivery of risk-reduction services.**

Meetings of this sort already occur, intermittently, among a few local researchers and policy makers. However, our proposed study group would hold regular meetings for the specific purposes of, for example, identifying needs and opportunities for cross-training among the various local projects, ensuring timely communication of research findings, replicating successful projects in areas of the County not yet served, expanding or redesigning projects already underway, developing grant proposals, and providing information upon request to the Los Angeles County Commission on AIDS and the Department of Health Services.

Los Angeles County has received funds from the Centers for Disease Control to support an evaluation and enhancement of the County's existing program of street-based outreach to injection drug users. One of the early steps in this newly funded project is creation of a Local Evaluation and Planning Group (LEPG), which will review findings and develop further outreach enhancements. Depending on its membership and priorities, the LEPG may very well serve as the sort of study group we are recommending.

Finally, trends indicate the persistence of occasional needle sharing, often with strangers, despite outreach efforts which continually emphasize the danger of needle sharing. We believe that a second strategy should be given careful consideration in the effort to reduce needle sharing. That strategy is needle exchange, which operates with apparent success in other U.S. and European cities. Needle exchange programs allow adults who are currently drug-dependent to trade "dirty" needles for sterile ones. Many such programs also offer education on HIV risks, a brief medical examination, and referral to drug abuse treatment. Some programs operate under the auspices of local health departments, while others are run by private citizens with the official or unofficial permission of authorities.

This report is not the place for a detailed review of the possible pros and cons of needle exchange. However, research does suggest that exchange programs attract injection drug users who are not reached by other methods of outreach, facilitate entry into drug abuse treatment, and contribute to reduced HIV risks--notably to less frequent needle sharing. These favorable effects have not been accompanied by unwanted side-effects, such as use of injection drugs by persons who had not done so before or a higher frequency of use among current injectors (Blumberg 1991; Buning 1991; O'Keefe et al. 1991). We therefore believe that needle exchange in Los Angeles would probably broaden the range of drug users who are reached by intervention efforts, bring into treatment many users who otherwise would not seek it, and contribute uniquely to the reduction of HIV risks among local drug users.

The occurrence of favorable effects and unwanted side-effects will depend to some degree on local context and operational factors, such as siting, hours of operation, and neighborhood attitudes. Thus, despite the favorable evidence, we do not believe that needle exchange can be adopted, or allowed to operate, without first enlisting the support of neighborhood residents and conducting a careful pilot test.

#5 **We recommend that a needle exchange program of limited scale and duration be established in a County "hot spot" where HIV infection and drug use are relatively widespread and where residents have first had an opportunity to comment. This program should begin only after evaluation criteria and procedures have been determined.**

HIV RISK AND COCAINE INJECTION

We found no evidence that cocaine injection is associated with higher risk among drug users in Los Angeles. HIV infection rates observed among cocaine injectors are similar to rates observed among opiate injectors. Moreover, drug preference is unrelated to needle sharing overall, needle sharing with strangers, needle sharing at shooting galleries, or failure to use bleach as a needle disinfectant.

It remains possible that a preference for cocaine injection is in fact associated with drug-related HIV transmission risks in Los Angeles. Seroprevalence data were broken down by drug of abuse in only a few studies, and the few comparisons we were able to make were imprecise. Moreover, because risk measures available for our analyses are dichotomous (yes/no), we were not able to determine whether sharing occurs more often, or bleach use less often, among drug injectors who prefer cocaine to opiates or among those whose frequency of drug injection is greater.

RECOMMENDATIONS

It is important to continue collating data on seroprevalence and risk behavior in local studies. Wherever possible, future analyses should improve on ours through use of continuous measures of drug preference and risk behavior.

#6 **We recommend that future seroprevalence reports prepared by Los Angeles County focus in part on drug preference as a predictor of serostatus.**

So long as overall seroprevalence remains low among injection drug users in this area, it may not be possible to detect any difference between drug users who prefer cocaine and those who prefer opiates or other injection drugs. But any early sign of such a difference would suggest a need for preventive outreach tailored specifically to patterns of use and risk behavior pertaining to cocaine injection.

#7 **We recommend that the County ask representatives of all studies conducted in Los Angeles to collaborate on research assessing risk behavior by drug preference.**

The study group recommended above could easily serve this purpose. Collaboration should entail the use of common measurement and analysis procedures so that findings can be directly compared across studies. Continuous measures of risk and drug preference should be used when possible. The interpretation of findings should take into account possible background differences among samples.

SEXUAL BEHAVIOR OF CRACK USERS

We sought to determine whether crack use might serve as a unique risk marker for targeting drug abuse treatment and HIV prevention in Los Angeles. Our findings indicated that HIV risk incurred through sex with multiple partners is higher among crack users than among nonusers, regardless of gender. Findings also indicated that HIV risk through failure to use condoms is more likely among men who have smoked crack than among men who have not. None of these relationships was explained by other demographic or lifestyle characteristics that we were able to test. Moreover, most relationships were strong; statistical significance was not due simply to the large sample size. Thus, crack does appear to represent a unique and important marker for HIV risk.

As in other cities, crack users in Los Angeles are more likely than nonusers to have multiple sex partners, to engage in sex for pay, and to have sex while high. Services targeted to crack users will therefore be likely to capture a great many people who incur HIV risk in these other ways.

RECOMMENDATIONS

Most outreach projects in the United States are targeted to injection drug users and their sex partners.

#8 **We recommend that, wherever possible, outreach projects in Los Angeles widen their scope to target crack-using men and women, regardless of whether they use other drugs by injection and regardless of whether they trade sex for crack.**

It may be important to develop new outreach projects which are targeted especially to crack users and which provide not just basic information but also intensive training in skills for reducing sex-related risk. Such projects could be based in jails, sexually transmitted disease clinics, hospitals, and other community service agencies.

The association between crack and failure to use condoms held for men but not for women. This gender difference suggests that women who smoke crack may be somewhat more motivated or able to use condoms than their male partners. If so, prevention efforts for crack users might benefit from a "couples" approach in which male and female partners in a relationship are jointly offered training in risk reduction while, at the same time, women are supported in an effort to train their male partners. Another alternative is a "small groups" approach in which preventive education is delivered in sessions involving several crack users, both men and women.

The emergence of crack as a unique risk marker also suggests the importance of placing more crack users in treatment. Though not specific to crack users, our research on

methadone maintenance treatment indicates that opiate users are able to reduce their sex-related HIV risks while in treatment because they no longer engage in sex for money (which they needed to support their drug habit) and because treatment leads to a heightened sense of self-efficacy for sex risk reduction (Longshore et al. 1991b). Treatment for dependence on drugs other than opiates can produce similar outcomes. However, real progress is unlikely until treatment for crack dependence becomes more widely available through subsidized slots. An interim step in this direction is to ensure that crack users who seek treatment are referred promptly to existing slots. A recent study by the Los Angeles Homeless Health Care Project (1991) indicates some need for improvement in Los Angeles County's treatment referral system. It may also be important to augment the availability of low-cost, informal treatment alternatives such as Cocaine Anonymous, other self-help approaches, or recovery assistance based in religious institutions.

#9 **We recommend that the County take steps to ensure that (a) appropriate treatment slots are promptly available to crack users who seek treatment and (b) the County referral system is equipped to provide immediate and complete information on all appropriate treatment options, formal and informal.**

COST CONSIDERATIONS

It is impossible to assess the nonfinancial burdens of the AIDS epidemic--burdens such as the loss of valued relationships, social and family dislocation, and emotional trauma. But it is possible to project the likely financial cost associated with medical care for persons with AIDS. It is also possible to estimate the cost of enhanced prevention (outreach and drug abuse treatment services) of the sort we recommended above.

The annual cost of medical treatment and associated care for persons diagnosed with AIDS is estimated to be about $75,000 (Hellinger, 1990; National Academy of Sciences, 1988; Quinn et al., 1990). If seroprevalence among injection drug users reaches 10% in Los Angeles within two years, approximately 5,000 more injection drug users will be infected with HIV. Most of them will eventually require publicly financed medical care. If these cases develop AIDS within five years and live two years after diagnosis, the cost to the public would probably be at least $1 billion in 1997-98. This figure is a conservative estimate because seroprevalence could increase more rapidly and the time between infection and onset of AIDS could be longer. Furthermore, we have not considered the likely pre-diagnosis transmission of HIV from the additional 5,000 cases to their sex partners and unborn children. We have also not tried to estimate the undoubtedly high costs associated with care of dependents, lost productivity, and other factors.

If outreach programs are enhanced in the ways we have recommended and if another 1,500 treatment slots are added to the County's capacity, the estimated extra cost in 1992-93 will be approximately $26 million. Compared to this figure, the projected cost of AIDS-related

medical treatment for 5,000 more cases is forty times higher. Even if our costing assumptions are drastically revised, the essential conclusion does not change. Double the annual cost of enhanced prevention (outreach and drug abuse treatment) to $52 million and cut the cost of medical care to $600 million. The comparison still favors prevention by a factor of ten.

In summary, if the trade-offs between enhanced prevention and medical care are viewed strictly in terms of likely cost to the public, the saving represented by enhanced prevention is enormous.

CLOSING

Seroprevalence rates rose quickly in New York City in the early 1980s, roughly doubling every year before reaching a plateau of 50% to 60%. This occurred before the risk of AIDS was widely recognized. In San Francisco, seroprevalence doubled in the span of one year, from 6% in 1986 to 13% 1987, even though by that time the risk of AIDS was widely known. In Los Angeles, though HIV transmission is apparently occurring very slowly, many injection drug users in Los Angeles remain at high risk. Thus, as noted in the December 1990 report, an increase in HIV transmission is still quite possible in Los Angeles. Stopping the further spread of HIV in Los Angeles will require continued monitoring and outreach to prevent possible regression to high risk and to augment the limited change seen thus far.

NOTE

1. More information on these projects can be obtained from: Vivian Brown, Ph.D., or Cathy J. Reback, Ph.D., Women and AIDS Risk Network, 5601 West Slauson Avenue, Suite 200, Culver City, CA 90230, (310) 641-7795; Fen Rhodes, Ph.D., AIDS Research & Education Project, California State University, Long Beach, 1250 Bellflower Blvd., Long Beach, CA 90840, (310) 985-7508; and Adeline Nyamathi, Ph.D., UCLA Nursing Study, 10833 Le Conte Avenue, Los Angeles, CA 90024, (310) 825-8609.

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