HIV risk behavior among injecting drug users in Amsterdam

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CHAPTER 1 Introduction

The present research among injecting drug users (IDUs) focuses on injecting behavior with a risk of transmission of the human immunodeficiency virus (HIV). The first aim of this research is to study the relationship between participation in different (prevention) programs and injecting risk behavior; the second aim is to study determinants of this injecting risk behavior. Findings will be discussed in relation to approaches to primary prevention of HIV.

In this introduction, a brief general background will be provided, by outlining the history of opiate and cocaine use, and by discussing the relation between medical problems and illicit drug use within a policy context. The main routes of transmission of HIV among IDUs will be described, together with the principle measures aimed at prevention of injecting risk behavior. Section 1.4 focuses on the Amsterdam policy with respect to hard drug use and prevention of HIV. It describes the "low threshold" methadone program and the needle and syringe exchange program. Several potential determinants of injecting risk behavior have been considered. These will be introduced in section 1.5: severity and type of drug use, and psychopathology.

1.1 Opiate and cocaine use, a brief historical outline

Until the 19th century, opium and coca had been used for many centuries in their natural form, without many legal restrictions, and without irreversible physical damage to users1,2. In the 18th and 19th century, opium, and later morphine, the major alkaloid of opium, were increasingly used in the Western world as treatment for a wide variety of problems, while cocaine was introduced somewhat later, in the second half of the 19th century. Around 1850, the hypodermic syringe was perfected. Because pain could be controlled using less morphine when injected, physicians initially thought that injecting morphine was less likely to result in addiction than oral use 3. Purified cocaine became commercially available in 1884, followed shortly, around 1895, by heroin, which was produced commercially from morphine2,3. Opium, and later morphine, were used as pain-killer and calming agent, heroin as cough suppressant and cocaine as stimulant, as cure for an opiate or alcohol habit and as local anaesthetic. As the use of these substances became more and more prevalent, so did the frequency of addiction and abuse. Around the turn of the century, a growing fear of addiction and of the casual social use of habit-forming substances developed among the public 3,4. Consequently, the use of opiates and cocaine was gradually declared illegal in the first quarter of the 20th century. As Platt & Labate note2, the attempt to solve the narcotic problem by legal control has resulted in a significant modification of what it means to be an addict (or ab)user. For example, criminal involvement, specific social and medical problems, paranoia, sociopathy, etc., may be more related to the illegality of drugs than to drug use itself2. During the 1920s and 1930s, opiate and cocaine use declined as a societal problem2,4. The major epidemic of heroin use in the United States (U.S.) did not start until the early 1960s2, while in the Netherlands, the epidemic started when street heroin became available around 19722. Similarly, although cocaine has been present in most European capitals for many years, a significant European market in illicit cocaine did not develop until the early 1970s5. Many heroin users, both in Europe and in the U.S., use or abuse other drugs in addition to heroin: alcohol6, cocaine7, benzodiazepine8-10, and other substances like barbiturates and amphetamines11.

1.2 Medical problems, drug use and policy

The acquired immunodeficiency syndrome (AIDS) was first reported as a distinct clinical entity in 19812. In 1983, the risk groups had been identified, the routes of transmission of the etiologic agent (presumably a virus) were understood3, and the etiologic agent, human immunodeficiency virus (HIV), was identified by Montagnier in France and Gallo in the U.S.4 HIV is transmitted mainly through sexual contact, through the use of contaminated injection equipment, through intravenous or perinatal exposure and through blood (products). In the industrialized world, injecting drug users are, after homosexual men, the second largest group at risk of AIDS. In Europe, by December 31st 1991 (after adjustment for reporting delays), a cumulative total of 72,674 AIDS cases have been reported, of whom 42% were in the homo/bisexual transmission group, 34% were among injecting drug users, 9% a result of heterosexual transmission and 2% due to mother-to-child transmission2. HIV among injecting drug users is associated with a substantial spread of HIV to non-injecting heterosexual partners 1-6 and from female injectors to their children's.

Before the onset of AIDS, mortality and morbidity rates among heroin addicts were already higher than in the general population's. This was the result of 1) the use of the drug itself (accidental overdosage, related to different degrees of purity of street heroin), 2) violence or accidents related to drug use and 3) the medical complications of unfavorable living conditions and of unhygienic injecting procedures (e.g. pulmonary infections like pneumonia and tuberculosis, endocarditis, septicemia, vasculitis, abscesses, viral hepatitis, tetanus and skin infections) 1,2. Stimson 20 points out that, before AIDS, despite the often severe medical problems associated with heroin use and injecting and the high mortality rate, the major concern of society in general and of scientific research was the problem of drug dependence itself, and not the associated infectious and contagious diseases. In other words, the major focus was the prevention or cure of illicit drug use, either by law enforcement, by medical/therapeutic treatment or both. Stimson argues that with AIDS, a new conceptual framework has developed in relation to illicit drug use, which he terms the "public health paradigm". A medical model (HIV) associated with a specific drug use behavior (needle sharing) has become the focus of attention, rather than the problem of drug dependence. The major aim now appears to be prevention of the spread of HIV, and this is associated with several changes in emphasis. Firstly, at variance with earlier viewpoints, the drug user or injector is now seen as a rational actor, who cares about his or her health. Secondly, instead of curing the addiction, the first aim is now to educate drug users on HIV prevention, or, how to use drugs and remain healthy. Health promotion, "harm reduction" and risk reduction become important. These aims demand that drug users are reached out to. Thus, a third development is that services are no longer only available to the motivated; services have to be accessible to all and "user-friendly".

The public health paradigm, as outlined by Stimson, seems to be on firm ground in several European countries, like England and the Netherlands. In the U.S., law enforcement and medical approaches with respect to drug use have clashed since the start of the century. Recently, the U.S. government declared the "war on drugs". With regard to HIV, the U.S. government appears to favor the standpoint that a law enforcement approach is the best way to prevent HIV infections among drug users. On the other hand, U.S. public health professionals widely support the view that HIV, as compared to drug dependence, is the more serious threat to public health or to people in general. Many voices are raised to acknowledge the failure of the moralistic and law enforcement approach in preventing drug use and in preventing HIV infections in drug users. For example, Mosher & Yanagisako 21 argue that illicit drug use should not be seen as a moral problem requiring a punitive approach within the criminal justice system. Instead, drug use should be seen as a public health problem, which ought to be taken care of by the public health system. An issue around which much doubt exists, especially in the
U.S., is the question whether harm reduction as HIV prevention strategy is compatible with the aim of primary drug use prevention. 22. Racial tensions make HIV prevention issues even more complicated. For example, the Black Leadership Commission on AIDS in New York sees bleach distribution by public health officials as a social policy "copout", or, in other words, as an inexpensive way to stop AIDS from spreading among users while the government fails to provide the millions of dollars needed to help black users get off drugs. 23 A New York City needle and syringe exchange program was closed after black citizens accused the mayor of "genocide" 24.

It needs to be noted that the public health paradigm, as described by Stimson, is not all that new; minimisation of harm from drug use was - in England - a policy objective since the 1920s. 25 In the Netherlands, the "harmreduction" approach (although not indicated as such) was adopted in the middle of the 1970s 26-28. Rather than giving rise to a new approach, AIDS seems to have given political legitimacy and acceptability to earlier formulated goals of normalization and harmreduction 21.

1.3 HIV transmission routes among IDUs and prevention measures

The main route of transmission of human immunodeficiency virus (HIV) among drug injectors is through using each other's needles and syringes, generally termed "needle sharing" 29. Heterosexual transmission plays a minor role, as compared to transmission by injecting risk behavior 30-36. "Frontloading" is a method of sharing drugs by which contamination of one's equipment with HIV can occur 37. However, the HIV risk of this behavior appears to be low relative to needle sharing 38. In the U.S., cocaine has in recent years become more popular, both as primary drug of abuse as secondary to the use of opiates 39,40. Both injecting cocaine and smoking crack (cocaine base) have been found related to an increased HIV risk 41-44, through increased injecting risk behavior and increased sexual risk behavior, respectively.

As soon as information became available on the nature, prevalence and transmission of HIV around 1983, it was generally understood that major behavioral changes among IDUs were essential, especially with regard to injecting behavior. Individual behavioral change depends on knowledge of the threat and on the availability of material resources necessary to avoid the danger. A third necessary factor is the motivation to change, which, in the case of HIV, means the motivation to protect oneself against HIV infection, or, for HIV-positive persons, the motivation to protect others. At the start of the HIV epidemic, there was much doubt as to whether drug users would be willing and capable of changing their behavior; in other words, whether they would act in a healthconscious and rational rather than selfdestructive way. However, due to the urgency of the threat, it was commonly felt that there was no time to study the effectiveness of measures before implementing them, nor to study behavioral determinants which could help to target prevention measures. Initially, health education focused on improving knowledge by informing IDUs about AIDS and the transmission of HIV, both agency-based and through outreach work. Later, programs were developed aiming to improve the risk reduction skills of drug users and to stimulate self-organization and peer support. Attempts were made to increase the availability of non-infected injection equipment: in the U.S. chiefly by providing a disinfectant (i.e., bleach) 45-48; in Europe mainly by providing new needles and syringes through exchange programs. The Amsterdam needle and syringe exchange started in 1984 (see 1.4.2), while in 1986 similar programs started in Sweden and Australia and in 1987 in England and Scotland 49. Thus, the present research of determinants of injecting risk behavior is complicated by the fact that, since 1984, prevention activities aimed at IDUs have been increasing steadily. In other words, the behavior under study was subject to efforts from various institutions to change this same behavior.

1.4 The Amsterdam "harm reduction" approach

Since the 1980s, many drug users in Amsterdam have been in contact with the medical and social services for drug users. Buning 50 estimates that, on a yearly basis, there are around 7000 hard drug users in Amsterdam (including 2500 current injectors) of whom 70% are in touch with the care system.

In 1968, methadone reduction schemes were introduced in Amsterdam for opium addicts, which attracted many foreign drug users 51. From 1972 on, Chinese opium became less available, and people started to become addicted to heroin. Methadone reduction schemes were gradually replaced by maintenance schemes 51. In Amsterdam, the harm reduction approach (although not indicated as such) was initiated around 1977, in addition to the existing facilities for methadone treatment, drug-free treatment and resocialisation projects. Due to the epidemic of heroin use, the number of arrested addicts with withdrawal symptoms increased strongly. As a result of this, in 1977, the police requested the help of the Mental Health department of the Municipal Health Service. This department formed a special drug team which visited arrested addicts on a daily basis and provided medical help if required. If severe withdrawal symptoms were present, decreasing doses of methadone were prescribed 52. Soon it became clear that many drug users were not reached by the existing programs. Therefore, much emphasis was put on contacting addicts. In that same year, a program was started to visit addicts in general hospitals 53. Two years later, in 1979, doctors of the Municipal Health Service were available for consultation in a building squatted by mainly Surinamese drug users, and a mobile methadone clinic for drug users of Surinamese origin was initiated, the "methadone by bus" project 54, 55. The methadone program also organized, in cooperation with the Sexually Transmitted Diseases clinic, an evening consultation for addicted prostitutes, at which methadone and medical care was provided. Both projects were defined as "low threshold", as their first goal was to get in touch with as many drug users as possible, in order to collect medical and social information, and to give medical care if necessary. The rationale of the harm reduction approach can be described as: "If it is not possible to cure drug users, one should at least try to minimize the harm that is being done both to them and the wider social environment" (p. 154). In addition to the low threshold methadone program for Surinamese drug users and for addicted prostitutes, more and more general practitioners started to prescribe methadone to addicts in general. Around 1980, 80% of the methadone in Amsterdam was prescribed by general practitioners, and the number of foreign addicts, especially German, rose. A lively black market in methadone developed: the price decreased from approximately Dfl. 5,- per pill to Dfl. 1,- in 1980 51. To put a stop to this undesired development, in 1981 a Central Methadone Registration was started. In that same year, the low threshold methadone program was made accessible to all drug users residing in Amsterdam 53.

1.4.1 The "low threshold" methadone program

In 1981, the low threshold methadone program put in operation two mobile methadone buses, which visited six locations daily, and four out-patient methadone clinics. Nonresidents were prescribed methadone only when it was medically indicated or when it enabled the user to return to the city or country of origin. The idea was to contact drug users through the buses. For bus clients, illicit use was permitted; the aim was to regulate their addiction and to give them medical care. Because these drug users were in contact with the care system, it was expected that those who wanted to quit their habit could relatively easily be directed to middle or high threshold programs. In the middle threshold program (the out-patient methadone clinics), illicit use was not permitted. Bi-weekly urine samples were taken and counselling was available. High threshold programs consisted of drug-free treatment. "Regulated" drug users who did not want to quit their habit were referred to their general practitioner for methadone prescriptions. In 1987, general practitioners were the main methadone prescribers for approximately 30% of all drug users on methadone in Amsterdam 54. As Buning et al. 53...
describe, the "graduation model" worked only for drug users who were genuinely motivated to quit their habit, and a considerable number of drug users showed no motivation to change at all. Furthermore, drug users started to move back and forth between the low and middle threshold programs, and this was not related to a motivation to quit drug use. On the buses, drug users had to attend seven days a week to drink their liquid methadone: there were no "take away" dosages. At the out-patient methadone clinics, clients could get methadone pills for the weekend and sometimes even for longer periods. Thus, it was more attractive to attend the "middle threshold" program, and a clever drug user could remain in it some time without getting caught using illicitly and being sent back to the bus. Also, illicit use by drug users attending the out-patient methadone clinics was often condoned when these drug users were showing their good intentions by cooperating with counselling or by improving their social situation. Thus, the division low versus middle threshold gradually lost its significance. Therefore, when using the term "low threshold" methadone program hereafter, both the methadone buses and the outpatient methadone clinics are meant. Some authors have argued that a low threshold methadone program may contribute to HIV prevention 55-56, partly through the opportunity to provide health education to a large number of drug users, partly through syringe exchange facilities for participants and partly through the stabilizing effect of methadone on heroin addiction. Moreover, methadone itself is expected to help drug users to stop or reduce injecting 28.

1.4.2 The needle and syringe exchange program

In the Netherlands, the possession of needles and syringes has never been illegal. In Amsterdam, needles and syringes could traditionally be obtained at pharmacies and certain shops, and this has not changed since the AIDS epidemic 57-58. A needle and syringe exchange program was initiated in 1984 by the Amsterdam drug users organization, the "Junkiebond". Its initial aim was to prevent the spread of Hepatitis B. In 1985, 100.000 2cc needles and syringes were handed out 50, and this number has gradually risen to approximately one million, both in 1990 and in 1991 (A.D. Verster, Municipal Health Service, personal communication). Thus, since 1984, the (free) availability of 2 cc needles and syringes has strongly increased. Participation in the program, which in 1991 operates in approximately 15 locations, does not require identification or registration. For this reason, no information is available on the number of participants or on their demographic characteristics. Some locations exchange a maximum of 30 or 100 needles and syringes at a time. In principle, needles and syringes are exchanged on a one-for-one basis, which has as its purpose the removing of used equipment from circulation. This is important from a public health point of view, as it diminishes the chance of needlestick accidents among the general public. In fact, the exchange percentage in 1991 was estimated at 86% (A.D. Verster, personal communication), which means that for each 100 new needles and syringes 86 used ones came back. It should be clear that even participants who obtain all their new needles and syringes at the program and who bring all used equipment back can engage in risky injecting behavior: giving away used needles and syringes to others, or, when they have run out of new needles and syringes, and none of their own are available, using a needle and syringe which has already been used by somebody else.

1.5 Severity and type of drug use

With AIDS, a new vocabulary came into use, consisting of relatively neutral terms like "drug user", "intravenous drug user" (IVDU) and "injecting drug user" (IDU), as compared to earlier terms like drug misuser, drug abuser and addict. These earlier terms proceed from a vast body of research, concerning different types and characteristics of (illicit) drug use. After exposure to a drug, initial experimentation can occur, and tolerance may develop, which means that repeated administration of a certain amount of a drug fails to provide the same effect as the initial dose. Physical dependence is characterized by a predictable pattern of physiological responses (the abstinence syndrome or withdrawal ill ness) which appears when regular administration of a drug is discontinued, while psychological dependence indicates the need to avoid aversive subjective effects associated with discontinuance of the use of a drug. Drug dependence can be defined as the continued use of a drug (in the absence of a medical indication), despite adverse social and medical consequences, while behaving as if the effect of the drug is needed for continued well-being. Symptoms of drug dependence include, but are not limited to, tolerance and withdrawal illness. The intensity of dependence may vary from a mild desire to a compulsion to use. In relation to the use of substances, like cocaine, which are not associated with physiological signs of withdrawal, substance abuse can be defined as: "a maladaptive pattern of substance use indicated by continued use despite knowledge of having a persistent or recurrent social, occupational, psychological, or physical problem that is caused or exacerbated by use of the substance or recurrent use in situations in which use is physically hazardous" 59. Addiction denotes the compulsive end of the continuum of dependency or substance abuse. Alexander 60 defines it as "an overwhelming involvement with drugs and/ or other activities that are harmful to the person involved and to society". This definition purports to rule out casual, recreational and regular use, everyday dependencies and "positive addictions", signifying only serious, self-destructive involvement, either with drugs or with activities like gambling. It is important to realize that physical dependence should not be equated with drug dependence, substance abuse or addiction. Tolerance and withdrawal symptoms may be present without drug dependence (for example in hospital patients receiving opioids), and drug dependence or addiction can occur without physical dependence 59 9.5 9.

An important issue is the continuity of drug use. Sporadic use of cocaine is well known, as the use of cocaine does not cause physical dependence. Heroin use, on the other hand, is often pictured as continuous (daily) use over a period of years. This is contradicted, for example, by findings of Robertson et al. 61, among heroin users not in treatment, which indicate the presence of periods of spontaneous abstinence of heroin use (and relapse), and the existence of episodes of dependent and nondependent use. However, study subjects had a relatively short duration of use (3.6 years). Studies on the natural history of intravenous drug use show tremendous variability in patterns of use, both intra- and interindividual 6 2.

Dutch opiate users are often polysubstance dependent, i.e., they use at least three categories of psychoactive substances, while no single substance predominates 59. Substances used next to heroin include cocaine, amphetamines (mainly in the 1970s), tranquilizers (especially benzodiazepines), sleeping pills, alcohol and cannabis'.

The smoking of cocaine base developed in the U.S. in the 1970s 65, and was first reported in the Netherlands in 1981 66. For smoking cocaine, the cocaine hydrochloride acid is converted back into a base (in the U.S. often indicated as "crack") by processing it with sodium bicarbonate (=baking soda) or aqueous ammonia. In the Netherlands, the cocaine base is mainly processed by users themselves. Around 1981, the cocaine base was often smoked in a water pipe filled with rum 66, but this method appears to be rare among Amsterdam addicts nowadays. Both heroin and cocaine base are smoked (either together or apart) by heating a tin foil from underneath and inhaling the vapor of the heroin and/or the cocaine base. This mode of smoking heroin and/or cocaine ("chasing the dragon") is indicated in Dutch as "chinezen". Sniffing of heroin is rare, while sniffing of cocaine occurs mainly among non-deviant cocaine users 67.

With regard to injecting, it is estimated that about 40% of the Dutch drug users in Amsterdam have injected drugs recently, as compared to 5% among drug users from Surinam, the Netherlands Antilles, Morocco, Turkey and 70% among other drug users of foreign origin (mainly German and South-
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European) 50. Most injecting in Amsterdam appears to be injecting into the veins (i.e. intravenous use). This method of drug use has the quickest and strongest effect compared to other methods of use. As injecting can be seen as an adaptation to the conditions of decreased drug availability68, and as drug-use behaviors are not consistent over time 61, 62, the prevalence of a history of injecting is higher than the prevalence of current injecting. Thus, among drug users entering an epidemiological study of HIV infection in Amsterdam 69, 81 % report a history of injecting, while 63% report injecting in the preceding six months.

1.6 Coping, psychopathology and drug use

A wide variety of theories exist which try to explain drug use, drug dependence, drug abuse or addiction at a physiological, psychological, social and societal level76. The present research focuses on the psychological aspects of drug use. Wills & Shiffman71 provide a conceptual framework which relates drug use to coping theory. The model is mainly based on studies of smoking and alcohol use. However, studies of opiate addiction also suggest that opiate use may serve a coping or adaptive function by fulfilling psychological needs 60, 72, 73.

Given a certain amount of stress, individuals will employ different coping skills, dependent on the perceived severity and changeability of the stressor, the difficulty of the coping response, the variety and quality of a person's coping repertoire and the available social network resources. A central postulate within Wills & Shiffman's framework is that substances may be used as a coping mechanism for two reasons: to reduce negative affect, when a person is anxious or overaroused, or to increase positive affect, when a person feels fatigued, depressed or underaroused.

In relation to substance use, Wills & Shiffman distinguish two broad categories of coping skills: a) temptation-coping skills and b) stresscoping skills. Temptation-coping skills, like self-control and social skills, are relevant for dealing with situations in which substance use, or temptation for substance use, is present. Stress-coping skills are necessary to cope with major life events and with enduring life strains. Coping with these kind of stressors can be defined as specific cognitive or behavioral activities undertaken by the individual to maintain a balance between environmental and internal demands and resources currently available to meet those demands74. Two functions of coping, frequently occurring simultaneously, can be distinguished: the alteration of the ongoing person-environment relationship (instrumental or problem oriented coping) and the control of stressful emotions (emotion regulation). However, coping responses differ with regard to effectiveness. Some ways of coping may lead to gradual adaptation of self and/or one's environment and eventual resolution of life changes, whereas others may lead to unresolved grief, depression and social alienation or to hostility, conflicts and characterological disturbances. Wills & Shiffman (p. 8) predict that substance use as a way to cope with stress will in general have non-productive consequences: "Although substances may provide short-term changes in affect, a reliance on this approach for dealing with environmental stressors reduces the probability of learning and practicing alternative coping responses; in the long run this would tend to reduce social competence and increase overall stress levels. Additionally, drug-abusing behavior may gradually alienate potential social supporters, leading to increasing social alienation and increased dependency on the use of substances to cope".

This view of drug use, as a gradually failing attempt to cope with stressors, coincides with a different theoretical line of approach: the relationship of psychopathology to drug use. Rates of current psychiatric disorders (apart from substance use diagnoses) have been found to be high among drug addicts75, 76. The causal relation can go both ways: among persons starting with illicit drug use, there are relatively many with psychological problems or psychopathology, while on the other hand, illicit drug use may cause or aggravate psychological problems or psychopathology. Hard drug use, psychopathology, ineffective coping and social isolation seem closely interrelated at many levels. However, it is important to realize that these interrelations occur in a society in which use of hard drugs is illegal; they may be quite different in a society in which hard drug use is not considered deviant. Furthermore, most of the studies cited below concern drug users in treatment, or entering treatment, and cannot be generalized to drug users in general.

Frequently diagnosed psychiatric disorders among opiate addicts are major depressive disorder, alcoholism and antisocial personality 76, 77. Drug dependence has been described as the result of attempts at self-medication, in order to cope with psychological or social problems78. Psychopathology among opiate addicts appears to be associated with impaired social functioning. Depressed addicts had only mild to moderate depressive symp toms, but had more severe medical and psychosocial problems than non-depressed addicts75, 76. These associated psychosocial impairments suggest a failure to cope with everyday problems. Research on coping and affective disorders in general79 suggests that problem oriented coping (i.e. problem analysis, information seeking and problem solving behavior) is associated with less depression, while avoidance, which appears to be an ineffective coping strategy, is associated with more depression. Research among addicts entering a clinical detoxification center found a correlation between social functioning (i.e., conflicts with family and others) and psychiatric problems80. However, the authors note that this finding may be due to the fact that the sample consisted of treatment-seeking addicts. Follow-up interviews with opiate addicts, 2.5 years after treatment, found the most prevalent psychiatric disorders related to poor current functioning and poor psychosocial adjustment at follow-ups'. Van Limbeek82 found lower levels of social adequacy among addicts with depressive symptoms. Drug addicts with severe psychiatric problems showed virtually no improvement in drug treatment83. Psychopathology among substance abusers was found related to a small social network; a large network was related to adequate general coping skills84. Abstinence of heroin appears to be facilitated by close social ties 85. Findings by Kranzler & Liebowitz86 suggest that anxiety and/or depressive symptoms may contribute to relapsing into drug or alcohol use once a period of abstinence has been achieved. This is confirmed by Rhoads87 for female drug users: the occurrence of stressful events combined with low perceived availability of support appears to lead to depression and anxiety. In the absence of social support, female addicts appear to "self-medicate" with drugs in order to cope with stressors.

To summarize, drug users seeking treatment have high levels of psychopathology. Drug users with psychopathology, when compared to other drug users, appear to function less well socially, to have less social support, to have a smaller social network and to have less temptation-coping skills.
1.7 Protection motivation

Apart from knowledge about the threat and the availability of material resources for safe injecting, behavioral change among IDUs at an individual level requires the motivation to protect oneself against HIV. In view of the high HIV prevalence among IDUs in many areas of the world, the relatively easy transmission of HIV through needle sharing and the fatal course of HIV infection, it can be assumed that HIV represents a severe stressor for health-conscious IDUs. Even if HIV is not experienced as a major stressor, health-conscious IDUs will have to cope with the temptation to inject in the absence of a "safe" needle and syringe (either a self-used one or a new one) or in the absence of bleach or boiling facilities. Temptation coping skills are then of relevance.

Several related models have focussed on preventive health behavior in general: the health belief model, the dual process model, and protection motivation theory. Protection motivation theory assumes two simultaneous and independent processes: an appraisal of the magnitude of the threat and an appraisal of possible ways of coping. The figure shows how information (both environmental, like verbal persuasion, and intrapersonal, like prior experience) about a health risk evokes two cognitive processes. According to this theory, a maladaptive response would be facilitated by the rewards of this behavior and inhibited by the perceived vulnerability to the threat and its perceived seriousness. Anxiety, according to the model, has no direct relation with behavioral intention or behavior. Anxiety is mediated by perceived vulnerability, which can be seen as a cognitive representation of anxiety. An adaptive response is, according to the model, facilitated by the conviction that this behavior reduces the health risk (response efficacy) and, secondly, by the conviction that one is able to perform this behavior consistently (self-efficacy). Costs connected to the adaptive behavior are seen as inhibitive of the adaptive response. The figure shows that facilitating and inhibiting factors together lead to protection motivation; the latter is expected to determine adaptive or maladaptive behavior. Although factors like social support and network size are not explicitly included in protection motivation theory, these factors are expected to affect threat and/or coping-appraisal indirectly. Assuming that drug users are concerned about their health, the question is whether they will be able to cope effectively with the HIV threat. The relations between drug use, psychopathology, ineffective coping and social isolation, discussed in section 1.6, suggest that effective coping may be rare. Furthermore, among active drug users, the threat appraisal process may be distorted, due to the sedative effect of opiates and tranquillizers or to the euphoric effect of psychostimulants.

So far, this section has discussed the motivation to protect oneself against HIV, as a potential determinant of safe behavior. For infected IDUs, who are aware of their serostatus, a reason for safe behavior may also be self-protection motivation: the belief that AIDS can be postponed by avoiding reor other infections. However, no evidence for this belief has been found. Another reason for safe behavior may be the desire to protect others from HIV: other-protection motivation.

1.8 Method

The main focus of the present research is needle sharing among injecting drug users. Needle sharing includes two different behaviors: borrowing and lending. Borrowing is defined as injecting with needles and/or syringes which have been used by somebody else, lending as letting someone else inject with a needle and/or syringe which a person has already used him- or herself. The actual HIV risk associated with these two behaviors depends of course on one's serostatus.

In current HIV-related terminology, the term "injecting drug user" indicates persons with a history of injecting illicit drugs or currently injecting drugs, regardless of the presence of dependence, abuse or addiction. According to the above given definitions, almost all injecting drug users participating in the present research are heroin addicts (with a history of injecting), many of whom are polysubstance dependent. Considerable individual differences exist with regard to the frequency of use, the duration of use and the number and kind of drugs used in addition to heroin.

The first study is described in chapter 2. In this study, in 1987, currently injecting drug users were interviewed at different locations, in order to study the impact of the exchange program on injecting risk behavior. Participants were asked to participate in a follow-up interview. Demographic and drug use characteristics of IDUs who used the exchange program more than 90% of the time ("exchangers") were compared to IDUs who never or irregularly used the exchange program ("non-exchangers").
The other six studies (chapter 3-8) were conducted as part of an epidemiological study of HIV infection among drug users in Amsterdam. The aims of this ongoing cohort-study, which started in 1985, are to study a) the prevalence, incidence and natural history of HIV infection in drug users, b) risk factors for existing and new infections, c) behavioral changes and d) determinants of HIV risk behavior. The cohort-study involves voluntary, confidential HIV-antibody testing and counselling. Participants enter mainly through "low threshold" methadone programs or through the separate Sexually Transmitted Diseases clinic for addicted prostitutes. After informed consent is obtained, specially trained nurses take a blood sample and interview participants using a standard questionnaire. Since 1989, additional questionnaires on specific psychosocial or behavioral topics have been added to the standard questionnaire over regular periods of time, and at each visit, a medical examination is done. From 1985 until 31st March 1992, 951 drug users participated at least once, of whom 582 participated in the follow-up study. HIV seroprevalence among the 951 participants was 26%. The seroprevalence was 4% among 182 drug users who had never injected and 31% among the 769 drug users with a history of injecting. The subgroup of 591 drug users who had injected in the six months preceding intake had a prevalence of 34%. As the six studies described in chapter 3-8 were conducted within the larger epidemiological study, the serostatus of all subjects was known and many of the subjects were - at follow-up visits - aware of their serostatus. For this reason, it was possible to study behavioral determinants while differentiating between HIV-negative and HIV-positive drug users, and to take knowledge of serostatus into account.

The study described in chapter 3 examines changes over time (1985-1989) in drug use among 386 IDUs, both with regard to the current route of intake (injecting versus smoking/inhaling) as to the kinds of drugs used (heroin, cocaine, tranquilizers etc.)

In the same sample, evidence was sought for the assumption that "low threshold" methadone programs have a function in controlling the spread of HIV among drug users. For this purpose, long term regular participants in these programs were compared to short term and/or irregular participants (see chapter 4).

The next three studies focus on determinants of needle sharing. Chapter 5 is directed at psychopathology and stress and will examine the hypothesis that drug users with coexisting psychopathology or stress have higher levels of injecting risk behavior than other drug users. Chapter 6 focuses on demographic, social and drug use characteristics of HIV-negative injectors who inject in a risky manner. Chapter 7 investigates whether it is meaningful to study "protection motivation" in the prediction of injecting risk behavior among HIV-negative IDUs aware of their serostatus. The studies described in chapter 6 and 7 also look at the impact of the exchange program on needle sharing.

While these last two studies concern HIV-negative injectors, at risk of acquiring HIV-infection, chapter 8 describes a study of risk behavior, beliefs, attitudes and intentions of HIV-seropositive IDUs, aware of their serostatus.

In the general discussion (chapter 9), the findings of these studies are related to other empirical findings and to the conceptual framework of coping, psychopathology and protection motivation, presented in this introduction.

References

CHAPTER 1 Introduction


Studied on injecting drug users (IDUs) and AIDS have mentioned the ready availability of new needles as a method of preventing needle sharing and the spread of HIV infection among this group [1,2]. The needle and syringe-exchange programme in Amsterdam (hereafter called exchange programme) started in 1984 through an initiative of the drug users organization, the 'Junkiebond'. In 1986, needle-exchange schemes started in Sweden and Australia and in 1987 in England and Scotland [3,4]. While the initial aim of the Amsterdam programme was to prevent hepatitis B infection, this was soon overshadowed by the more important goal of AIDS prevention. The number of needles and syringes distributed increased greatly, from 100 000 in 1985 to 720 000 in 1988 [ 5 ]. At present it is too possible to exchange at 11 locations, consisting of methadone posts and other drug help organizations. At these locations, IDUs can exchange any kind or number of used needles and syringes for the same number of 2 cc needles and syringes. Condoms can be bought at a low price and needles on safe sex and safe use are also available. The main aim of the programme is to promote the once-only use of needles and syringes and to prevent needle sharing. This is part of the general Amsterdam drug policy of harm reduction as the primary goal where the drug user is not willing or able to stop injecting drugs. The modus operandi of the exchange programme is that it removes used needles from circulation ('off the streets'), which is important from a public health point of view. In 1987, the percentage of returned needles was only 70%; instructions for exchange workers to keep more strictly to the one-to-one exchange rules led to an exchange percentage of 86% in 1988 [5].

To keep the threshold as low as possible, counselling is optional and there is no registration at the exchange locations (except of the number of needles handed out per month per location). Therefore, there are no data available on number and characteristics of clients.

It is estimated that in 1987 there were about 7000 drug users in Amsterdam, of whom about 40% injected drugs.

There was, therefore, an estimated total of 2800 IDUs in Amsterdam [6]. Assuming that an average IDU uses 1.8 needles per day (84 recent IDUs from the Amsterdam cohort study among drug users (10) interviewed with a new questionnaire since February 1989 injected an average of 3.2 times a day and used the same needle on average 1.8 times; this means that they used 1.8 needles a day), in 1987 38% of all necessary needles were obtained at an exchange programme, while the other 62% were bought either in medical shops, a few pharmacies, small shops in the redlight (prostitution) district or on the street. In 1987, a study was started to evaluate the exchange programme. In this report the relationship between participation in the exchange programme and risk level of injecting is analysed.

The study population consisted of 145 Dutch and non Dutch IDUs in Amsterdam who volunteered to participate. The criterion for inclusion in the study was having injected during the previous 6 months. Subjects were recruited from exchange locations such as methadone maintenance programmes, drug advice agencies and the drug users' organization (Junkiebond) and from non-exchange locations such as consulting hour for foreign addicts, hospitals and police stations.

The mean age of 29.6 years and the male/female ratio of the subjects (2.4:1) are similar to those of the 4700 (approximately) drug users in Amsterdam (30.1 and 31:1: 1 years, respectively) who were seen by the Municipal Health Service in 1987 [6]. Since participants were self-selected, their representativeness is unknown.

From March to September 1987, participants were interviewed by nine different interviewers with a standardized questionnaire about their drug use, injecting behaviour and participation in the exchange programme in Amsterdam. All the interviewers, except one medical student, worked or had worked in the drug department and were experienced in working with drug users. None of the interviewers worked in the methadone-maintenance or treatment programmes in which their interviewees were participating.

Ten people were interviewed anonymously. When the other 135 participants in the original sample were approached for a follow-up in 1988, two had died and two refused a second interview. Twenty-three of the 83 foreign addicts were known to have returned to their country of origin. Of the remaining 108 people that we tried to contact, 60 participated in the follow-up interview. Although a follow-up of 41% seems low, one has to remember that tracing and motivating IDUs is very difficult.

Using the data from the first interview, we found a few significant differences between the 60 people who were reached for follow-up and the 85 who were not reached. The follow-up group consisted largely of Dutch IDUs (53 versus 35%) and therefore more of the follow-up group had had contact with a methadone agency in the previous 5 years than the group lost to follow-up (79 versus 49%). The follow-up group contained fewer people who had injected daily in the previous month (63 versus 88%), fewer people who had used heroin daily (57 versus 83%)

and more who had used methadone daily (72 versus 46%). However, there were no significant differences with regard to age, sex and duration of injecting. Risk levels with regard to injecting (see below) were also not significantly different and the same was true for the percentage of exchangers in both groups.
The mean interval between first and second interview was 13.5 months (range 10-20 months, median 14 months). Follow-up participants were interviewed with a follow-up version of the first questionnaire with a few added questions.

Demographic characteristics, drug use and injecting behaviour were analysed, with degree of participation in the exchange programme as an independent variable. Statistics used were chi-square, Student's t- and McNemar tests. P values less than 0.05 were taken as significant.

To study the risk level of injecting we combined the injecting variables 'to use your needle only once' and 'borrowing used needles from others in the previous month'. We defined risk level 0 as not injecting in the previous month, and risk level 1 as the way of injecting with least risk, i.e. not borrowing needles and only using sterile needles. Risk level 2 was defined as 'not borrowing needles but re-using your own needle'. Although technically there is no difference with regard to AIDS risk between risk level 1 and 2, there are behavioural and psychological differences which are important with regard to AIDS prevention. Re-using your own needle is a high-risk activity because it can cause infections and because others may have used the needle in the meantime or needles may have been mixed up. From a psychological viewpoint it can be argued that it is easier not to share when you have already developed a habit of using only new (clean and sharp) needles than when you habitually use a needle more times. Risk level 3 was defined as borrowing used needles.

To study variables associated with needle sharing, 13 variables were selected for entry as independent variables in a logistic regression model with borrowing during the last two years as the independent variable. The 13 variables were: age, sex, nationality, duration of injecting, frequency of injecting heroin the month before, frequency of injecting cocaine the month before, frequency of injecting the month before, amount of injecting now compared with 6 months before, frequency of injecting alone the month before, frequency of exchanging needles within the last 6 months, using methadone daily, contact with methadone programme during the previous 5 years, having volunteered for an HIV test.

Results

General and drug-use characteristics at the first Interview

The study group consisted of 102 men and 43 women. Forty-three per cent had Dutch nationality, 30% German nationality and 27% another nationality. The mean age was 29.6 years (range 18-47 years). Males were, on average, 30.2 years old; women, on average, 28.4 years old.

Most (88%) of the interviewed IDUs reported that injecting had been their principal method of using drugs in the previous 2 years and 78% reported having injected daily during the previous month. The mean duration of injecting was 8 years and there was a significant correlation between age and duration of injecting: 0.48 (P < 0.001). The male IDUs had been injecting for a significantly longer time than the females: 9 versus 7 years (P < 0.05).

In the study group, 72% used heroin daily and 50% cocaine daily. Methadone was used daily by 57%, hashish and marijuana by 23%, tranquilizers by 18% and alcohol by 14%. Amphetamines were used daily by only 3% of the study group.

The German subgroup, although not older than the other nationalities, had been injecting for a longer time than the others: 10 versus 8 years (P < 0.05). Dutch IDUs were more often in contact with methadone programmes than foreign IDUs (90 versus 41%, P < 0.0001). This can be ascribed to the Amsterdam drug policy of preventing non-residents from entering methadone-maintenance programmes. Dutch IDUs also used methadone more often (66 versus 49%) at the time of the interview, but this difference was not significant.

Differences between exchangers and non-exchangers at the first Interview

Table 1. Needle-sharing behaviour of 145 injecting drug users in Amsterdam at interview 1, according to participation in the exchange programme.

<table>
<thead>
<tr>
<th>Behaviour</th>
<th>Exchangers (n = 72)</th>
<th>Non-exchangers (n = 73)</th>
<th>Total (n = 145)</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Borrowing used needles from others in the previous month</td>
<td>7 (10)</td>
<td>17 (23)</td>
<td>24 (17)</td>
<td>$\chi^2 = 3.9, d.f. = 1, P &lt; 0.05$</td>
</tr>
<tr>
<td>Borrowing used needles from others in the previous 2 years</td>
<td>23 (33)</td>
<td>42 (57)</td>
<td>66 (66)</td>
<td>$\chi^2 = 7.4, d.f. = 1, P &lt; 0.01$</td>
</tr>
<tr>
<td>Lending used needles to others in the previous month</td>
<td>25 (35)</td>
<td>28 (38)</td>
<td>53 (37)</td>
<td>NS</td>
</tr>
<tr>
<td>Lending used needles to others in the previous 2 years</td>
<td>27 (40)</td>
<td>41 (57)</td>
<td>68 (49)</td>
<td>NS</td>
</tr>
</tbody>
</table>

Values are given in numbers with percentages in parentheses.
Seventy-two people (50%) reported almost always (90% of the time or more) obtaining their new needles in the previous 6 months at the exchange programme. Forty-four people (30%) reported using the exchange programme never or rarely (10% of the time or less). The remaining 29 (20%) reported using the exchange programme, on average, 51% of the time. For the present analysis, we compared the group of 72 people who used the exchange programme more than 90% of the time with the other 73 people who used the exchange programme never or irregularly. We shall call the first group the 'exchangers' and the second group, the 'non-exchangers'.

There was no significant difference between these groups with regard to sex or nationality. The exchangers were older than the non-exchangers (31.2 versus 28.2 years, Student's t-test P=0.001) and had been injecting for a longer period of time (9.4 versus 7.4 years, Student's t-test P < 0.05). Exchangers had been in contact with methadone programmes in the last 5 years more often than non-exchangers (76 versus 48%, x² = 10.4, d.f. = 1, P < 0.01). This also shows that 24% of the exchangers had not been in contact with methadone programmes in the last 5 years. There were no significant differences between groups with regard to the kind of drugs they used daily. Injecting behaviour in both groups also appeared to be similar: there were no significant differences between the percentages reporting predominant injecting during the previous 2 years, the percentages reporting injecting daily during the previous month, and the percentages reporting injecting only when being alone during the previous month. Easy availability of free needles was not associated with an increase in injecting: 72% of the exchangers reported that they injected the same or less than 6 months previously compared with 49% of the non-exchangers (x² = 7.0, d.f. = 1, P < 0.01). During the previous 6 months 3% of exchangers and 27% of non-exchangers found themselves daily in the high-risk situation of possessing drugs but not clean needles (x² = 15.2, d.f. = 1, P = 0.0001). Eighty-two per cent of the exchangers used their own needles only once, compared with 29% of the non-exchangers (x² = 39.3, d.f. = 1, P < 0.0001). More non-exchangers than exchangers had borrowed needles in the previous month as well as in the last 2 years; there was no such difference with regard to lending needles to other people (see Table 1).

Variables associated with needle sharing at the first interview

To study variables associated with needle sharing, 13 variables (see Methods) were selected for entry as independent variables in a logistic regression model, with borrowing during the last 2 years as the dependent variable. Five variables in the final model contributed significantly to the fit of the model (Table 2). As can be seen from the odds ratios, a level of 2, for example, for the frequency of injecting in the previous month is associated with a 1.77 (77%) greater risk of borrowing during the previous 2 years than a level of 1. This means that (1) not injecting daily during the previous month, (2) not exchanging needles during the previous 6 months, (3) volunteering for an HIV test, (4) being male, and (5) being of a younger age are independently associated with borrowing of needles during the previous 2 years.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Odds ratio</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of injecting in the previous month</td>
<td>1.77</td>
<td>1.18-2.64</td>
</tr>
<tr>
<td>Frequency of exchanging needles in the previous 6 months</td>
<td>0.99</td>
<td>0.98-1.00</td>
</tr>
<tr>
<td>Having volunteered for an HIV test</td>
<td>0.20</td>
<td>0.07-0.58</td>
</tr>
<tr>
<td>Sex</td>
<td>0.25</td>
<td>0.09-0.63</td>
</tr>
<tr>
<td>Age</td>
<td>0.92</td>
<td>0.85-1.00</td>
</tr>
</tbody>
</table>

*Borrowing in the previous 2 years: 0, not at all; 1, at least once. Frequency of injecting in the previous month: 1, more than once a day; 2-6, once a day—once a month; 8, not at all. Frequency of exchanging needles in the previous 6 months: percentages of the total number of needles obtained. Having volunteered for an HIV test: 0, yes; 1, no. Sex: 0, male; 1, female. Age: years.
The impact of the needle and syringe-exchange programme in Amsterdam on injecting risk behaviour

Exchangers and non-exchangers at the second Interview

Thirty-five (49%) of the 72 exchangers and 25 (34%) of the 73 non-exchangers participated in the follow-up. The proportion exchanging in the follow-up group did not change significantly (57% at interview 1 versus 63% at interview 2, n = 54).

Of the 35 exchangers, three had not injected during the previous 6 months at follow-up. Twenty-six were still exchanging more than 90% of the time (group EE) and 5 had started to exchange less than 90% of the time (group EN). The follow-up exchange data are missing for one former exchanger; this case is therefore excluded from analysis.

Of the 25 non-exchangers, two had not injected during the last 6 months at follow-up. Fifteen were still not or were only irregularly exchanging (group NN) and eight had started to exchange more than 90% of the time (group NE). General characteristics of the groups EE, EN, NN and NE can be compared in Table 3. As can be seen, the group of stable exchangers (EE) is older and injects longer than the group of stable non-exchangers (NN).

Risk levels of injecting at first and second Interview

Risk levels were compared between the group of exchangers and non-exchangers. In 1987, at the first interview, the exchangers used at a significantly lower risk level than the non-exchangers (Table 4). Most of the exchangers (74%) used drugs at risk level 1, which means using only sterile needles (see Methods), versus 26% of the non-exchangers.

Fewer exchangers (17%) used drugs at risk level 2 (meaning no borrowing but re-use of your own needle) than non-exchangers (48%). Ten per cent of the exchangers used drugs at risk level 3 (which means borrowing) versus 23% of the non-exchangers.

When the group who used a needle once only (n = 80) is compared with the group which re-used needles (n = 65) we find that borrowing needles (risk level 3) occurs less frequently among the once-only users than among the re-users (9 versus 26%, P < 0.01).

In 1988, at the second interview, again a significant difference in risk level was found between exchangers and non-exchangers, as can be seen in Table 5.

<table>
<thead>
<tr>
<th>Risk level</th>
<th>Exchangers (n = 72)</th>
<th>Non-exchangers (n = 73)</th>
<th>Total (n = 145)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2 (3)</td>
<td>2 (1)</td>
<td>4 (3)</td>
</tr>
<tr>
<td>1</td>
<td>53 (74)</td>
<td>19 (26)</td>
<td>72 (50)</td>
</tr>
<tr>
<td>2</td>
<td>12 (17)</td>
<td>35 (48)</td>
<td>47 (32)</td>
</tr>
<tr>
<td>3</td>
<td>7 (10)</td>
<td>17 (23)</td>
<td>24 (17)</td>
</tr>
</tbody>
</table>

Values are given in numbers with percentages in parentheses. Risk level 0, no injecting; 1, no borrowing plus using only sterile needles; 2, no borrowing but re-use of own needle; 3, borrowing used needles; $\chi^2 = 33.5$, d.f. = 3, $P < 0.0001$.

At the second interview a question was added concerning the frequency of injecting over a longer period of time, i.e. 6 months. A relationship was found between exchanging and frequency of injecting during the last 6 months: 32% of the exchangers said they had injected irregularly during the last 6 months compared with 70% of the nonexchangers ($X^2 = 5.7$, d.f. = 1, $P < 0.05$).
The impact of the needle and syringe-exchange programme in Amsterdam on injecting risk behaviour

Discussion

Exchangers appear to be older, to inject for a longer time and to be more frequently in contact with methadone programmes than non-exchangers. Participation in a needle exchange programme is not associated with an increase in injecting. Exchangers less often find themselves in a high risk situation (i.e. having drugs but no clean needle) than non-exchangers. Predominantly, they use their own needle only once, while most non-exchangers use it more than once. Exchangers also borrow used needles from other IDUs less often than non-exchangers; i.e. the injecting risk level of exchangers was much lower than of non exchangers in both 1987 and 1988. There seems to be no grounds for the fear that exchangers - because of their reliable supply of needles - will lend their used needles to others more often: there was no difference between exchangers and non-exchangers with regard to lending nee dles to others. Another positive finding is that the exchange programme seems to be able to reach IDUs who are not reached by methadone programmes.

Not exchanging needles in the last 6 months, being male and being younger were all associated with borrowing and these factors can be interpreted as predictive of borrowing. It is important to note that being male and being of a younger age are associated with borrowing independent of exchanging. This means that even among exchangers young IDUs and male IDUs have a higher rate of borrowing.

Volunteering for an HIV test was also associated with borrowing during the last 2 years. In this case the relationship is probably inverse: people who had been borrowing seemed to be more inclined to have an HIV test than people who had not been borrowing. This supports the current idea that drug users who volunteer for an HIV test have been more at risk than drug users in general.

The study was designed as a follow-up study. Followup rates would have been better had only Dutch subjects been selected for the first interview, since 57% of the initial interview sample were non-Dutch IDUs there was clearly less likelihood that they would be available for interview at follow-up.

The differences between the follow-up group and the group lost to follow-up can partly be explained by the larger proportion of Dutch users in the follow-up group. Dutch users have much easier access to methadone programmes than non-Dutch users, and, consequently, use more methadone than non-Dutch users. Daily injecting and daily heroin use was less common in the follow-up group than in that lost to follow-up. One possible reason could be that a considerable number of German and Italian high frequency users had returned to their country of origin.

There is an interesting relationship between infrequent injecting and not exchanging, which was found in 1988 (comparable data were not available over 1987). This can be explained by the fact that those injecting irregularly might be in either a stopping phase or a re-starting phase, and therefore do not want to organize a supply of clean needles any longer or are not yet ready to organise themselves around their injecting behaviour. The financial advantage of exchanging over buying can also be expected to be more relevant for regular users.

We do not have a clear explanation for the finding that injecting infrequently in the previous month is associated with borrowing needles over the previous 2 years. It seems unwarranted to assume that injecting frequency over the previous month is an indicator for injection frequency over a longer period of time. The most plausible explanation is that serostatus is an intervening variable and that among those who have borrowed needles in the previous 2 years there are many seropositives who have decreased their rate of injection because of their serostatus. In any case, the relationship between irregular injecting, borrowing needles and participation in an exchange programme seems significant enough to be examined more thoroughly.

Until now a needle-exchange programme has been seen mainly from the 'supply side': offering a means of prevention. The 'demand side' is that an exchange programme is probably especially relevant to the more regular users or to users while they are in a period of regular use. In earlier articles [8,9] it was stressed that because of the great heterogeneity of the drug-using population it is very unlikely that only one method of HIV prevention will be universally effective. Since using irregularly seems to be associated with non-exchanging it becomes important to use (or keep using) other methods of HIV prevention in addition to an exchange programme.

Another argument for this is that being young and being male is associated with borrowing needles independent of exchanging. This means that young or male exchangers are at greater risk of borrowing than old or female exchangers. Intensive counselling on risk reduction was advocated in a recent study (10) as a necessary ingredient for behaviour change. However, counselling has a higher threshold than simply exchanging, which means it may not be accepted by some users. A third prevention approach - giving information (by leaflets) about disinfecting a used needle with bleach - has been rejected until now in the Netherlands in order to keep the main prevention messages of 'no sharing' and 'always exchanging' clear. However, this approach does offer a compromise for those who find themselves in high risk situations. Ideally, of course, it would be better if every IDU used either his/her own needle, or did not inject at all, but this is not a realistic universal objective. Knowledge about disinfecting with bleach might mean one less se reversion each
time a young male exchanger acquires drugs after office hours but has neither his own needles nor money. Since most of the IDUs we interviewed already practised cleaning a used needle with water when re-using, or borrowing to prevent the needle from getting clogged, it would appear to be a small step to add one more phase to this process (i.e. first rinsing twice with bleach).

We conclude that the exchange programme seems to be effective in lowering the risk level of injecting while not leading to an increase in injecting. It is possible to reach IDUs who are not reached by methadone programmes with an exchange programme. However, the exchange programme seems to attract mainly older, long-term injectors and regular injectors. Therefore, efforts have to be made to reach younger, short-term, and irregular injectors. Furthermore, the group that is not in contact with methadone programmes, predominantly non-Dutch IDUs, should be encouraged to exchange. Finally, to optimize risk reduction, the exchange programme should be one part of a set of varied preventive measures aimed at a heterogeneous IDU population.

Acknowledgements

We thank H.J.A. van Haastrecht for statistical advice, G. Hodge-Manos for correcting the English, Dr G.J.P. van Griensven for his critical comments, J.S.A. Fennema for his efforts in tracing IDUs for follow-up, M. Grove and M. ter Pilli for preparing the manuscript and, finally, workers in the drug aid agencies and the participating IDUs for their cooperation.

References

Changes over time in heroin and cocaine use among injecting drug users in Amsterdam, The Netherlands, 1985-1989

British Journal of Addiction (1991) 86, 1091-1097 RESEARCH REPORT

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Introduction

Some injecting-related HIV risk reduction has occurred among injecting drug users (hereafter called IDUs) in Amsterdam.1-3 In the USA, next to HIV risk reduction among drug users, 4-5 there seems to be an increase in HIV risk due to an increase in cocaine use.6 Cocaine injecting has been shown to be related to risky injecting behaviour7 and to HIV-seropositivity.8 Smoking or inhaling cocaine ('crack') appears to be related to risky sexual behaviour,9,10 and to HIV infection.11,12 In Europe, an increase in the use of smokable forms of cocaine has been reported,13 but data on the relation with HIV infection are absent so far.

It seems therefore relevant to monitor drug use trends, especially with regard to cocaine use. The authors surveyed oral drug use and injecting variables in IDUs in Amsterdam enrolled in an HIV study through 'low threshold' methadone clinics from December 1985 until March 1989. The objective of the present study is to assess whether changes over time have occurred in ways of drug use and in the kind of drugs used.

Drug users and low threshold methadone programs in Amsterdam

It is estimated that on average about 5500 hard drug users (DUs) were present in Amsterdam in each quarter during the years 1987 and 1988. This estimate does not include short term visits by drug tourists. Among these 5500 in both years approximately 2400 DUs, i.e. 40%, had injected in the previous month.14

The Drugs Department of the Municipal Health Service in Amsterdam operates seven low threshold methadone clinics: four neighbourhood clinics, two clinics for extremely problematic DUs and one clinic for DUs who work as prostitutes or who are non-residents.15 These clinics do not aim at treatment of the addiction; they aim primarily at contacting heroin users and 'regulating' (stabilizing) their use.15 Illicit opiate or cocaine use is not a reason for dismissal. The clinics daily provide onsite primary medical and social care and supply methadone to a yearly population of approximately 3500 DUs (both IDUs and non-IDUs). In 1987, the average prescribed methadone dose was 35 milligrams.16

Methods

Study population and variables

In 1985 an epidemiologic study of HIV-infection among drug users was initiated. This ongoing study, aspects of which have been previously described,16 involves voluntary, confidential HIV antibody testing and counselling for drug users in Amsterdam, combined with an interview by specially trained nurses using a standard demographic and behavioural questionnaire. Most DUs (83%) entering the study have never injected (IDUs), while 55% have injected in the previous month.14

The present study concerns the intake-visits in the period December 1985 to March 1989 of all 386 IDUs who enrolled for the HIV-study through one of the previously mentioned seven methadone clinics. The research team was distinct from methadone clinic workers.

Limited data are available on DUs who get methadone on prescription in Amsterdam,14,16 but not separately for injecting DUs. With regard to age, there was no significant difference between the 386 IDUs in the sample and all DUs who got methadone prescribed in Amsterdam in 1987. With regard to the sex-ratio there was a difference: there were relatively fewer males in the study than among DUs attending low threshold methadone clinics in 1987 (respectively male/female ratio 2:1 versus 3:1).

All variables, except HIV-serostatus, are selfreported. All 386 participants are IDUs, which means they have injected drugs at some previous time. Current behaviour is behaviour in the 6 months preceding intake. Long term methadone (LTM) use was defined as daily methadone use in the last 5 years. Heroin smoking in the present study comprises both smoking heroin and tobacco in a cigarette as well as 'chasing the dragon', a method in which the heroin vapours are inhaled. Cocaine freebasing is the smoking or inhaling of cocaine.
alkaloid. Use of benzodiazepines and/or sedatives was determined by asking about the current use of different benzodiazepines, barbiturates and methaqualones (indicated by brand name). To study changes over time the total study period was split up in four consecutive intake-periods of 10 months each: I=12/85-9/86, II=10/86-7/87, III=8/87-5/88, IV=6/88-3/89.

**Statistical analysis and serology**

Statistics used included chi-square ($X^2$), Fisher's exact test, Mann-Whitney test (M-W-test) and Spearman rank correlation coefficient. P-values less than 0.05 were considered significant.

Overall increases or decreases in drug use over time were studied; for each drug use variable a logistic regression model was fitted with drug use as dependent variable. 20 Moment of intake (in days as from start of the study) and six potentially confounding variables (age, sex, German or South European nationality, time living in Amsterdam, post at which participant enrolled in the study and long term methadone use) were forced into the models as independent variables. Adjusted odds ratios (ORs) and 95% confidence intervals (CIs') were calculated for the period length of 303 days, which is the length of the four consecutive intake periods.

It was decided not to include drug use behaviours which were practised by less than 45 participants during the total study period, since estimates from models based upon these data might be unstable. Serological tests used for HIV-testing were ELISA's. Confirmation of positive specimens was performed by immuno blotting and competitive ELISA's, as has been described before.

These intervals were calculated as follows: $e^{\beta + 1.96 \times \text{standard error}}$.

### Results

Table 1 presents the general characteristics of the total group and of the four consecutive intake groups.

<table>
<thead>
<tr>
<th></th>
<th>I*</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>$n$</td>
<td>118</td>
<td>124</td>
<td>85</td>
<td>59</td>
<td>386</td>
</tr>
<tr>
<td>$n$ (%)</td>
<td>31%</td>
<td>32%</td>
<td>22%</td>
<td>15%</td>
<td>100%</td>
</tr>
<tr>
<td>Mean age in years (sd)</td>
<td>30.7</td>
<td>28.5</td>
<td>29.3</td>
<td>30.7</td>
<td>29.7</td>
</tr>
<tr>
<td></td>
<td>(6.1)</td>
<td>(6.0)</td>
<td>(5.3)</td>
<td>(6.2)</td>
<td>(5.9)</td>
</tr>
<tr>
<td>% HIV-positive</td>
<td>30</td>
<td>30</td>
<td>26</td>
<td>29</td>
<td>28</td>
</tr>
<tr>
<td>% male sex</td>
<td>64</td>
<td>59</td>
<td>78</td>
<td>78</td>
<td>67</td>
</tr>
<tr>
<td>% enrolled through</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>—neighbourhood meth. clinic</td>
<td>55</td>
<td>74</td>
<td>69</td>
<td>86</td>
<td>70</td>
</tr>
<tr>
<td>—meth. clinic for non-residents and prostitutes</td>
<td>9</td>
<td>15</td>
<td>19</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>—clinic for extremely problematic drug users</td>
<td>36</td>
<td>11</td>
<td>12</td>
<td>10</td>
<td>19</td>
</tr>
<tr>
<td>% Dutch</td>
<td>86</td>
<td>77</td>
<td>79</td>
<td>78</td>
<td>81</td>
</tr>
<tr>
<td>% German/South European</td>
<td>8</td>
<td>14</td>
<td>12</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>% using daily methadone in previous 5 years</td>
<td>56</td>
<td>43</td>
<td>46</td>
<td>63</td>
<td>51</td>
</tr>
<tr>
<td>% living ≤2 years in Amsterdam</td>
<td>19</td>
<td>23</td>
<td>18</td>
<td>17</td>
<td>19</td>
</tr>
</tbody>
</table>

Table 2 presents drug use in the 6 months preceding intake. Most prevalent with regard to oral and intranasal use after methadone are the smoking of heroin and the use of benzodiazepines. Three quarters of the IDUs currently inject, of whom approximately one half inject daily. Most current IDUs mainly inject heroin and cocaine, either simultaneously ('speedball') or apart.

**Drug use in the four consecutive intake-groups**

Table 2 shows that the injecting behaviour of the four intake-groups over time, adjusted for the six possible confounders, is similar. However, daily methadone use and use of benzodiazepines decrease over time, while cocaine freebasng and heroin smoking increase. Fig. 1 shows the non-adjusted proportions of cocaine freebasng, heroin smoking, current injecting and current daily injecting in the four intake groups.

When comparing changes over time in current daily injecting among different subgroups, an adjusted OR of 0.65 was found in the subgroup of 93 cocaine freebasers (CI=0.40-1.07), as compared to an adjusted OR of 0.99 among the 291 non-basers (CI=0.77-1.29) (see fig. 2 for non-adjusted data). In the subgroups of heroin smokers and nonheroin smokers the adjusted ORs for current daily injecting were 0.95 (CI=0.67-1.34) and 0.91 (CI=0.67-1.24) respectively.

Since the four intake-groups differed with regard to current daily methadone use we calculated ORs which were also adjusted for this variable. No noteworthy changes occurred among the earlier found adjusted ORs or CIs. The possibility exists that IDUs with high risk behaviour entered the HIV study preferentially at the start. However, as can be seen in table 1, the HIV-seroprevalence in each of the four intake groups is similar. Current borrowing is the same in the four intake-groups (adjusted OR=0.97, CI=0.78-1.20) and there was no relation between intake group and frequency of ever borrowing: in intake group I to IV respectively 37%, 364%, 37% and 41% had borrowed 10 times or more (X2 for trend=0.17, df=1,p=0.68).
Cocaine freebasing

The HIV-prevalence among the 93 cocaine freebasers is 19% compared to 32% among the 291 non-basers ($X^2=4.6$, df=1, $p=0.03$). Cocaine freebasing in the present study was found to be related to three of nine previously determined HIV-risk factors: 17 cocaine freebasers have more recently started injecting ($X^2=4.7$, df=1, $p=0.03$), they have borrowed less often (M-W-test, $p=0.005$) and most of them (90%) smoke heroin (as compared to 36% among non-basers, $X^2=84.0$, df=1, $p<0.0001$), all of which has been found to be related to a smaller risk of HIV-infection.

Among the 93 cocaine freebasers there are 19 (20%) current prostitutes as compared to 41 (14%) among the 291 non-basers ($X^2=2.1$, df=1, $p=0.14$). Among the subgroup of 60 current prostitutes 42% of freebasers report using condoms always in vaginal contacts with clients as compared to 20% of non-basers ($X^2=3.4$, df=1, $p=0.07$). Current prostitutes who freebase have as many clients per month as non-basers (means 55 and 58, medians 24 and 50 respectively, M-W-test, $p=0.49$).

In a group of 31 DUs, who enrolled in the study from September 1988 to March 1989, extra questions concerning sexual behaviour were asked. Thirteen of these 31 currently had vaginal contact with a casual partner. There was no difference between freebasers and non-basers in this regard ($X^2=0.9$, df=1, $p=0.35$). The mean number of different casual partners in the previous six months is as high in the 16 cocaine freebasers as in the 15 non-basers: 1.2 versus 0.6, median 0.5 and 0 respectively (M-W-test, $p=0.27$). There is also no significant difference between cocaine freebasers and non-basers with regard to always using condoms in vaginal contact with casual partners (13% and 20% respectively, Fisher's exact test $p=1.0$).

Discussion

The most striking findings in our sample were firstly the increase over time in cocaine freebasing and in heroin smoking, and, secondly,
that there were no indications of significant changes in injecting over the years 1985 to 1989. The decrease over time in daily methadone use was not related to the changes found in other drugs. Thus, the findings pertain both to daily methadone users as to others. We do not have a clear explanation for the decrease in daily methadone use. The decrease in benzodiazepine use might be a reflection of restrictions in prescribing tranquillizers to drug users, which started in 1986. 21

Potential limitations of the present study include, first of all, that the representativeness of the sample for IDUs in Amsterdam or IDUs in low threshold methadone programs in Amsterdam cannot be known; no data on both populations are available. A second potential limitation is that our sample is self-selected; it consists of IDUs who voluntarily entered an HIV study. A third potential limitation is the lower number of participants in the later intake groups; only 37% of the sample is in the third or fourth intake group. Therefore, if IDUs with an high HIV-risk entered the study preferentially at the beginning, this would be a serious potential confounder. However, there are no indications for this: no changes over time were found for HIV sero status, current injecting, current borrowing and ever borrowing. These findings are in agreement with earlier studies,’ -; which found that neither needle sharing nor HIV sero status at intake are related to time of intake in the HIV study.

A higher proportion of current cocaine freebasers and current heroin smokers is found in the later intake-groups. In the total group, there are no indications of changes over time in current injecting, in current daily injecting or in the kind of drugs injected. There is an indication for a decrease in current daily injecting among cocaine freebasers: in 1985/1986 half inject daily, while in 1988/1989 among a relatively larger groups of cocaine freebasers only one in eight inject daily.

These findings suggest that in spite of an increase in number of needles and syringes exchanged in the years 1985 to 1989,14 no parallel increase in current injecting or current daily injecting among IDUs has occurred, which is in agreement with earlier studies.12

It was found that almost all cocaine freebasers in the present study also smoke heroin. In Amsterdam, traditionally, the combination of cocaine freebasing and heroin smoking is practised by Surinam/Antillian drug users. This ethnic group, which injects rarely, is hardly represented in the present study (only 3%). Our findings seem to indicate that non ethnic IDUs are adopting the combination of heroin
smoking and cocaine freebasing. Heroin smoking has been found to be independently associated with HIV seronegativity.12 The increase in heroin smoking seems therefore favourable from an HIV prevention point of view.

Freebasing cocaine became popular in Amsterdam in 1981?r In the USA crack rocks (the dried end product of a heated mixture of cocaine hydrochloride, sodium bicarbonate (baking soda) and water are sold ready for use by dealers, while an Amsterdam DU who freebases cocaine buys cocaine hydrochloride and prepares the 'freebase' him or herself, either in the above described manner or by adding aqueous ammonia. The increase in cocaine freebasing among IDUs at intake over time does not seem to be related to a decrease in price. A spokesman of the 'Junkiebond' (the union of DUs in Amsterdam) mentioned prices of cocaine hydrochloride between 140-200 Dutch guilders per gram in 1989, while in 1985 prices between 115-170 Dutch guilders per gram were reported.23 Up till the beginning of 1990, the Municipal Police had no indications that ready for use crack was being sold in Amsterdam (personal communication R, Jellema, Amsterdam Municipal Police).

In the present sample there were no indications that sexual risk behaviour was related to cocaine freebasing. Also, the IDUs in the sample who freebase cocaine have a relatively low HIV seroprevalence. Of importance is furthermore that they are primary opiate users.

Accordingly, the present findings suggest that the relationship between crack use, risky sexual behaviour and high HIV-seroprevalence reported in the USA6,9,10,11,12 is not only related to the pharmacological effects of crack but also to the specific cultural and social setting and to the primary use of cocaine. In conclusion, our study shows that cocaine freebasing and heroin smoking in recent years have become more popular among IDUs in our sample and that injecting does not increase. Whether these changes occur due to the AIDS-threat is difficult to assess. From an HIV-prevention point of view, these changes could have a favourable effect on the spread of HIV among this high risk group, However, the present picture may altogether change if ready for use crack did become available and reach new or existing primary cocaine users,

Acknowledgements

This study was supported by the Netherlands Foundation for Preventive Medicine (grant no. 28-1258). The authors thank the nurses B, Frolich, B. Scheerings-Troost, G. Stienstra and J. Tiewissen for interviewing and collecting blood samples; Dr J. Goudsmit and M. Bakker for performing the laboratory tests; R, Jellema and the 'Junkiebond' for information they provided; H, J, A, van Haastrecht for management of data and critical comments and M, ter Pelle and T, Maruanaya for preparing the manuscript.

References


HIV Prevalence and Risk Behavior among Injecting Drug Users Who Participate in "Low-Threshold" Methadone Programs in Amsterdam

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American Journal of Public Health, April 1992, vol 82 no 4
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Introduction

Methadone treatment for intravenous heroin users can help reduce the risk of infection with the human immunodeficiency virus (HIV). The magnitude of this reduction depends on the ability of methadone programs to reduce illicit opiate injecting.1-5 The Amsterdam "low-threshold" methadone programs endeavor to take down the barriers that treatment programs and/or methadone maintenance programs put up for drug users (DUs) by not prohibiting illicit use of opiates or other drugs. This enables these programs to contact many active DUs who do not want to quit drug use. Low-threshold programs do not aim at treating the addiction; instead, they aim primarily at contacting heroin users and regulating or stabilizing their use by preventing withdrawal symptoms. Within the "harm reduction" approach, 8,9 the programs' function is to signal and take care of sociomedical problems in an early phase. Together with social support, this approach should provide a foundation on which initiatives to quit drug use will have a better chance of succeeding. After the onset of the HIV epidemic, the hope arose that low-threshold methadone programs would have a function in controlling the spread of HIV, 9,11 either by informing active DUs about the HIV risk or through the prescription of methadone, which would stabilize addiction and lifestyle and thereby reduce injecting. The present study aims at evaluating the effect of the Amsterdam low-threshold programs on HIV risk behavior and on the spread of HIV among injecting drug users (IDUs) participating in an epidemiological study of HIV infection

Methods

Low-Threshold Methadone

An estimated 5000 to 6000 DUs were in Amsterdam in each quarter of 1985 to 1989.12,13 Among them, approximately 40% had injected in the previous month. The Drugs Department of the Municipal Health Service operates seven low threshold methadone clinics, 1 2-14 which daily provide on-site primary medical and social care and supply methadone to a yearly population of about 3500 DUs. Nonresidents get methadone only when it is medically indicated or when it is needed to enable the user to return to the city or country of origin. Illicit opiate or cocaine use is not a reason for dismissal from the program. Neither is discontinuation of the program for several days, although a reintake (which entails seeing a doctor) is then re quited. If clients want to quit drug use, they either enter a methadone reduction scheme with urine screening for opiates or are directed to a treatment clinic. Regulated DUs get methadone prescribed by their general practitioner. Between 1981 and 1984, the flow to general practitioners was approximately as large as the opposite flow. In 1987, the average daily methadone dose in the low-threshold programs was approximately 35 mg (range: 5 to 120 mg). Doses between 60 and 120 mg were prescribed in about 3% of cases. The average yearly duration of methadone supply for Dutch DUs was 21 weeks.
Study Population and Variables

In 1985 an epidemiological study of HIV infection among DUs was initiated. This ongoing study involves voluntary, confidential HIV antibody testing and counseling for DUs, combined with an interview by specially trained nurses using a standard demographic/behavioral questionnaire. DUs enroll in the study through a low-threshold methadone clinic or through a sexually transmitted diseases clinic for addicted prostitutes. Most DUs entering the study have at some time injected; 55% have injected in the month before entering. The present study concerns all 386 DUs who had injected drugs at some time and who enrolled in the study through low-threshold methadone clinics from December 1985 until March 1989. Interviews and serological tests were completed for all 386 IDUs; 110 (28%) were IUV seropositive. The mean age of the 386 IDUs at entrance was 29.7 years (standard deviation = 5.9, range: 16 to 57); 260 were male (67%) and 126 female (33%); and 311 (81%) were Dutch. Limited data are available on DUs who get methadone on prescription in Amsterdam but are not available specifically on IDUs. With regard to age, there was no significant difference between the 386 study participants and all DUs who got methadone on prescription in Amsterdam in 1987. The male/female ratio in the study was 2:1, as compared with 3:1 among DUs attending low-threshold methadone clinics in 1987. Behavior reported over the 6 months preceding the interview is called "current" behavior. Behavior in the period prior to these 6 months as far back as 5 years before the interview is indicated as occurring "in the previous 5 years." Current IDUs who started injecting at least 5 years ago are called "long-term IDUs." The variable frequency of borrowing used needles concerns the full 5 years preceding the interview. Long-term regular methadone users (LTM users) were defined as IDUs who started using methadone at least 5 years preceding the interview and who reported daily methadone use in the 5 years preceding the interview. The non-LTM users were defined as IDUs who started using methadone less than 5 years preceding the interview and IDUs who reported irregular use of methadone during these 5 years. Time of the interview was divided into four consecutive periods of 10 months each: (1) December 1985 to September 1986, (2) October 1986 to July 1987, (3) August 1987 to May 1988, and (4) June 1988 to March 1989.

---

**TABLE 1—Logistic Regression Model of Predictors of HIV Infection among Amsterdam IDUs**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Adjusted Odds Ratio (n = 377)</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>First occurrence of injecting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;5 years ago</td>
<td>1</td>
<td>1.00-1.00</td>
</tr>
<tr>
<td>≥5 years ago</td>
<td>2.39</td>
<td>1.27-4.47</td>
</tr>
<tr>
<td>Last occurrence of injecting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥6 months ago</td>
<td>1</td>
<td>0.98-3.75</td>
</tr>
<tr>
<td>&lt;6 months ago</td>
<td>1</td>
<td>0.99-1.48</td>
</tr>
<tr>
<td>Frequency of borrowing</td>
<td>1.21</td>
<td>0.99-1.48</td>
</tr>
<tr>
<td>Mainly heroin and cocaine injecting in the previous 5 years</td>
<td>1</td>
<td>1.00-1.00</td>
</tr>
<tr>
<td>No</td>
<td>1</td>
<td>1.00-1.00</td>
</tr>
<tr>
<td>Yes</td>
<td>2.13</td>
<td>1.30-3.49</td>
</tr>
<tr>
<td>German or South European nationality</td>
<td>3.53</td>
<td>1.61-7.77</td>
</tr>
<tr>
<td>Other, incl. Dutch</td>
<td>1</td>
<td>1.00-1.00</td>
</tr>
<tr>
<td>Time living in Amsterdam</td>
<td>1.42</td>
<td>1.20-1.68</td>
</tr>
</tbody>
</table>

*Only IDUs that had no missing values on any of the variables used in the analysis (n = 377) were included.

*Values: 0 = never, 1 = 1 time, 2 = 2-9 times, 3 = 10-99 times, 4 = 100 times or more; a value of x is associated with a risk of being HIV seropositive that is 1.21 times higher than a value of x–1.

*French, Spanish, Italian, Greek, Portuguese, or Yugoslav.

*Values: 1 = no time or <1 year, 2 = 1-<2 years, etc., to 6 = ≥5 years; a value of x is associated with a risk of being HIV seropositive that is 1.42 times higher than a value of x–1.
Statistical Analysis and Serology Statistics used were $X^2$, Student's t, Spearman rank correlation coefficient, Mann-Whitney test, odds ratios (ORs), and 95% confidence intervals (CIs). P values (two sided) of less than .05 were taken as significant. Logistic regression models were used to determine the independent contribution of different characteristics in predicting HIV serostatus. All demographic and drug use variables that had a univariate statistically significant association with HIV serostatus were considered for entry into the model. Three injecting variables (first and last occurrence of injecting and frequency of borrowing) were considered crucial and were entered at the first step. At each further step, the variable that contributed most to the prediction of HIV serostatus was selected. To provide estimates of the statistical association between LTM use and HIV infection while controlling for possible confounders, adjusted ORs and CIs were derived from logistic regression coefficients. Serological tests used for HIV testing were enzyme-linked immuno sorbent assays and/or immunoblotting.

### Results

#### Predictors of HIV Infection

A model was built (see Methods) that optimally could predict HIV serostatus. First occurrence of injecting, injecting mainly heroin and cocaine in the previous 5 years, nationality, and time living in Amsterdam were significantly associated with HIV infection (see Table 1).

<table>
<thead>
<tr>
<th>TABLE 2—Duration and Regularity of Methadone Use of LTM users and Non-LTM users among Amsterdam iDUs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LTM users</strong> (n = 194)</td>
</tr>
<tr>
<td>Mean number of years (SD) since first methadone prescription</td>
</tr>
<tr>
<td>(Median, range)</td>
</tr>
<tr>
<td>Daily methadone use in the previous 6 months (%)</td>
</tr>
<tr>
<td>Daily methadone use in period before this (for LTM users, up to 5 years before the interview; for non-LTM users, since first methadone prescription, no more than 5 years preceding intake) (%)</td>
</tr>
</tbody>
</table>
Differences between LTM Users and Non-LTM Users

One hundred and ninety four IDUs (50%) met the criteria for LTM use and 189 (49%) fell in the non-LTM group (3 IDUs had missing data). Table 2 shows the differences between the two groups with regard to duration and regularity of methadone use. Compared with non LTM users on demographic and drug use variables, LTM users are older, more often male, and more often Dutch; they have lived longer in Amsterdam, started injecting longer ago, and inject mainly heroin less often and cocaine, either by itself or together with heroin ("speedball"), more often (see Table 3). LTM users inject daily as often as non-LTM users. Among the 189 non-LTM users, 135 persons (71%) currently use methadone daily and 54 persons (29%) do not (see Table 2). The proportion of current daily injectors is also similar in these subgroups: 49 of 135 (36%) versus 19 of 54 (35%). Frequency of borrowing and reuse of own needles and syringes are similar among LTM and non-LTM users (see Table 3). LTM users have a higher HIV prevalence than non-LTM users: 37% versus 20% (OR = 2.42, CI = 1.54-3.83). There is a positive relation between number of years since the first methadone prescription and being HIV positive (P = .005). The higher seroprevalence of LTM users is found in each of the four consecutive time periods: for LTM users it is 35%, 49%, 28%, and 32%, respectively, as compared with 21%, 16%, 24%, and 18% among non-LTM users.

Controlling for Possible Confounding

To control for possible confounding, the variable of LTM use was entered in a logistic regression model together with
the variables of age, sex, German or South European nationality, time living in Amsterdam, first occurrence of injection, and last occurrence of injection, with HIV serostatus as a dependent variable. The adjusted OR was 1.60 (CI = 0.93-2.74), indicating a slightly-but not statistically significant-increased risk of being HIV seropositive for LTM users. As we considered duration of injecting an important possible confounder, we explored the relation between LTM use, HIV risk behavior, and HIV serostatus separately in the subgroup of 223 longterm IDUs. Among these IDUs, duration and regularity of methadone use in the 133 LTM users and 90 non-MM users were similar to what was found in the total sample (see Table 2). With regard to demographic and drug use variables, the differ ences (and similarities) between the 133 LTM users and 90 non-LTM users were the same as in the total group, with one exception: the proportion of males among MM users and non-LTM users are the same. As in the total sample, the 133 LTM users are more often HIV positive than the 90 non-LTM users (43% vs 28%; OR = 1.97, CI = 1.10-3.52). Adjusted for age, sex, nationality, and time living in Amsterdam, the OR for LTM use was 1.34 (CI = 0.69-2.63). To exclude possible confounding due to exposure to HIV before coming to Amsterdam, we did a separate analysis among Dutch IDUs who were Amsterdam residents for at least 5 years. In this subgroup of 230IDUs, the 147 LTM users differ from the 83 non-LTM users on four demographic and drug use variables: LTM users are older, started injecting longer ago, currently inject more often, and inject mainly cocaine more often. With regard to current daily injecting, having borrowed at least 10 times, and current borrowing, there are no significant differences between LTM users and non-LTM users. LTM users are again more often HIV positive than non-LTM users (38% vs 21%; OR = 2.39, CI = 1.22-4.71). Adjusted for age, sex, and first and last occurrence of injecting, the OR was 2.06 (CI = 1.02-4.16). HIV infection may have been the reason for long-term participation in low-threshold methadone programs. To exclude this potential bias, we added the variable daily methadone use to a separate multivariate logistic regression analysis of incident HIV infections. The behavior of 31 IDUs, who were HIV-seronegative at entrance into the study but who seroconverted for HIV during follow-up, was compared with that of 202 randomly selected controls, who remained seronegative throughout their follow-up period. In univariate analysis, daily methadone use, reported over a mean period of 8 months preceding the first visit after seroconversion or the selected control visit, was not "protective" (OR = 0.67, CI = 0.31-1.47). When the variable daily methadone use was adjusted for the independent risk factors for HIV seroconversion, its OR became 0.81 (CI = 0.35-1.83).

Discussion

An important finding of the present study is that IDUs participating in low-threshold programs who report long-term daily use of methadone engage in similar or even more HIV risk behavior than IDUs who use methadone for a shorter time and/or irregularly. Univariately, being HIV seropositive is associated with LTM use and with the number of years since the first methadone prescription. In contrast, studies from other countries have reported that DUs in long-term methadone maintenance have a lower HIV seroprevalence than DUs not in treatment; which suggests that these maintenance programs are successful in protecting IDUs from HIV infection. In the present study, the HIV prevalence of LTM users who entered the study before October 1986 (i.e., in the first time period) is 35%. These IDUs started using daily methadone before 1981. Because HIV prevalence among 145 DUs entering low-threshold programs in 1983 and 1984 was only 34%, presumably HIV hardly circulated among DUs in 1981. This indicates that these LTM users got infected mainly while enrolled in the low-threshold programs.

The present study has some limitations. First, the short average duration of yearly methadone supply in low-threshold methadone programs (21 weeks) suggests that, in reality, LTM users did not use methadone continuously in the 5 years preceding intake. Due to privacy regulations, it is impossible to validate our data with data from the methadone program records. Thus, it is unknown whether the actual yearly duration of methadone use in the total sample significantly differs from our data. Nevertheless, we hold it possible that the self-reports overestimate the actual duration of methadone use. For the present study, it is assumed that LTM users were supplied with methadone more continuously-and during a much longer time-than non-LTM users.

Second, because no data on IDUs in low-threshold programs are available, the representativeness of the sample is unknown. However, although our sample is not atypical for low-threshold program participants with regard to number of years of methadone user13 .26 or age, males are underrepresented in the present study.
Third, comparing methadone users with non-users, preferably randomly assigned, would have been more appropriate. However, to find a group of comparable IDUs who have never used methadone is—within the Amsterdam context—impossible: only young or newly starting injectors have never used methadone, and so random assignment was not feasible.

Finally, HIV-seropositive IDUs may have entered the study preferentially—for example, because of health problems. However, all IDUs in the present study entered before March 1989, when zidovudine or prophylaxis for Pneumocystis carinii pneumonia or tuberculosis was not yet given to DUs in the Netherlands. Thus, DUs seemed to enter the study because of HIV risk through injecting, not because of health problems.

With regard to demographics, LTM users were found to be more often Dutch and to have lived a longer time in Amsterdam than non-LTM users. This is in agreement with the intake rules of low-threshold programs, which discourage nonresident drug users from participating.

With regard to drug use, current daily injecting is similar for LTM and non-LTM users, as is borrowing of needles and syringes. LTM users inject mainly heroin less often and inject cocaine, either by itself or together with heroin, more often. A similar relation was found previously; Chaisson et al.27 reports that methadone treatment reduces heroin injecting more strongly than it does cocaine injecting. Speedball injecting is associated with an increased HIV risk, both in the present sample and in New York City.28

To summarize, there were no indications that LTM users engaged in less HIV risk behavior than non-LTM users. Furthermore, when we looked at the effect of LTM use on HIV risk, while controlling for confounders, we found no indication of a protective effect of LTM use. The same was true in a separate analysis of incident HIV infectionst19: a protective effect of daily methadone use could not be identified.

These findings suggest that the low-threshold programs do not have an effect on HIV risk because risk behavior is not reduced. Another possibility is that a risk reduction takes place shortly after the start of methadone prescription but does not grow over the years. In contrast, in a prospective study among IDUs in US methadone maintenance programs; the prevalence of injecting declined from 81% at the beginning of admission to 63% at the end of the period. After this prevalence declined gradually to 42% in the third year and 29% in the fourth year of participation. However, no such decline is apparent in our sample.

To conclude, our results do not support the view that long-term regular participation—as compared with short-term and/or irregular participation—in low-threshold methadone programs in Amsterdam is associated with less HIV-risk-injecting behavior or with a decreased risk of HIV. The apparent failure of the programs to reduce such behavior may be due to the low average methadone dose level or to the (permitted) irregular attendance.1,2,29 However, raising methadone doses to a level at which little or no illicit opiate use occurs, combined with measures to increase attendance, may lower the number of clients, given that not all DUs wish to stop illicit use. Such measures thus would counteract the possibility of providing medical and social care to a large group of DUs, many of whom are HIV seropositives.

It therefore seems necessary to judge carefully the relative merits of the low-threshold approach versus other kinds of approaches. In any case, we suggest that contacts with IDUs in the low-threshold programs should be used more intensively for HIV prevention efforts and that an increase in methadone dose level, together with measures to enforce regular attendance, may be required if these programs want to play a role in HIV prevention.

Acknowledgments

This study was supported by the Netherlands Foundation for Preventive Medicine (grant no. 28-1258). The authors thank the nurses B. Frolich, B. Scheringa-Troost, G. Stienstra, and J. Tewissen for interviewing and collecting blood samples; Dr. J. Goudsmit and M. Bakker for performing the laboratory tests; G.H.A. van Brussel and P. Drotman for critical comments on earlier drafts; H.J.A. van Haastrecht for critical continents and data management; and M. ter Pelle and T. Mamanaya for preparing the manuscript.
References


Introduction

The present study investigates the relation of psychopathology, stress and HIV-risk injecting behaviour in drug users participating in a HIV study through low threshold methadone programmes in Amsterdam, The Netherlands. Psychopathology, either primary or secondary, has been found to be more prevalent among drug users than among the general population.1-2 Next to the existing drug dependence the three most common psychiatric disorders among drug users are depressive disorders, alcoholism and personality disorders, primarily antisocial personality. 6 Psychopathology has been found to be an important predictor of addiction treatment success , 7,8 with a negative relation between severity of psychiatric problems and treatment success. Both addiction treatment and HIV prevention require a certain level of control over addictive behaviour. Addiction treatment demands stopping the addictive behaviour, while HIV prevention demands a certain degree of planning by having clean works available at all times or, if no clean needle is available, either the postponement of drug use or the cleaning of a used needle and syringe or smoking/ free basing instead of injecting. Psychopathology, co-existing to addiction, may increase the likelihood of risk-taking behaviour.9

The relation between stress and drug use is a complicated one. On the one hand, using drugs seems to decrease stress; on the other hand, stress may lead to increased drug taking.10 Drug use can be seen as a coping mechanism, as a maladaptive attempt by an individual to cope with life stressor through habitual use of drugs.11 Wills & Shiffman12 predict that a reliance on this approach reduces the probability of learning more adaptive ways to cope with stressors, which, in the long run, will reduce social competence, lead to less and less social support (i.e. to social isolation), to increased dependency on drugs and to increased overall stress levels. This suggests that drug users with high stress levels may have more difficulty in coping with the AIDS threat than others, resulting in less safe behaviour. Dolan et al. 13 found a relation between severity of drug-related problems and needle sharing. Therefore, the hypothesis of the present study is that addicts with co-existing psychopathology o high stress have a higher level of HIV-risk injecting behaviour than other addicts.

The present study aims, first, to provide data on the prevalence of psychopathology (or psychological morbidity), as measured by the General Health Questionnaire (GHQ), and of stress, as measured by a Dutch scale of experienced stress (VOEG-13) in a sample of drug users, and secondly, to investigate the relations between psychopathology and stress as measured by these scales on the one hand, and sociodemographic, social and drug use characteristics on the other hand. The third and major purpose of the present study is to investigate the relations between psychopathology and stress and HIV-risk injecting behaviour. The main HIV risk behaviour among drug users is the sharing of used needles and syringes. Analysis of behaviour that carries a great risk of HIV infection-borrowing used injection equipment-is most relevant among injecting drug users (IDUs) who are not infected with HIV, while analysis of behaviour with a high HIV-transmission risk-lending needles-is most relevant among infected IDUs Therefore, in the present study, the relation between psychopathology, stress and HIV-risk behaviour will be studied separately for HIV negative and HIV-positive IDUs. The HIV positive subgroup lending used needles is used as an indicator of a high HIV-transmission risk while in the HIV-negative subgroup five indicators for HIV risk are employed: borrowing, first occurrence of injecting, last occurrence of injecting frequency of injecting and injecting heroin cocaine together. All five variables have been identified as independent HIV-risk factors among Amsterdam IDUs.14,15

Method

The present research is part of an epidemiological study of HIV infection among drug users which was initiated in 1985. This ongoing study involves voluntary, confidential HIV antibody testing and counselling for drug users in Amsterdam, combined e with an interview by specially-trained nurses using a standard demographic and behavioural questionnaire. Almost all drug users in the ongoing study have enrolled either through the special STD
Psychopathology, stress and HIV-risk injecting behaviour among drug users

Clinic for addicted prostitutes or through low threshold methadone clinics.* Participants can either participate once or take part in the follow-up study (in which visits are scheduled every 4 months). Drug users participating in the follow-up study receive 25 Dutch guilders (approximately 8 pounds for each follow up visit and HIV test. Since March 1989, at 4 month intervals, a different additional questionnaire on specific psychosocial or behavioural issues is added to the basic questionnaire.

The present study concerns the period from 1 March to 9 November 1989 and concerns only drug users who participate in the HIV study through low threshold methadone clinics. These drug users were given, next to the basic questionnaire, the GHQ-30 and the VOEG-13. Initially, the Beck Depression Inventory was also used, but due to poor compliance this test was dropped. For this study, the first interview in the study period (either intake or follow-up visit) of each drug user was selected; of the follow-up interviews only those with a previous visit of less than 9 months ago were selected. This resulted in 186 interviews with drug users, who all ought to have completed the GHQ and VOEG-13 during that interview. In order to be able to assess the stability of the GHQ-30, HIV-positive drug users who came for a second visit during the study period were given this scale a second time (while HIV negatives were given another questionnaire).

* Low threshold methadone clinics in Amsterdam provide daily on-site primary medical and social care and supply methadone to drug users. The aim of these clinics, which are not drug free, is to contact heroin users and to stabilize their use.

Statistical analysis and serology

Participants that report having injected drugs are considered IDUs, participants who have injected in the 6 months preceding intake or in the period since their last interview are considered current IDUs. Similarly, all behaviour in the 6 months preceding intake or since the last interview is called current behaviour. Univariate statistics include the $X^2$ test of independence, Fisher's exact test, the two sample tests, the Mann-Whitney (M-W) test for two independent samples, Pearson product-moment correlation and Spearman's rank order correlation. As a measure of reliability, Cronbach's alpha was computed. To determine which sociodemographic and long-term drug use variables were independently related with psychopathology or stress (at a 0.05 level of significance), stepwise logistic regressions (forward and backward) were done, including only variables univariately associated (with p < 0.10) with psychopathology or stress.

Serological testing for HIV was performed by ELISAs. Confirmation of a positive specimen was performed by competitive ELISAs and immunoblotting, as described previously.

Measures

Psychopathology

Psychopathology was assessed using the 30-item version of the General Health Questionnaire (GHQ-30). Generally this scale is used as a self-administered questionnaire. For the present study among active drug users, who often find it difficult to concentrate on written material, the interviewer read out the questions and the possible answers, while the interviewed drug user could either read along or only listen. A validated Dutch version of the GHQ-30 was employed; 19 for non-Dutch English-speaking drug users we used the English GHQ-30.

The GHQ is a psychiatric screening test aimed at detecting functional psychological disturbances in the general population. The questions of the GHQ refer to the occurrence of unusual and unpleasant mental phenomena and to the impairment of normal function. A score (range 0-30) is considered as an indicator of psychopathology if there is a discrepancy or discontinuity, as experienced by the respondent, in normal functioning. The GHQ score can therefore be seen as a continuous scale, ranging from normality to psychopathology. Because of its design the GHQ misses psychoses, dementia and character disturbances. The GHQ has been widely used as predictor of being a `psychiatric case' as measured by a standardized psychiatric interview? Sensitivity and specificity of the GHQ in this regard are around 80%. The GHQ can also be used to provide a general indication of psychological morbidity.

The presence of psychopathology (or psychological morbidity) as measured by the GHQ-30 was operationalized according to convention: threshold score 5. A score below 5 is assumed to indicate absence of psychopathology, a
score of 5 and higher is assumed to indicate psychopathology.

Stress

To measure stress we used the 13-item version of the VOEG (a Dutch 21-item questionnaire on experienced health," administered in the same way as the GHQ-30 (see above). The VOEG measures the tendency to somatize psychosocial stress conditions, and can be used as a general indicator of stress. 27 The 13-item version (VOEG-13) was developed by Jansen & Sikkel 28 and explains 95% of the variance of the original VOEG. The answer "yes" is coded as 1 and "no" as 0. Since there is no conventional cut-off score, we used the total score as an indicator of the amount of stress experienced by the respondent.

Results

The sample

The sample of 186 drug users consisted of 31 (17%) drug users who entered the HIV study through low threshold methadone clinics for `extreme problematic' drug users and 155 drug users (83%) who enrolled through regular low threshold methadone clinics. Thirty-two (17%) drug users came for an intake visit, at which they reported on behaviour in the previous 6 months, while 154 drug users came for a follow-up visit (second to twelfth visit), at which they reported on behaviour in the period since their last interview, with a mean duration of 4.2 months (SD = 1.1). Mean age was 32.3 years (SD = 6.0). There were 137 (74%) males and 156 (84%) Dutch drug users in the sample. Daily methadone was used by 137 (74%) participants, with a mean dosage of 45 mg. One hundred and sixty-six (89%) drug users were IDUs, and 122 (66%) current IDUs. The IDUs started to inject a mean number of 11.4 years ago. Among the current IDUs, 37 (30%) reported to inject heroin daily, 20 (16%) reported to inject cocaine daily and 28 (23%) reported to inject heroin and cocaine together daily. Seventy-nine (42%) drug users were HIV-seropositive at the present visit. With regard to knowledge of serostatus, 66 (35%) knew that they were HIV positive (HIV+), 34 (18%) (among whom 27 for whom the present visit was an intake visit) did not know their serostatus (HIV?) and 86 (46%) knew that they were HIV-negative (based on their last received test result) (HIV-). No seroconversions were found at the present visit.
Non-respondents and non-completers

There were 20 non-respondents on both the VOEG13 and GHQ-30. Furthermore, the GHQ-30 score could not be calculated for an additional 15 participants due to one or more missing items. With regard to sex, age, being IDU or current IDU there were no significant differences between the 151 drug users who completed both questionnaires and the 35 who did not. However, there was a lower proportion of German and South European drug users (7%) among the 151 completers, as compared to 23% among the non-completers ($X^2 = 7.5$, df = 1, $p = 0.006$). Furthermore, among the completers there were 57 (38%) HIV-seropositives, as compared to 22 (63%) among the non-completers ($X^2 = 7.3$, df = 1, $p = 0.007$). With regard to knowledge of serostatus, among the completers there were 34% HIV+, 15% HIV?, and 51% HIV-, as compared to 40, 34 and 26%, respectively, among the non-completers ($X^2 = 10.2$, df = 2, $p = 0.006$).

Psychopathology, as measured by the GHQ-30

GHQ-30 reliability and stability; score distribution. Cronbach’s alpha was 0.90 (n = 151), indicating high internal consistency. The corrected item-total correlation coefficients varied between 0.20 and 0.71. The mean inter-item correlation was 0.24.

There were 37 HIV-positive drug users who completed the GHQ-30 two times. The mean number of months between times 1 and 2 were 4 months (SD = 1). The mean score at time 1 was 10.0 (SD = 7.0), at time 2 it was 9.6 (SD = 6.9). At time 1, and also at time 2, 29 of the 37 drug users (78%) had psychopathology. Twenty-four persons had a score indicative of psychopathology at both visits. Test-retest correlation (Spearman) between GHQ scores at times 1 and 2 is 0.57 ($p < 0.001$).
The mean GHQ-30 score among the 151 drug users who completed the GHQ-30 is 9.6 (SD = 7.1, range 0-27, mode 7, median 7). The distribution of scores is shown in Fig. 1. The distribution is skewed to the right and platykurtic (skewness is 0.72 and kurtosis -0.46).

Table 1. Average VOEG-13 scores as a function of sex and age for a general population sample* and the present sample of active hard drug users (possible range of scores 0–13)

<table>
<thead>
<tr>
<th>Age</th>
<th>Male (n = 2093)</th>
<th>Female (n = 2066)</th>
<th>Male (n = 122)</th>
<th>Female (n = 44)</th>
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<td>3.25</td>
<td>3.5</td>
<td>—</td>
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<tr>
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<td>2.44</td>
<td>3.71</td>
<td>4.9</td>
<td>5.9</td>
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<td>36–49</td>
<td>3.29</td>
<td>4.33</td>
<td>4.3</td>
<td>8.0</td>
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<tr>
<td>50–64</td>
<td>3.93</td>
<td>5.29</td>
<td>3.7</td>
<td>—</td>
</tr>
</tbody>
</table>

* The data are from a survey held in 1977 by the Netherlands Central Bureau of Statistics among a sample of 6000 persons taken from Dutch people aged 15 years and over: in the present form these data were presented by Jansen & Sikkel.

Prevalence of psychopathology; relations with stress, serostatus, knowledge of serostatus and current social/drug use characteristics.

Psychopathology (as operationalized above) was present in 109 (72%) drug users. Psychopathology was found to be associated with stress; the correlation (Spearman) between GHQ-30 scores and VOEG-13 scores is 0.53 (n = 151, p < 0.001). Drug users with psychopathology had a median VOEG-13 score of 6, those without psychopathology a median score of 2 (M-W test, p<0.0001). Neither entering the study through the low threshold clinic for ‘extremely problematic’ drug users nor a positive HIV serostatus were related to psychopathology. Among HIV+ 81% had psychopathology, versus 73% among HIV? and 66% among HIV-. These differences were not statistically significant.

With regard to current social support and circumstances, the proportions having steady housing, having regular contact with the parents, having a steady partner and having one or more good friends were not significantly different for the group with and without psychopathology. There is also no significant difference between drug users with or without psychopathology with regard to current daily methadone use, or, among current daily methadone users, with regard to dosage of prescribed methadone. Among the drug users with psychopathology, 77 (71%) are current IDUs, as compared to 23 (56%) among the drug users without psychopathology, but this difference is again not significant (X^2 = 3.1, df=1, p = 0.08). Independent predictors of psychopathology among sociodemographic and long-term drug use variables. Univariately the following six sociodemographic and long-term drug use variables were found to be positively related (with p < 0.10) with psychopathology: age, number of years living in Amsterdam, having regularly injected for one or more years, number of years since first using heroin or methadone regularly and having regularly used barbiturates/tranquilizers for one or more years.

In a stepwise logistic regression analysis with the six above-mentioned variables as independent variables and psychopathology as the dependent variable, number of years since first using heroin regularly and the regular use of barbiturates/tranquilizers for one or more years were found to be the strongest independent predictors of psychopathology (with, respectively, odds ratio (OR) per 5 years 1.51, 95% confidence interval (CI) 1.04-2.19 and OR 2.50, CI 1.11-5.60). None of the other four variables improved the model significantly.
Number of years since first using heroin regularly is highly correlated with age and with number of years regularly injected (Spearman's r is 0.58 and 0.67, respectively, p < 0.001).

Stress, as measured by the VOEG-13

VOEG-13 reliability; score distribution. Cronbach's alpha was 0.83 (n = 166), indicating high internal consistency. The corrected item-total correlation coefficients varied between 0.37 and 0.61. The mean inter-item correlation was 0.27.

The mean VOEG-13 score is 5.1 (SD = 3.6, range 0-13, mode 2, median 5). The distribution is skewed to the right and platykurtic (skewness is 0.40 and kurtosis is -0.83). Table 1 compares average scores of participants with those of a large general population sample. The rise in stress with increasing age is absent among drug users (Spearman's correlation between age and VOEG-13 scores is -0.04).

Relations between stress and serostatus, knowledge of serostatus and current social/drug use characteristics. Neither entering the study through the low threshold clinic for 'extremely problematic' drug users nor a positive HIV serostatus were related to stress. Among HIV+ the median stress score is 5.5, as compared to 5.5 among HIV? and 3.5 among HIV-. These differences are not statistically significant.

With regard to current social support and circumstances, drug users who have regular contact with their parents and drug users who have no good friends report more stress (M-W test, p = 0.008 and 0.02, respectively). Current daily methadone users have a similar stress level as drug users who do not use daily methadone, and among daily methadone users there is no relation between stress level and methadone dosage; the same is true when comparing current IDUs with others.

Independent predictors of stress among sociodemographic and long-term drug use variables.

In univariate analysis eight sociodemographic and long-term drug use variables were related to the amount of experienced stress (with p < 0.10). Associated with an increased stress score are: female sex, incomplete schooling (having left school before age 16), number of years since first working as a prostitute, number of years since first using heroin, methadone, barbiturates/tranquilizers or alcohol regularly and having used cocaine for one or more years regularly. Those who have ever worked as a prostitute are mainly females (60%), as compared to 11% females among non-prostitutes (X² = 45.8, df = 1, p < 0.0001). In a stepwise logistic regression analysis with the eight above-mentioned variables as independent variables and stress as the dependent variable (dichotomized in scores below or equal to the median and scores above the median), the strongest independent predictors of an above median stress score were, in the forward analysis, the regular use of cocaine for one or more years (OR 3.51, CI 1.31-9.41), female sex (OR 2.16, CI 1.04-4.52) and number of years since first using barbiturates/tranquilizers regularly (OR per 5 years 1.38, CI 1.01-1.86). All three had a positive relation with stress. In the backward analysis the same first two variables were selected (with approximately the same ORs and CIs), but this time number of years since first using heroin regularly was selected (OR per 5 years, 1.41, CI 1.02-1.95). None of the other four variables significantly improved the model.

Relations between psychopathology (n = 56), stress (n = 60) and HIV-risk injecting behaviour among HIV-negative current IDUs

Among the subgroup of 56 HIV-negative current IDUs, those with psychopathology (42 = 75%) more often had injected recently ('today or yesterday'), as compared to those without psychopathology (60 vs 21%, respectively, X² = 6.1, df = 1, p = 0.01). Also, they currently more frequently injected (median 32 injections per month (range 0-150), versus median 3.5 (range 0-75); M-W test, p = 0.01). With regard to type of drug injected, they more frequently injected cocaine by itself and heroin and cocaine together ('speedball') (M-W test, p = 0.04 and 0.001, respectively). Finally, they had more injections per injecting day in the previous month (median 3 as compared to 2 among those without psychopathology; M-W test, p = 0.04). Number of years since first injecting is not significantly different between the two groups. Neither is borrowing of used needles, although the relation is in the expected direction: 12 (31%) among 39 HIV-negative current IDUs with psychopathology report borrowing in the previous months as compared to 2 (14%) of the 14 HIV-negative current IDUs without psychopathology (data of three persons are missing).
Only one significant relation was found between stress and the above-mentioned HIV-risk injecting variables: a negative relation between frequency of injecting heroin itself and stress (Spearman's $r = -0.24$, $p = 0.04$, $n = 60$).

Relations between psychopathology ($n = 44$), stress ($n = 50$) and HIV-risk injecting behaviour among HIV-positive current IDUs

Contrary to our expectation, lending is associated with having no psychopathology and with having little stress. One (3%) of 35 IDUs with psychopathology reported lending, compared to 2 (22%) of 9 IDUs with a normal score ($X^2 = 4.2$, $df = 1$, $p = 0.04$). The four current IDUs who lent used needles and syringes to others had a median stress score of 2 (range 2-3), as compared to a median of 6.5 (range 0-13) among those who did not lend (M-W test, $p = 0.05$).

Discussion

Psychopathology (or psychological morbidity), as measured by the GHQ-30, was found in 72% of the present sample of drug users. This is quite similar to the rate (with the GHQ-28) found in a sample of

Australian heroin users: 61%.

This high prevalence of psychiatric co-morbidity among drug users is consistent with previous studies (see Introduction) in which other instruments to measure psychopathology were used. With regard to experienced stress, drug users in the present study seem to score higher than males and females in the same age groups in the general population, while the rise in stress with increasing age in the general population is absent. Females in the present sample have a higher stress score than males, which is the same in the general population.

The median GHQ score in the present sample is 7. This suggests relatively mild symptomatology or minor psychopathology among many of the 'cases', which is again similar to the findings reported by Swift et al. 29 Persons with a high GHQ score report more stress than others. The best independent predictors of psychopathology among demographic and long-term drug use variables are the number of years since first using heroin regularly and having used barbiturates/tranquillisers for one or more years regularly. The first variable is strongly correlated with age and with number of years regularly injected. Thus, in the present study a typical drug user with a high GHQ score is an older, long-term polydrug user and injector, who experiences considerable stress. This is contrary to the study of Swift et al. 29 in which no relation was found between age, years of problem use of heroin and GHQ score.

The best independent predictors of stress in the present sample are having used cocaine regularly for one or more years, gender and either number of years since first using heroin or since first using barbiturates/tranquillisers regularly. This indicates that the amount of experienced stress is related to duration of drug use, which is in line with Wills and Shiffman's prediction that drug use in the long run will lead to increased stress levels. In the present study, both psychopathology and stress are related to duration of drug use and to polydrug use. However, the two concepts differ in that only stress seems to be related to cocaine use and to female sex.

With regard to current social support and circumstances, in the present sample psychopathology is not related to any of the studied variables, while stress is associated with a lack of good friends. This is in agreement with Wills and Shiffman's prediction of social isolation. The presently found positive association between stress and regular contact with the parents can be interpreted in different ways. One interpretation is that continued contact with the parents increases the stress level of drug users; however, an alternative interpretation seems more likely: drug users who experience stress tend to see their parents more regularly.

In the present study it is noteworthy that both stress and psychopathology are not significantly related to HIV serostatus or to knowledge of HIV serostatus. However, among drug users who did not complete both questionnaires there were more with a positive HIV serostatus and more who did not know their serostatus, as compared to those who did complete both questionnaires. It is possible that these non-completers would have obtained high stress and/or psychopathology scores.

Our results indicate that GHQ-30 and VOEG-13 are internally consistent instruments. Their relative shortness is valuable, since research among drug users is more and more directed at active drug users as opposed to clinic samples. However, the validity of each scale when used with drug users ought to be studied by comparing them with other instruments.
Several limitations of the present study need to be mentioned. Firstly, since the sample consists of drug users who have entered voluntarily in a HIV study through low threshold methadone programmes, the representativeness of the sample for drug users in Amsterdam is unknown. Secondly, the GHQ and VOEG-13 were not self-administered but administered by an interviewer, which may have influenced the results. This procedure was necessary since most of the interviewed active drug users find it difficult to concentrate on written material. This points to a third limitation: the respondents were active opiate users. The effects of present drug use on the GHQ score or stress score are unknown.

Among the subgroup of HIV-positive current IDUs we observed a relation between low stress and lending and between absence of psychopathology and lending, which was contrary to our hypothesis. We do not have an explanation for these findings. In any case, the results indicate that HIV-positive IDUs with high stress or psychopathology are not a group with a special risk of HIV transmission.

Among HIV-negative current IDUs three HIV-risk factors are related in the expected direction to psychopathology: frequency of injecting, frequency of injecting heroin and cocaine together and recent injecting, while first occurrence of injecting and borrowing are not significantly related to psychopathology. Stress is not related in the expected direction to any of the five variables, while there is a negative relation with frequency of injecting heroin. Therefore, the hypothesis that stress is positively related to injecting risk behaviour is not supported.

Apparently, in the present sample, psychopathology is related to HIV-risk injecting behaviour only among HIV-negative current IDUs. These findings suggest that HIV-negative current IDUs with psychopathology are a group with an increased risk of HIV infection. A similar finding was reported by Woody et al. who found a relation between needle sharing and psychopathological distress (as measured by the Symptom Checklist (SCL-90) and BDI) among IDUs who claimed to be seronegative.

The cross-sectional nature of the present study makes it impossible to draw conclusions about causal relations and their direction. Psychopathology, as measured by the GHQ-30, may be the result or the cause of current frequent injecting in this sample of active drug users. Nevertheless, the present study shows that especially injectors who have a high risk of HIV infection have serious psychological and social problems as well as drug use problems. Whatever the direction of causality, psychopathology may interfere with rational decision making and with capacities for planning. Risk reduction programmes aiming to prevent infection among HIV-negative injectors ought to take this into consideration.

Acknowledgements

This study was supported by the Netherlands Foundation for Preventive Medicine (grant no. 281258). The authors thank the nurses B. Frohlich and R. Lopez-Dias for interviewing and collecting blood samples; Dr J. Goudsmit and M. Bakker for performing the laboratory tests; H. W. Hoek and Dr P. P. G. Hodiamont for their critical comments on earlier drafts, H. J. A. van Haastrecht for data management, P. Krijnen for help with the statistical analysis and M. tar Pelle and T. Maruanaya for preparing the manuscript.

References


Psychopathology, stress and HIV-risk injecting behaviour among drug users


NEEDLE SHARING AND PARTICIPATION IN THE AMSTERDAM SYRINGE EXCHANGE AMONG HIV-SERONEGATIVE INJECTING DRUG USERS.
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Public Health Reports 1992

INTRODUCTION

A syringe exchange (SE) was set up in Amsterdam in 1984 to reduce the risk of hepatitis B and human immunodeficiency virus (HIV) infection among injecting drug users (IDUs). Since then, SEs have been installed in many countries. The aim of the Amsterdam SE was to promote the one-time use of needles and syringes by making them available without charge and thus increasing their accessibility and by disseminating information about HIV risk. The thinking was that through increased access, sharing of injection equipment (and reuse of one's own equipment) would not be necessary and would become less prevalent. Prior to 1984, IDUs could obtain new injection equipment by buying it. This is still possible at pharmacies, some shops, and on the street in the red light district of the City.

The sharing of needles and syringes for injecting drugs ("needle sharing") has been found to be related to multiple drug use, younger age, homelessness, cocaine use (including injectig)", injecting drug use by a regular partner or by peers, drug craving, little experience with injecting, and frequency of injecting. Both in Amsterdam and elsewhere, drug users who take advantage of SEs report lower levels of sharing than who do not avail themselves of SEs. Can this difference in fact be attributed to having better access to syringes? It also may be due to a better motivation for risk reduction or to other characteristics of those who attend SEs.

Results from another Amsterdam study suggest that users who regularly exchange needles and syringes for new ones, when compared with other IDUs, inject more frequently, for a longer period, and are more often in contact with methadone programs. In the United Kingdom, SE clients were found to be especially older, longer-term injectors. In the State of Washington in the United States, clients were found more often to be frequent, long-term injectors. These characteristics could act as confounders in the relation between SE participation and needle sharing.

Another important issue is the stability of behavior over time. In the United Kingdom, contrary to expectation, SE participation was found to be highly variable over time. To our knowledge, no studies have examined the stability of needle sharing. With good access to syringes, however, it can be expected that needle sharing is less regular than with bad access.

Our study focussed on one aspect of needle sharing: borrowing, that is injecting with needles or syringes, or both, that have been used by somebody else. Since only HIV-seronegative IDUs are at risk of becoming infected through this behavior, this study was conducted among HIV-seronegative IDUs only.

The aim of the study was to determine, among both regular exchange users and others, specific groups at increased risk of borrowing, so further prevention efforts could be directed at them. Three hypotheses that were deemed relevant to this undertaking were examined. 1) Regular SE users, when compared with nonusers or irregular users, inject more frequently and over a longer period and use daily methadone more often, 2) Regular SE users borrow used needles and syringes less often than others, and 3) Regular SE use constitutes stable behavior among current IDUs, while borrowing is variable; borrowing is more variable among regular SE users than among other IDUs.

METHODS

Sample

In 1985, an epidemiological study of HIV infection was implemented among drug users in Amsterdam. This ongoing cohort study involves voluntary and confidential HIV-antibody testing and counselling, combined with an interview conducted by trained professionals using a standard demographic and behavioral questionnaire. Drug users either can participate once in the study or also take part in the follow-up study (in which study-visits are scheduled every 4 months). For follow-up visits, participants receive 25 Dutch guilders (approximately $13). Participants enroll mainly through methadone programs or through a clinic on sexually transmitted diseases for addicted prostitutes, at which methadone is provided by methadone program staff members. The HIV seroprevalence among IDUs in the study cohort appears to be slightly higher than among Amsterdam IDUs recruited "on the street" and in methadone programs. Enzyme-linked immunosorbent assays (ELISAs) are used for HIV testing.

Confirmation of a positive specimen is performed by competitive ELISAs and by immuno blotting, following Centers for Disease Control criteria.

Our study concerned all 131 HIV-seronegative IDUs who were examined in the larger ongoing study between March 1989 and January 1990 (either at intake or at follow-up) and who reported having injected drugs in the 46 months preceding their visit. These visits are indicated as A and concern an intake visit for 47 IDUs (36%) and a follow-up visit (2nd-12th visit) for 84 IDUs (64%), with a mean of 4.4 months (standard deviation 1.3) between visit A and their previous visit. The consecutive return visit for 113 (86%) of these 131 IDUs between June 1989 and December 1990, with a mean of 4.8 months since visit A (s.d. 2.2), is hereafter indicated as visit B.

Variables and analysis

For our purposes, current behavior was defined as behavior in the 6 months preceding an intake visit or, for follow-up visits, in the months since the previous visit.

Hypotheses 1 and 2 were studied crosssectionally at visit A. To study hypothesis 1, it was determined whether "regular exchange use" that is, currently obtaining 90% or more of new needles and syringes at the SE, was associated with current frequency of injecting, duration of injecting, or current daily
methadone. The 90% criterion was chosen because it gave a more clear-cut division between the two subgroups (75 exchangers, mean 99%, median 100% versus 55 non-exchangers, mean 20%, median 0%) than the 100% criterion (65 exchangers, mean/median 100% versus 65 non-exchangers, mean 31%, median 10°x6).

To study hypothesis 2, we first examined the relation between regular exchange use and "borrowing", that is, currently having injected at least once with a needle or syringe or both previously used by someone else. Second, we studied social and drug use indicators of borrowing drawn from previous research on determinants of needle sharing. Third, we studied the effect of regular exchange use on borrowing, while controlling for independent and significant indicators of borrowing and other potential confounders, including five demographic variables: sex, age, nationality, number of years living in Amsterdam - previously found as an independent predictor of HIV-serostatus1 8 - and kind of visit (intake versus follow-up) in the larger cohort-study, because less injecting risk behavior was found to be associated with follow-up visits compared with intake visits”.

To study hypothesis 3, a longitudinal analysis was conducted by comparing behavior at visits A and B among persons who currently injected at both visits. Statistics include the x² test of independence, the two-sample t-test, the Mann-Whitney (M-W) test for two independent samples, the Pearson correlation coefficient, and the Spearman rank order correlation coefficient; p-values less than 0.05 were considered significant. In multivariate analyses, logistic regression modelling was used to determine the independent and significant (with p<0.05) contribution of variables in indicating regular exchange use (hypothesis 1) and borrowing (hypothesis 2). The contribution of these variables in indicating outcome is expressed in odds ratios (ORs) and 95% confidence intervals (Cis).

RESULTS

Characteristics of the sample Because of missing data, the effective sample size at visit A per variable varies from 123 to 131. Percentages for variables were calculated based on the number of persons for whom data were available. The sample consisted of 80 male (61%) and 51 female (39%) HIV-seronegative IDUs, who have lived in Amsterdam for a mean of 12.4 years (s.d. 12.5). Their mean age was 31.4 years (s.d. 5.9, range 19-47). Of the 131, 86 (66%) were Dutch, 22 (17%) German and 23 (17%) were of another nationality. Of the total, 114 (87%) study participants had permanent housing, that is, they were not homeless and did not live in a squatted house, and 58 (44%) had a steady sexual partner, 30 of whom were current drug injectors. Currently working as a prostitute (for money) was reported by 41 IDUs (32%).

Table 1 presents duration of drug use. All 131 IDUs reported lifetime use, and 128 (98%) reported current use of heroin or morphine or both. Current
Daily methadone use was reported by 96 IDUs (73%), with a mean daily dose of 47 milligrams (s.d. 17.6). A history of borrowing needles or syringes was reported by 92 (74%) participants, and a history of being "clean" for at least one month, that is, not being opiate dependent outside an institution after becoming dependent, by 78 (60%), with the longest continuous period of non dependence 12.6 months on average.

With regard to current daily use of non injected drugs, those used most often were methadone (73%), benzodiazepines (23%), 5 or more glasses of alcohol daily (22%), and heroin (11%). On current daily use of injected drugs, 36 (27%) reported injecting heroin, 21 (16%) injected cocaine, 44 (34%) injected heroin together with cocaine ("speedball"), and 7 (5%) injected amphetamines. Frequent injecting, defined as more than once daily on average, was reported by 66 (50%); 35 (27%) reported injecting once daily on average, and 30 (23%) less than once daily. A total of 67 (51%) reported regular injecting, that is, every week. Regular injecting was positively related with frequent injecting (X^2=23.55, df=2, p=0.0001). The 117 IDUs (89%) who injected in the previous month reported a mean of 3.7 injections on injecting days in that previous month (s.d. 2.9, median 3, range 1-15), with the same needle used a mean of 1.8 times in general (s.d. 1.3, median 1, range 1-8).

Hypothesis 1: determinants of regular exchange use

Among 130 respondents, 75 (58%) were regular users of the syringe exchange. The number of years since first injection was not significantly different for regular exchange users (mean 10.8, s.d. 6.2) and other IDUs (mean 10.5, s.d. 6.5). The number of years injecting regularly was slightly different, however. Regular users of the exchange reported a mean of 8.8 years of injecting regularly (s.d. 6.2) versus 6.9 years (s.d. 5.6) among other IDUs (M-W test, p=0.10). Frequent injecting was reported by 48 (64%) of the regular exchange users, compared with 18 (33%) among the other IDUs (X^2 =19.5, df=2, p<0.0001). Daily methadone use was reported by 54 (72%) of the regular exchange users, versus 41 (75%) among the other IDUs (not significant).

In multivariate analysis, frequency of injection was the strongest indicator of regular exchange use, while duration of regular injecting contributed at a marginal level and daily methadone use not at all. With the first two variables in the model, the odds ratios of currently injecting more than once daily and of once daily, as compared to less than once daily, were 8.65 (CI=3.05-24.54) and 4.47 (CI=1.46-13.69), respectively. The odds ratio for number of years regularly injected (per year) was 1.07 (CI=1.00-1.14). Daily methadone use was not a confounder.
Hypothesis 2: the effect of regular exchange use on borrowing

Of 125 respondents, 36 (29%) reported borrowing previously used needles or syringes or both. Of 30 borrowers about whom more data were available, 5 had borrowed exclusively from their steady sexual partner. Only one of these IDUs reported that this steady partner recently tested HIV-negative.

Of the 75 regular exchange users, 18 (24%) reported borrowing, while 18 (33%) of the other 55 IDUs did so (OR=0.63, CI=0.29-1.38). This difference is not statistically significant ($X^2=1.35$, df=1, $p=0.24$). The figure shows this difference between regular exchange users and other IDUs corrected for frequency of injecting. There is no confounding or interaction. For 30 borrowers (15 regular exchange users, 15 other IDUs) more data on borrowing were known. Regular exchange users reported a median of 2 times borrowed (range 1-180), as compared with a median of 1 (range 1-10) among other IDUs (M-W test, $p=0.52$). Four regular exchange users (27%) reported disinfecting borrowed equipment (either with bleach or by boiling), as compared with 5 other IDUs (33%) (Fisher's exact test, $p=1.0$). Thus, with regard to borrowing and disinfecting, no significant differences between regular exchange users and other IDUs were found.

Reuse of one's own needle and syringe was different: 48 (66%) of the regular exchange users reported using the same needle only once, compared with 21 (38%) of the other IDUs ($X^2=9.6$, df=1, $p=0.002$).

Table 2 lists (next to five demographic variables) the examined social and drug use variables and their bivariate associations with borrowing. In multivariate analysis, the following three variables were independent and significant indicators of borrowing: (a) number of years with moderate-to-heavy alcohol use, (b) permanent housing, and (c) frequency of cocaine injecting. The model that resulted when regular exchange use was entered is shown in table 3. As can be seen, the adjusted OR for regular exchanging is 0.60, which is not statistically significant, and not different from the

<table>
<thead>
<tr>
<th>Variable</th>
<th>Nonborrowers (n=89)</th>
<th>Borrowers (n=36)</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male sex (%)</td>
<td>60</td>
<td>61</td>
<td></td>
</tr>
<tr>
<td>Nationality (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Dutch</td>
<td>65</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>- German</td>
<td>14</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>- other</td>
<td>21</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Mean age in years</td>
<td>31.5</td>
<td>31.0</td>
<td></td>
</tr>
<tr>
<td>Intake visit (as opposed to follow-up visit) (%)</td>
<td>30</td>
<td>50</td>
<td>0.04</td>
</tr>
<tr>
<td>Mean (median) number of years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- living in Amsterdam</td>
<td>12.6 (7)</td>
<td>12.3 (6.5)</td>
<td></td>
</tr>
<tr>
<td>- regularly injecting</td>
<td>7.9 (7)</td>
<td>7.7 (6.5)</td>
<td></td>
</tr>
<tr>
<td>- regularly using</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* cocaine</td>
<td>4.1 (3)</td>
<td>5.5 (4)</td>
<td></td>
</tr>
<tr>
<td>* tranquilizers</td>
<td>1.7 (0)</td>
<td>2.8 (1)</td>
<td></td>
</tr>
<tr>
<td>* moderate-to-heavy alcohol</td>
<td>2.0 (0)</td>
<td>5.7 (2)</td>
<td></td>
</tr>
<tr>
<td>Current frequency of injecting (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- more than once daily</td>
<td>45</td>
<td>58</td>
<td></td>
</tr>
<tr>
<td>- once daily</td>
<td>29</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>- less than once daily</td>
<td>26</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Current daily injecting (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- cocaine</td>
<td>11</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>- heroin and cocaine (&quot;speedball&quot;)</td>
<td>32</td>
<td>39</td>
<td></td>
</tr>
<tr>
<td>Permanent housing (%)</td>
<td>92</td>
<td>78</td>
<td></td>
</tr>
<tr>
<td>Having a currently injecting steady sexual partner (%)</td>
<td>23</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Current use of tranquilizers (%)</td>
<td>39</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Current daily use of methadone (%)</td>
<td>73</td>
<td>72</td>
<td></td>
</tr>
</tbody>
</table>

ns=not significant, $a=\chi^2$ with df=1, $b=\chi^2$ with df=2, $c=T$-test, $d=\text{Mann-Whitney}$ test
NEEDLE SHARING AND PARTICIPATION IN THE AMSTERDAM SYRINGE EXCHANGE AMONG HIV-SERONEGATIVE INJECTING DRUG USERS.

bivariate relation.

Duration of injecting, daily methadone use, and demographic variables were no confounders for the effect of regular exchange use on borrowing. Frequency of injecting was found to be a slight confounder. When entered into the model in table 3, the adjusted OR for regular exchange use became 0.49 (CI=0.18-1.31). The interaction term of frequency of injecting and regular exchange use did not improve the model.

Hypothesis 3: is regular exchange use a stable habit and borrowing not?

Among the 113 IDUs seen at visit B, 5 had seroconverted since visit A. This corresponds to a seroconversion rate of 11.0 per 100 person-years (CI=0.62-19.18).

Among the 113 IDUs, 101 reported current injecting. Borrowing since A was reported by 22 of these 101 current injectors (22%), and regular exchange use by 69 (68%). In a longitudinal analysis, among the 101 who were current injectors at both visits A and B, regular exchange use at A was related to regular exchange use at B (Pearson's r=+0.45, p<0.001, n=100): of regular exchange users at A, 84% is again a regular exchange user at B.

Borrowing at A is related to borrowing at B (r=+0.32, p<0.01, n=93): of borrowers at A, 42% report borrowing at B, while among non borrowers at A only 13% report borrowing at B. The relation between borrowing at A and at B was different for regular exchange users and other IDUs, although contrary to our hypothesis. Among regular exchange users at A, a strong relation between borrowing at A and B was found (r=+0.63, p<0.001): of the IDUs who reported borrowing at A, 62% also reported borrowing at B, compared with 4% among those not reporting borrowing at A. No significant relation was found among the IDUs who did not regularly exchange: r=-0.11 (23% of borrowers at A and 33% of non borrowers at A reported borrowing at B). The strong positive relation between borrowing at A and B among regular exchange users, and the absence of such a relation among other IDUs, was also found after controlling for frequency of injecting.

DISCUSSION

One of the main findings of our study was that regular exchange use may be attributable to differences in drug use. Similar to earlier finding8, the Amsterdam SE seems most attractive to frequent, long-term injectors. In our sample, no indications were found that daily methadone users were regular SE clients more often than other IDUs.

Before further discussion of our findings, we would like to reiterate that the sample consisted of HIV-seronegative IDUs only, that is, IDUs at risk of HIV infection. Many studies of determinants of needle sharing concern IDUs with unknown serostatus 5, 12. Comparisons of results, therefore, need to be made cautiously. The self-reported data may be biased by memory loss or a tendency to give socially desirable answers. Also, the sample consisted of volunteers for an HIV test that was combined with an epidemiological study of HIV. Therefore, one should be careful in generalizing findings to the population of HIV-negative IDUs in Amsterdam.

Although 74% of the IDUs in the sample had a history of borrowing, they remained seronegative so far. Nevertheless, it is not a "safe" group, as

![Table 3](image)

**Table 3**

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Adjusted Odds Ratio</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular exchanging</td>
<td>- no</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>- yes</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.25-1.44</td>
</tr>
<tr>
<td>Number of years with moderate-to-heavy alcohol use*</td>
<td>1.11</td>
<td>1.04-1.20</td>
</tr>
<tr>
<td>Permanent housing</td>
<td>- yes</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>- no</td>
<td>4.17</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.28-13.62</td>
</tr>
<tr>
<td>Frequency of current cocaine injecting</td>
<td>- monthly or less</td>
<td>2.10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.75-5.84</td>
</tr>
<tr>
<td></td>
<td>- weekly</td>
<td>3.76</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.31-11.79</td>
</tr>
</tbody>
</table>

* The adjusted odds ratio corresponds to each increase of one year (e.g., 5 years is associated with a risk of borrowing that is 1.11 times higher than 4 years).
NEEDLE SHARING AND PARTICIPATION IN THE AMSTERDAM SYRINGE EXCHANGE AMONG HIV-SEERONEGATIVE INJECTING DRUG USERS.

indicated by the seroconversion rate found at follow-up. Groups at increased risk of borrowing were long-term moderate-to-heavy alcohol users, current cocaine injectors, and persons without permanent housing. When examining the interrelations between the long-term drug use variables, the numbers of years of alcohol use is most strongly related to years of tranquilize use (Spearman's r = 0.48). The alcohol variable thus reflects a history of alcoholism or polydrug use or both in addition to the primary opiate addiction. Polydrug use has been found related to needle sharing 5,6 as have homelessness 9,10 and cocaine use (including cocaine injecting) 11,24,25. Regular exchange users were found to borrow less often than other IDUs for each category of frequency of injecting. This relation was not statistically significant, however, even after controlling for other potential confounders.

Regular exchange use was a rather consistent behavioral characteristic over an average period of 5 months. This suggests that client turnover is a smaller problem than in the United Kingdom. It is difficult to compare findings, however, because of differences in study design and measures. Contrary to our hypothesis, borrowing seems to be especially regular among the group of regular exchange users, while it is more variable over time among other IDUs. This finding could not be explained by differences in frequency of injecting. Thus, another group at increased risk of borrowing are previous borrowers, especially among regular exchange users.

What are the implications of our findings for further prevention efforts? The absence of "hard" indications for a lower level of borrowing among regular exchange users is in line with the results of other studies among IDUs participating in the cohort-study 19,20,26 In our view, however, this does not necessarily lead to the conclusion that the Amsterdam SE has no preventive effect.

First, if IDUs with a relatively high risk level participate in the cohort-study 21,22 this may obscure the differences between regular exchange users and other IDUs with regard to borrowing. Also, the differences in borrowing between regular exchange users and other IDUs may reflect a real difference in the population that may not have reached statistical significance in our study because of the small sample size. Second, we found that regular exchange users reuse their own needles and syringes less often than other IDUs, which may indicate better access to syringes. Third, we found that borrowing - as well as not borrowing - is particularly consistent among regular users of the exchange. At the outset, we assumed that regularity of borrowing is indicative of the degree of access to syringes. This finding would thus lead to the unlikely conclusion that regular exchange users have less access to syringes than other IDUs. A better explanation may be that borrowing (and not borrowing) among regular exchange users is dependent on certain individual characteristics, while for other IDUs - among whom borrowing behavior was not consistent over time - it is more situationally determined. Since regular exchange users more often are frequent, long-term injectors, they may possess other individual characteristics, such as psychopathology, presently not measured, that may confound the effect of regular exchanging on borrowing. Fourth, there may be a time effect. A study in the United Kingdom, compared sharing behavior of users and nonusers of SEs from 1987 to 1990. Sharing declined in both groups, but it did so most strongly among nonusers of SEs. While nonusers of SEs had higher levels of sharing than SE-users in 1987, this difference had almost disappeared in 1990. There are indications of a similar development in Amsterdam 26 Thus, in 1984-85, the SE may have attracted risk reduction motivated IDUs, while five years later, a motivation for risk reduction may be equally present among regular exchange users and other IDUs. Our findings suggest that IDUs with different injecting behavior find different ways to supply themselves with new syringes according to their needs. Financial motives, for example, may induce frequent injectors to buy syringes and frequent injectors to exchange them. If the degree of access to syringes, according to one's needs, and the degree of motivation for risk reduction is similar among regular exchange users and others, then regular SE participation, compared with irregular participation or none at all, should not be expected to have a direct effect on borrowing. Therefore, factors like degree of access to new syringes (in relation to the amount needed) and motivation for risk reduction should be take into account in studies of SE users and nonusers and in studies of seroconversion-rates among these groups. Furthermore, results from studies of SEs in countries where new syringes can be purchased relatively easily (like the United Kingdom and the Netherlands) and access is relatively good cannot be generalized to countries (like the United States) where buying injection equipment is illegal and access is relatively bad.

With these caveats in mind, the question is which prevention efforts might help to reduce the risk behavior we have found. In our view, it seems more important to direct additional preventive measures at IDUs with an increased risk of borrowing than at IDUs participating in the SE irregularly or not at all. Three groups at increased risk of borrowing (cocaine injectors, long-term alcohol users, and IDUs without permanent housing) may have in common difficulties with advance planning and with keeping adequate supplies of new syringes. In that case, increased access to syringes, through extending opening hours at locations where syringes can be bought or exchanged, and through increasing the number of such locations, may be helpful. If the major obstacle is the carrying of new syringes, however, then provision of small bottles of bleach seems an adequate measure, provided that IDUs do not have the same objections against carrying bleach.

ACKNOWLEDGMENTS

This study was supported by the Netherlands foundation for Preventive Medicine (grant no. 28-1258).

The authors are grateful to B. Frédlich, B. Scheerenga-Troost, and R. Lopes Diaz for interviewing and collecting blood samples, to Dr. J. Goudsmit and M. Bakker for performing the laboratory tests, and to H.J.A. van Haastrecht for data management.

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NEEDLE SHARING AND PARTICIPATION IN THE AMSTERDAM SYRINGE EXCHANGE AMONG HIV-SERONEGATIVE INJECTING DRUG USERS.


Sharing of needles and syringes by injecting drug users (IDUs) carries a risk of acquiring or transmitting Human Immunodeficiency Virus (HIV) infection (Friedland, Harris, ButkusSmall et al. 1985, Robertson, Bucknall, Welsby et al., 1986, Chaisson, Moss, Onishi et al. 1987). Studies of "needle sharing" have focused mainly on demographic (e.g., age, sex), social (e.g. homelessness, having an injecting sexual partner) or drug use characteristics of sharers, and less on cognitive and motivational characteristics. For HIV-negative IDUs, aware of their serostatus, the motivation to protect themselves against HIV may contribute to safe behavior, while for HIV-positive IDUs, the motivation to protect others from acquiring HIV, as well as the wish to postpone AIDS by avoiding (re)infection, may contribute to not sharing equipment. In this study we will focus on cognitive and motivational antecedents of "borrowing" (i.e., injecting with a needle and syringe which has been used before by someone else) among IDUs who are not (yet) HIV-infected and who are aware of their serostatus.

Protection Motivation theory (Rogers 1983), the theoretical framework in the present study, has been applied to smoking behavior (Rogers, Deckner & Mewborn 1978), alcohol use (Kleinot & Rogers 1982), exercising (Wurtele & Maddux 1987), dental hygiene (Beck & Lund 1981), breast self-examination (Rippetoe & Rogers 1987) and AIDS (Van der Velde & van der Pligt 1991). The theory holds that information about a health threat evokes two cognitive processes: threat appraisal and coping appraisal (see figure 1).

According to the model, a maladaptive response like borrowing is facilitated by certain rewards (e.g. stopping drug craving while no sterile needle and syringe is available) and inhibited by the perceived severity of HIV infection and one's perceived vulnerability to it. In the model, anxiety has no direct relation with behavioral intention or behavior, but is mediated by perceived vulnerability, which is seen as a cognitive representation of anxiety. Adaptive responses, such as using new, one's own, or properly disinfected needles and syringes, are, according to the model, facilitated by response efficacy and self-efficacy. In the present context, response efficacy refers to the belief that using only new or one's own needles and syringes reduces the risk to acquire HIV. Self-efficacy refers to the perceived ability to perform these behaviors consistently. The costs of safe injecting, like having to buy new equipment, are expected to inhibit adaptive behavior. Figure 1 summarizes the relation between these facilitating and inhibiting factors, protection motivation and behavior. Two major methods of HIV prevention among IDUs are health education and provision of means. Health education provides information about the risk to get HIV-infected through needle sharing. Protection motivation theory holds that perceived vulnerability will inhibit maladaptive behavior. However, it also includes the possibility of interaction between threat and coping appraisal. If the perceived risk or severity is high, while one feels unable to protect oneself (i.e. has low response efficacy and/or self-efficacy), this may result, through feelings of helplessness and lack of control, in an adverse effect on behavior. Rogers (1983, p. 171) suggested: "These feelings may motivate attempts to restore perceived control of one's fate, which can be accomplished by consciously and vigorously choosing to perform the behavior that will lead to the inescapable danger." Increased feelings of vulnerability were indeed found associated with hopelessness (Rippetoe & Rogers 1987). Joseph et al. (1987) found that homosexual men believing to be at high HIV risk were less likely to undertake behavioral risk reduction than homosexual men with a low perceived risk. Furthermore, a high risk perception was associated with psychological and social distress.

Weinstein (1989) suggests that not only the perception of one's own risk (i.e., perceived vulnerability) is important in predicting behavior, but also comparative risk judgments. He used the term "unrealistic optimism" to describe biased perceptions of personal vulnerability to a health threat: people tend to think that they run less risk than others, while this is in fact not the case (Weinstein 1980, 1982, 1984). Unrealistic optimism may lead to the belief that additional precautions are unnecessary. It is unknown to which extent an optimistic bias is present among IDUs, and, if present, whether it contributes to unsafe behavior. Unrealistic optimism has been related to a variety of possible causes, both cognitive and motivational (see for a review van der Pligt et al, in press). One cognitive explanation sees optimism as the result of over reliance on past experience to predict the future and may be
of relevance for HIV-negative injectors. Most HIV negative injectors have engaged in unsafe injecting during their life as an addict (Hartgers et al. in press), and have not yet become infected, while many of their peers have. This may lead to an optimistic judgment of risk and a low perceived vulnerability. Another cognitive explanation sees optimism as a function of perceived behavioral control: the higher the control, the more optimism. A motivational explanation sees exaggerated perceptions of control and unrealistic optimism both as defensive coping strategies, employed to protect oneself - through denial - against the anxiety raised by severe health threats. Thus, a higher perceived severity would be associated with more optimism, and optimists would experience less anxiety. Van der Pligt et al. (in press) suggest that defensive coping as origin of optimism may play a role especially among high risk groups.

The second major method of HIV prevention among IDUs is the provision of means. Programs include the provision of needles and syringes through exchange schemes (mainly in Europe), or the provision of bleach through outreach-workers to disinfect equipment before sharing (mainly in the U.S.). Participation in the needle and syringe exchange program will be considered as a potential behavioral determinant of borrowing in the present study. The Amsterdam syringe exchange, which started in 1984, aims to promote one time use of injection equipment by increasing (free) access to needles and syringes and by providing information about HIV risk. In 1991, one million new needles and syringes were handed out (personal communication, A.D. Verster, Municipal Health Service), while the population of current injectors in Amsterdam is estimated at around 2500 (Buning 1990). Before 1984, IDUs could legally buy new injection equipment. This option is still available: through pharmacies and certain shops (Hartgers et al. 1988, Van Santen 1990). Reasons for participation in the exchange program may vary. Next to a motivation to reduce risks, financial motives may be important (Hartgers et al., in press). Also, it seems likely that the exchange program does not appeal to IDUs who are in a stopping or starting phase of injecting (Hartgers et al. 1989). Since financial barriers fall away for participants of the exchange program, we expect that participation in this program decreases response costs, and thereby improves actual behavioral control (Ajzen 1991) and facilitates adaptive behavior. Both in Amsterdam and elsewhere, syringe exchange attenders have reported lower levels of sharing than non-attenders (Stimson 1989, Hartgers et al. 1989, Watters et al. 1991, Brette 1991 and Hagan et al 1991).

In addition to actual behavioral control, it is important whether a person perceives himself to be in control of his or her behavior. The concept of "perceived behavioral control", which is related to self-efficacy (Bandura 1977), was added by Ajzen & Madden (1986) to the theory of "reasoned action" (Fishbein & Ajzen 1975). In protection motivation theory, self-efficacy is only related to intention, while according to Ajzen & Madden (1986), "perceived behavioral control" is related to both intention and behavior. Since 1977, many studies have linked self-efficacy to health promoting and health-impairing behavior (Bandura 1986, Strecher et al. 1986). A cross-sectional study among IDUs (Paulussen et al. 1990) confirms this: self-efficacy was found strongly related to both behavior and intention.

Finally, we will consider previous behavior as a potential determinant of borrowing. Previous behavior has been found related to future behavior independent of the regulating effects of behavioral intention (Bentley & Speckart 1979, Van der Velde, Hooykaas & van der Pligt, in press, Cleary et al. 1991). This effect may partly be attributable to method variance shared by the measures of prior and later behavior. However, if past behavior has a significant residual effect on later behavior, next to cognitive factors, this would indicate that an important factor (for example, habit) is missing in the tested model (see Ajzen 1991). Habit may be of importance as the investigated behavior - borrowing - is closely related to addictive behavior, which is in general characterized by compulsiveness and a long history.

The purpose of the present study is to investigate whether it is meaningful to study Protection Motivation in the prediction of needle sharing by IDUs. Other factors which will be considered are unrealistic optimism, participation in the syringe exchange program and previous behavior. As mentioned before, the present study concerns only IDUs who are not infected with HIV; all were aware of their negative serostatus through one or more previous HIV test(s). First, in a cross-sectional analysis, we will investigate the relations between previous borrowing, the different protection motivation factors and optimism. Second, we will study the relations between the different potential behavioral determinants and borrowing at follow-up. The implications of our findings for HIV prevention programs among IDUs will be discussed.

METHOD

Subjects

The present data set is part of a longitudinal study of HIV infection among drug users (DUs) in Amsterdam which started in 1985. This ongoing cohort-study (e.g. Van den Hoek et al. 1988, Van Haastrecht et al 1991) involves voluntary and confidential HIV-antibody testing and counselling for DUs, combined with an interview conducted by trained professionals using a standard questionnaire (in Dutch, English or German). Most DUs in the cohort-study enroll either through methadone programs or through a Sexually Transmitted Diseases (STD) clinic for addicted prostitutes. Subjects can participate only once or take part in the follow-up study. In this study, visits (including HIV testing) are scheduled every 4 months, and participants report on current behavior, i.e. behavior since their previous visit. For each follow-up visit, DUs receive 25 Dutch guilders (approximately $13). Enzyme-linked immunosorbent assays (ELISA's) and/or immunoblotting are used for HIV testing (see Van den Hoek et al., 1988).

In the period June-December 1990, 245 participants who assumed to be HIV-negative on the basis of previous test-result(s) came for a follow-up-visit (hereafter indicated as t1). An additional questionnaire concerning Protection Motivation was given to 215 of these DUs. Twenty five DUs did not receive the questionnaire due to understaffing on the day of their visit; for 5 DUs the reason was unknown. Among the 215 DUs a sample of 92 was selected who met four criteria: a) HIV-negative at t1 (n=210), b) having injected in the four weeks previous to t1 (n=103), c) having a previous visit of before, the present study concerns only IDUs who are not infected with HIV; all were aware of their negative serostatus through one or more previous HIV test(s). First, in a cross-sectional analysis, we will investigate the relations between previous borrowing, the different protection motivation factors and optimism. Second, we will study the relations between the different potential behavioral determinants and borrowing at follow-up. The implications of our findings for HIV prevention programs among IDUs will be discussed.

Finally, we will consider previous behavior as a potential determinant of borrowing. Previous behavior has been found related to future behavior independent of the regulating effects of behavioral intention (Bentley & Speckart 1979, Van der Velde, Hooykaas & van der Pligt, in press, Cleary et al. 1991). This effect may partly be attributable to method variance shared by the measures of prior and later behavior. However, if past behavior has a significant residual effect on later behavior, next to cognitive factors, this would indicate that an important factor (for example, habit) is missing in the tested model (see Ajzen 1991). Habit may be of importance as the investigated behavior - borrowing - is closely related to addictive behavior, which is in general characterized by compulsiveness and a long history.

The purpose of the present study is to investigate whether it is meaningful to study Protection Motivation in the prediction of needle sharing by IDUs. Other factors which will be considered are unrealistic optimism, participation in the syringe exchange program and previous behavior. As mentioned before, the present study concerns only IDUs who are not infected with HIV; all were aware of their negative serostatus through one or more previous HIV test(s). First, in a cross-sectional analysis, we will investigate the relations between previous borrowing, the different protection motivation factors and optimism. Second, we will study the relations between the different potential behavioral determinants and borrowing at follow-up. The implications of our findings for HIV prevention programs among IDUs will be discussed.

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The first follow-up visit of these 92 DUs after t1, within a period of 9 months, will be indicated as t2.

Measures

Safe injecting was assessed as follows: a) Did you use a needle and syringe which has been used by somebody else since your last visit, and if so, when was the last time? and b) If so, have you cleaned this needle and syringe, and in which way? For the present analysis, answers which indicated rinsing with bleach and/or boiling were considered is disinfecting. Safe injecting was scored in three categories: 1) borrowed but did not disinfect, 2) borrowed
and disinfected and 3) did not borrow. Previous safe injecting refers to safe injecting as reported at t1. At each visit, subjects were asked how they obtained new needles and syringes since their last visit, and to indicate the percentages (adding up to 100%) for four categories: buying, exchanging (at the exchange program), receiving (e.g., from friends) or otherwise. The percentage reported for exchanging was used as measure for the degree of participation in the exchange program. Protection Motivation variables were measured (at t1) as follows.

- Perceived severity of HIV infection: 2 items: (1) seriousness of infection with AIDS-virus; (2) infectiousness of AIDS-virus. Scores ranged from 1 (not at all) to 5 (extremely). Perceived severity was computed by summing these 2 items, with score range from 2 (not at all severe) to 10 (extremely severe). Although Cronbach's alpha was only 0.49, the scale was used as planned.

- Perceived vulnerability to HIV infection by injecting: 2 items: How do you estimate the chance to get infected with the AIDS-virus through injecting: (1) for yourself, (2) for other addicts. Scores ranged from 1 (zero) to 5 (extremely high). Protection Motivation theory concerns only one's own risk (item 1). A comparative risk-score was derived by subtracting the own risk-score from the risk attributed to others (item 2). Scores ranged from 4 (extreme optimism) to -2 (pessimism).

Subjects scoring higher than zero (i.e., who judge their own risk as lower than the risk of others) are indicated as "optimists".

- Anxiety. 3 items: How anxious/worried/nervous do you feel when you think about AIDS? Scores ranged from 1 (not at all) to 5 (very). Anxiety was computed by summing these 3 items, with a score range from 3 (not anxious) to 15 (extremely anxious). Cronbach's alpha is 0.87.

- Response efficacy. If someone always uses only his own needles, how certain are you then that that person prevents infection with the AIDS-virus through injecting? The score ranged from 1 (not at all certain) to 5 (extremely certain).

- Self-efficacy: 5 items: (1): How easy or difficult would you find it in the next half year only to inject with your own needles or with safely cleaned needles? The score ranged from 1 (very easy) to 5 (very difficult). The next 4 items represented specific difficult situations (for example, if one is ill with withdrawal symptoms), and were scored the same way. If the answer to the first question was 5 (very difficult), the following 4 times automatically also were scored 5. Self-efficacy was computed by summing the inverted item-scores and ranged from 5 (no self efficacy) to 25 (very good self-efficacy). Cronbach's alpha is 0.84 (corrected alpha 0.82, that is minus the cases with score 5 on item 1, n=91).

- Behavioral intention: Subjects could indicate whether they intended to stop injecting in the next half year. Among those who did not intend to stop injecting, the intention to inject safely was measured with the following item: In emergency situations (i.e., dope available, but no new or self used needle and syringe), how strong is your intention to first boil or clean with bleach somebody else's used needle in the next half year? Possible answers were: 0 (do not know/not at all strong), 1 (not so strong), 2 (strong), 3 (very strong) and 4 (does not intend to borrow at all).

For descriptive purposes, perceived severity, anxiety and self-efficacy were converted to 5 point scales.

RESULTS

Sample characteristics

On average, the 92 current IDUs started injecting 12.1 years before intake in the cohort-study (median 11.5, range 1-28 years). At t1, 75 subjects (82%) reported a history of borrowing. With regard to current daily injecting, 17 subjects (18%) injected heroin, 6 (7%) cocaine and 20 (22%) heroin and cocaine together ("speedball"). Weekly (but not daily) injecting of heroin, cocaine and speedballs was reported by 11 (12%), 11 (12%) and 25 (27%) subjects, respectively. The mean number of injections on injecting days in the previous month was 3.1 (median 2, range 1-14). A new needle and syringe was used a mean number of, 1.7 times (median 1, range 1-9).

Previous safe injecting, degree of participation in the exchange program and protection motivation at t1

With regard to previous safe injecting, 13 IDUs (15%) report borrowing but not disinfecting, 2 (2%) report borrowing and disinfecting and 74 (83%) report not to have borrowed (3 missing). Obtaining all new needles and syringes at the exchange program is reported by 67 IDUs (73%), while 8 (9%) report percentages from 50% to 99%. Seventeen subjects (19%) report not to have used the exchange program since their previous visit: 14 had bought all new needles and syringes, while 3 received new equipment from others.
Table 1 shows the frequency distributions of protection motivation factors. HIV infection is perceived as severe by 91% (score >4). Forty one percent perceive themselves to be vulnerable to HIV infection through injecting (score >2), while 98% perceive other addicts to be vulnerable to HIV infection. The mean comparative risk-score is 1.9 (s.d. 1.5); 83% of the subjects classify as optimists. Anxiety (score >4) was reported by 28% of the respondents. Response efficacy of using only one's own injection equipment is seen as high (score >4) by 92%, and 61% have a high self-efficacy score (score >4).

With regard to behavioral intentions, 15 IDUs (16%) express the intention to stop injecting. This intention is reported more often by subjects who do not participate in the exchange program. Among 17 non-participants; 6 (35%) report the intention to stop injecting, as compared to 9 (12%) among 75 participants (Fisher's exact test, p=.03). The intention to stop injecting is related neither to previous safe injecting nor to protection motivation variables.

Among the 77 subjects who did not intend to stop injecting, 4 (5%) report a weak or no intention to disinfect when borrowing, 15 (19%) report a strong to very strong intention to disinfect when borrowing and 57 (74%) report that they do not intend to borrow at all (1 missing).

Since scores on most variables were not normally distributed, Spearman's rank order correlation coefficients were used to examine significant bivariate correlations between variables measured at t1. Figure 2 shows that previous safe injecting is positively related to self-efficacy and negatively to perceived vulnerability. This indicates that safe injectors perceive themselves to be at low risk and as able to inject safely, while unsafe injectors feel vulnerable and less able to inject safely. Noteworthy is the relatively strong negative relation between perceived vulnerability and self-efficacy. Perceived vulnerability is negatively related with the intention to inject safely, while perceived severity, response efficacy and self-efficacy are all positively related to this intention.

Since the assumptions necessary for multiple regression analysis or linear discriminant analysis were not met, we employed logistic regression (Hosmer & Lemeshow 1989) to identify independent predictors of intention (dichotomized in 0 (does not exclude borrowing) versus 1 (intention not to borrow at all)). With this technique, the amount of change in the dependent variable for a oneunit change in the independent variable is indicated by the odds ratio (OR), while the partial correlation between the dependent variable and each of the independent variables is indicated by the R statistic, which can range in value from -1 to +1. The goodness-of-fit statistic compares the observed probabilities to those predicted by the model. A significance level greater than .05 indicates that the model does not differ significantly from a "perfect" model. For all analyses, a significance level of .05 was used. In a multivariate logistic regression model with severity, vulnerability, response efficacy and self-efficacy as independent variables, only self-efficacy was an independent and significant predictor of the intention to inject safely (see table 2). No significant interaction was found between vulnerability and self-efficacy in predicting intention.
Own risk, others’ risk and unrealistic optimism at t1

Perceived vulnerability of oneself (own risk) is not associated with the perceived vulnerability of other addicts (r=-.06, p=.29). The comparative risk score (others' risk-score minus own risk-score) was about equally influenced by both variables: Spearman's correlation between optimism and own risk is -.65, and between optimism and others' risk .76. First, we investigated possible differences in risk judgments as a function of previous safe injecting. Previous safe injecting was negatively related to own risk (see figure 2), not related to others' risk (r=.02, p=.43) and positively related to optimism (r=.22, p=.02). Thus, safe injectors have a low perceived own risk and are more often optimistic about their relative risk. Optimism was positively related to perceived severity (r=.21, p=.02) and to self-efficacy (r=.27, p=.006). Optimism was not related to anxiety, nor to any other Protection Motivation variable.

Indicators of safe injecting at t2

The second measurement (t2, mean time between visits 4.5 months) included 87 subjects, of whom 82 had injected since t1. There was no relation between the intention to stop injecting, as expressed at t1, and injecting at t2. At t2, two HIV seroconversions were observed, both were current
injectors at t2. All remaining analyses concern the 82 current injectors at t2, except for relations with the intention to inject safely, which concerns only 70 subjects who did not at t1 intend to stop injecting. With regard to safe injecting at t2, 5 subjects (6%) report borrowing but not disinfecting, 4 (5%) report borrowing and disinfecting and 73 (89%) report not to have borrowed since t1. Obtaining all new needles and syringes at the exchange program was reported by 58 subjects (71%). Eleven (13%) reported percentages from 1% to 95%, and 13 (16%) reported not to have used the exchange program since t1.

Figure 3
Predictors of safe injecting
(figures concern bivariate Spearmann’s rank order correlations with p<0.05)

Two variables of Protection Motivation theory, perceived vulnerability and self-efficacy, predicted safe injecting at t2, while the intention to inject safely (n=70), perceived severity and response efficacy did not. Other indicators of safe injecting at t2 were safe injecting at t0, optimism, and participation in the exchange program at t2. All variables had a positive relation with safe injecting at t2, except perceived vulnerability, which had a negative relation (see figure 3).

Logistic regression analyses showed that the strongest indicators of safe injecting at t2 (dichotomized in 0 (borrowed since t1) versus 1 (did not borrow since t1)) were the degree of participation in the exchange program and vulnerability. With both variables in the model (hereafter indicated as model A; goodness-of-fit statistic χ²=.76), the odds ratios were 1.02 (per percentage, 95% confidence interval (CI)=1.00-1.04, R²=.22) and 0.47 (CI=.25-0.90, R²=-.24), respectively. No other variable contributed significantly to the prediction of safe injecting. A model with only intention and self-efficacy had no predictive power; the same was true for a model with intention, self-efficacy and previous behavior. There were no indications for interaction between intention and self-efficacy. Adjusting model A for previous safe injecting resulted in a weaker relation between vulnerability and safe injecting (adjusted OR=.54, CI=.25-1.16, R²=-.11). This suggests that the link between vulnerability and safe injecting at follow-up is partly explained by the relation between vulnerability and previous behavior. In order to examine the possibility of interaction between vulnerability and self-efficacy, we entered both self-efficacy and the interaction term for self-efficacy and vulnerability in model A. The interaction term approached significance, but as a whole the model became unstable, due to small numbers, and was not significantly better than model A (improvement χ² test p=.13).

Figure 3 summarizes the major effects found in the present study. Optimism (with a bivariate positive correlation with safe injecting at t2 (r=.24, p=.02)) is not shown. Previous safe injecting is associated with high self-efficacy and low perceived vulnerability. High self-efficacy leads, as expected, to safe injecting at follow-up, but high perceived vulnerability is associated with unsafe injecting at follow-up. Intention is not significantly related to behavior at t2.
Figure 4 shows that most safe injecting (both at t1 and t2) occurs among low vulnerability high self-efficacy subjects (group 2); most unsafe injecting occurs among high vulnerability-low self-efficacy subjects (group 3).

DISCUSSION

The results of the present study do provide support for Protection Motivation theory and improve our understanding of needle sharing by IDUs. As predicted, perceived severity, response efficacy and self-efficacy are positively related to behavioral intention, with self-efficacy being the strongest predictor. Anxiety is related to vulnerability and does not have a direct relation with intention or behavior at follow-up. Self-efficacy is related to intention and to behavior at follow-up. This confirms earlier findings (e.g. Beck & Lund 1981), and is in accordance with the theory of planned behavior (Ajzen 1991). Contrary to expectations, intention does not predict behavior. Ajzen (1991) pointed out that a behavioral intention can only find full expression in behavior under volitional control. Most behaviors, however, depend to some degree on the presence of means and skills. Thus, next to intention, response costs (or actual behavioral control) and self-efficacy (perceived behavioral control) are important. In the present study, degree of participation in the exchange program and perceived vulnerability are associated with safe injecting at follow-up. In an earlier study, degree of participation in the exchange program was also related to safe injecting (Hangers et al. 1991). These findings suggest that participation in the exchange program indeed lowers response costs and improves actual behavioral control. Huang et al. (1989), in a cross-sectional study among IDUs, found that situational factors like response costs were better predictors of safe injecting than health beliefs. However, in the present study, a significant relation between safe behavior and participation in the exchange program was found at follow-up, but not at the first visit. Other studies concerning the Amsterdam exchange program failed to find significant effects of participation on injecting risk behavior (Hangers et al, in press) and on seroconversion rate (Van Ameijden et al. in press). However, those studies compared regular and full time attenders with irregular and non-attenders, while in the present and earlier study a continuous variable is employed. These findings suggest that the relation between participation in the exchange program and safe injecting is weak. This may be due to the fact that attenders have different characteristics than nonattendees (Hangers et al., in press). Further investigations seem necessary.

Similar to findings by Joseph et al. (1987), the relation between perceived vulnerability and safe behavior at follow-up is negative. This negative effect of perceived vulnerability on behavior is independent of self-efficacy and of degree of participation in the exchange program. Although no interaction is found, the results nevertheless suggest the presence of feelings of hopelessness or fatalism. High perceived vulnerability is associated with previous unsafe injecting, while this perceived vulnerability does not stimulate subjects to change their behavior: they do not intend to inject safely and continue to inject unsafely at follow-up. Most unsafe injecting occurs among subjects with high perceived vulnerability and low self-efficacy. In an earlier cross-sectional study, Magura et al. (1989) also found an indication that needle sharing is related to fatalism about developing AIDS. However, Magura's study concerned IDUs of unknown serostatus and needle sharing included both giving away used equipment and using others' equipment. Conversely, our results also point to the existence of a group of injectors with low perceived vulnerability and high self-efficacy, who inject safely at both
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Perceived vulnerability and optimism

The degree of optimism is high as compared to other studies among high risk groups (Bauman & Siegel 1987, Joseph et al. 1987, Van der Velde, van der Pligt & Hooykaas, in press). Since optimism in these studies concerns risk through sexual behavior, they may not be comparable. Correlations between risk judgements and self-reported behaviors are seldom significant (Weinstein 1984, 1989). However, in the present sample perceived vulnerability is related both to self-efficacy and previous safe behavior, which indicates that perceived risk is a function of previous behavior. This is similar to findings by Van der Velde, van der Pligt & Hooykaas (in press). As a result of the negative relation between own risk and safe injecting at follow-up, we found optimism - contrary to the expectations - positively associated with safe injecting at follow-up. Thus, our findings do not show adverse behavioral consequences of optimism. Optimism is positively related to self-efficacy (or perceived behavioral control), which points to a cognitive origin of optimism. Mixed support was found for the motivational explanation of optimism: in the present study, optimism is indeed positively related to the perceived severity of the threat. However, (different from findings by Bauman & Siegel (1987) among homosexual men), anxiety is not related to optimism, which pleads against defensive coping as an underlying mechanism.

IDUs in the present sample seem to estimate their own risk as a function of their previous behavior, but have extremely high risk estimates for other addicts. Thus, optimism seems the result of overestimating others' risk rather than of underestimating one's own risk (similar to Perloff & Fetzer (1986) and Van der Velde, van der Pligt & Hooykaas (in press)). In fact, the high risk estimates for others do not seem very unrealistic: all IDUs in the current sample are HIV-negative, despite their previous risk behavior, while the prevalence among Amsterdam injectors is estimated at approximately 30% (Van Haastrecht et al. 1991).

Previous behavior

In line with other findings (see introduction), previous behavior is predictive of behavior at follow-up, which may indicate habit. Furthermore, previous behavior appears to influence perceived vulnerability, and the effect which perceived vulnerability has on behavior at follow-up is partly attributable to previous behavior. However, previous behavior does not have an independent effect on later behavior, next to vulnerability and participation in the exchange program. This suggests that, in the present sample, cognitive factors and actual behavioral control are more important in determining behavior than previous behavior.

Conclusions and implications for prevention

Two important corollaries can be made. First, the present study shows that HIV-negative subjects, aware of their serostatus, differ widely in health beliefs, partly as a function of their previous risk behavior. In turn, these health beliefs are partly related to subsequent risk behavior. These findings suggest that studies of the effect of counseling and testing on HIV risk behavior (see for an overview Higgins et al. 1991) need to take cognitive factors into account. Second, among subjects aware of a seropositive serostatus, the wish for protection of others against HIV can be assumed to be an important determinant of behavior. Among subjects unaware of their serostatus, assumptions concerning one's serostatus may influence health beliefs and behavior. Consequently, it seems highly important to consider serostatus and knowledge of serostatus in studies of the relations between cognitive factors and behavior.

The implications for prevention can be summarized as follows. Protection motivation is based on threat appraisal and coping appraisal. The present findings suggest that, for many IDUs, actual and perceived behavioral control (or coping appraisal) is relatively low. A number of subjects feel unable to cope and see themselves as extremely vulnerable to HIV infection. This leads - possibly through feelings of hopelessness and/or fatalism - to unsafe injecting. As argued before, a heightened awareness of being at risk can result in maladaptive behavior; this implies that too much emphasis on the high vulnerability of IDUs may be undesirable. Measures like skills training and improved accessibility of new needles and syringes or disinfectants may be effective in increasing actual and perceived behavioral control (see also Paulussen et al. 1990 and Kok & Sandfort 1991). A better balance between threat and coping appraisal may result in more safe behavior.

ACKNOWLEDGMENTS

This study was supported by the Netherlands Foundation for Preventive Medicine (grant no. 28-1258). The authors thank the nurses B. Fr6lich, B. Scheerings-Troost and R. Lopes Diaz for interviewing and collecting blood samples; Dr. J. Goudsmit and M. Bakker for performing the laboratory tests; H.J.A. van Haastrecht for data management; J.A.R. van den Hoek and R.A. Coutinho for providing the opportunity to conduct this research and M. ter Pelle for preparing the manuscript.

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HIV RISK BEHAVIOR AND BELIEFS OF HIV-SEROPOSITIVE DRUG USERS

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Journal of Drug issues 1992

INTRODUCTION

Sharing of needles and syringes is the main route of transmission of human immunodeficiency virus (HIV) among drug injectors [Friedland et al. 1985], while heterosexual transmission is the main route from injectors to non-injectors [Des Jarlais et al. 1985, Moss 1987].

Behavioral change is dependent on knowledge, availability of means, and motivation to change. Studies among Amsterdam drug users (DUs) (Korf et al 1990, Hartgers et al 1991) suggest that Amsterdam DUs are well aware of HIV transmission paths. Furthermore, Amsterdam has a large needle and syringe exchange program [Hartgers 1989] and condoms are easily available.

In relation to injecting drug use, many European and U.S. efforts to prevent new HIV infections focus on sexual and injecting risk behavior of persons who are not infected (both injectors and sexual partners of injectors). Behavioral changes among these HIVnegatives are - given that knowledge and means are present - dependent on a desire for self-protection against HIV infection. However, in order to prevent new HIV infections, it seems equally important to focus prevention programs at the - smaller - group of HIV-seropositive (HIV+) DUs. One reason for safe behavior among HIV+ DUs might be the belief that AIDS can be postponed by avoiding re- or other infections. However, to our knowledge, no evidence for this belief has been reported. Next to this desire for self protection, safe behavior of HIV-positive drug users depends on the wish to protect their injecting and/or sexual partners from acquiring HIV, which could be termed a wish for "other-protection".

Provided that knowledge and means are present, models of health behavior tend to focus on motivation for self-protection. However, some of the concepts employed in these models may be relevant for other protective behavior, for example the perceived self-efficacy with regard to a certain behavior (i.e., the conviction that one is able to perform a certain behavior consistently) [Bandura 1977], the perceived efficacy of the advocated ("safe") response in reducing HIV risk (response efficacy) [Rogers 1983], the attitude towards the behavior (Fishbein and Ajzen, 1975) and the intention to perform safe behavior [Fishbein and Middlestadt 1989] The present paper presents the results of a study among HIV+ DUs who are aware of their serostatus. Central to the aims of the study were the extent to which these drug users put others at risk of HIV infection, their perceptions of the risk of transmitting HIV, their intentions with regard to future behavior, and the characteristics of HIV+ DUs who put others at risk.
**METHOD**

We studied HIV+ DUs who participated between June and November 1990 in a longitudinal HIV study among DUs in Amsterdam. This ongoing cohort-study [Van den Hoek et al. 1988; Van den Hoek et al. 1989a; Van Haastrecht et al. 1991] includes voluntary and confidential HIV-testing and counselling, combined with a standardized interview conducted by trained professionals. Participants can either participate once or take part in the follow-up study (in which study-visits are scheduled every 4 months). Enzyme-linked immunosorbent assays (ELISA'S) are used for HIV-testing. Confirmation of a positive specimen is performed by competitive ELISA's and/or by immunoblotting, as previously described [Van den Hoek et al. 1988].

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### Additional questionnaire for HIV-positive drug users

1. **Estimated chance of acquiring syphilis in the future**
   (1 item, 1=zero, 2=small, 3=moderate, 4=big, 5=very big)

2. **Estimated chance of infecting someone with HIV through sex in the future**
   (1 item, 1=zero to 5=very big)

3. **Estimated chance of infecting someone with HIV through needle sharing in the future**
   (1 item, 1=zero to 5=very big)

4. **Response efficacy condoms**
   (1 item: If someone always uses a condom at each sexual contact, how certain are you then that that person prevents infecting someone else with the AIDS-virus through sex, 1=not at all certain, 2=not certain, 3=sometimes certain, 4=sure, 5=extremely certain)

5. **Negative attitude towards condoms**
   (2 items: annoy when having sex, 1=not at all annoying to 5=extremely annoying; feeling uncomfortable, 1=not at all uncomfortable to 5=extremely uncomfortable. The item scores are summed, divided by 2 and truncated, so that a 5-point scale results: 1=not annoying/uncomfortable to 5=extremely annoying/uncomfortable)

6. **Self efficacy condom use, separately asked for prostitutes concerning sex with clients, and for heterosexually active non-prostitutes, concerning sex with casual partners**
   (5 items, the first one “How easy or difficult would you find it in the next half year to always use a condom at each sexual contact with a client/casual partner”, 1=very easy to 5=very difficult. The following 4 items represent specific difficult situations for example the client wants to pay more, or the casual partner finds it bothersome, and are scored the same way. If the answer to the first question is 5=very difficult, the following 4 questions automatically get score 5. The item-scores are summed, inverted, divided by 5 and truncated, so that the final score range runs from 1=very low self efficacy to 5=very good self efficacy.)

7. **Intention condom use, separately asked for prostitutes, concerning sex with clients, and for heterosexually active non-prostitutes, concerning sex with casual partners**
   (1 item: How strong is your intention to always use a condom in the next half year if you have sexual contact in the vagina with clients/casual partners, 0=do not know, 1=not at all strong, 2=not so strong, 3=very strong)

8. **Intention needle sharing**
   (1 item: How strong is your intention in the next half year to let your used needle never be used by somebody else? See 7 for answering categories)
All HIV+ DUs who were familiar with their serostatus and who came for a follow-up visit in the above mentioned period were given an additional questionnaire (see below) besides the standardized interview on medical history, demographic factors, drug use and sexual history. This resulted in a sample of 122 HIV+ DUs, who came for a 2nd to 16th visit in the cohort study, and who reported 'current' behavior; i.e. behavior in the period since the preceding interview (median 4.2 months, range 3.3-12.6).

Univariate statistics include the X 2 test of independence, Fisher's exact test and the Mann-Whitney test (M-W) and Kruskal-Wallis test (K-W) for two or more independent samples (employing scales as described in table 1 and 2).

Predictors of unsafe vaginal sex were estimated by stepwise logistic regression modeling.

RESULTS

Demography; heterosexual and injecting risk behavior
The sample consists of 61% male and 66% Dutch DUs. Their mean age in years is 32.6 (s.d. 5.5) and they have lived a mean number of 16.7 years in Amsterdam (s.d. 11.8). Having permanent housing is reported by 93%; currently working as a prostitute is reported by 15% (only females, hereafter indicated as female prostitutes). Almost all (98%) report a history of injecting. They have used heroin regularly for a mean number of 10.0 years (s.d. 4.7); current daily methadone use is reported by 79%.

Ninety eight (80%) DUs in the sample are (at the time of their visit) classified in CDC-I or II (acute or asymptomatic HIV infection), 18 (15%) in CDC-III (generalized lymphadenopathy) and 6 (6%) in CDC-IV (3 with symptomatic HIV disease, 3 with AIDS).

Sixty two of the 122 HIV+ DUs (51%) are heterosexually active, i.e. they report having had vaginal sex with a steady sexual partner (n=43), with a casual partner (n.=16) and/or with clients (n=18) in the previous months. Heterosexual activity is not significantly different between DUs in the different CDCsubgroups. Six DUs (all among the heterosexually active, is 10% of this group) report having had a sexually transmitted disease (STD) in the previous four months. Unsafe sex (defined as not (always) using condoms during vaginal sex in the preceding months) is reported by 29 HIV+ DUs (24%, 47% of the sexually active). When eight, who report only unsafe vaginal sex with an HIV+ steady partner, are excluded, this results in 21 HIV+ DUs who could have transmitted HIV via their sexual practices (hereafter called sex risk group or SR-group: 34% of sexually active HIV+ DUs). The SR-group consists of 14 females and 7 males. Thirteen HIV+ DUs (8 females, 5 males) report unsafe sex with a private steady partner, 4 (2 females, 2 males) with a private casual partner, and 4 HIV+ DUs (all female prostitutes) with a client. The 13 HIV+ DUs who had unsafe sex with a steady partner report that 8 (62%) of these steady partners have never injected. Four (19%) of the 21 SR-DUs report having had an STD in the previous months, as compared to 2 (5%) among the other 41 sexually active HIV+ DUs (Fisher exact test, p=0.09). Ninety five HIV+ DUs (78%) are current injectors. Four (=4%) of these report current needle sharing, defined as letting a needle and syringe, which they had already used themselves, be used by somebody else. These 4 persons do not report unsafe vaginal sex.
Risk estimates, beliefs, attitude and behavioral intentions

With regard to the risk estimates, 57 HIV+ DUs (47%) think they run a chance to get syphilis in the future (score a2), while 54 (44%) and 25 (21%; 26% of current injectors) think they might infect someone else with HIV in the future (score >2), respectively through sex or through needle sharing (see Table 1 for frequencies). All in all, 60 HIV+ DUs (49%) think they might infect someone with HIV in the future, either through sex, through needle sharing or through both.

The SR-group (n=21), when compared with the 41 heterosexually active and the 60 not heterosexually active subjects, think more often they might infect someone with HIV through sex in the future (76%, 44% and 33% with score >2 respectively, K-W p=0.0005).

With regard to response efficacy, 58 persons (48%) are uncertain (score c3) about the efficacy of using condoms (the advocated response to avert HIV risk) in preventing HIV transmission (Table 1). The SR-group, when compared with
the other heterosexually active and the heterosexually non-active subjects, are least uncertain about condom efficacy (33%, 46% and 53% with score <3 respectively; K-W, p=0.02). A negative attitude towards condoms (score > 4) is reported by 38 persons (31%) (Table 1). The SR-group, when compared with the other two groups, does not have a significantly more negative attitude (38%, 20% and 37% with score >4 respectively; K-W, p=0.08). When only the first two groups are compared (the SR-group and the other heterosexually active), there is also no significant difference (M-W, p=0.48). Table 2 shows that 16 (94%) of the 17 female prostitutes in the sample who answered these questions have a strong or very strong intention to always use condoms with clients, but a high self-efficacy score (>4) with regard to condom use with clients is obtained by only 7 (41%). SR-prostitutes have a less strong intention to use condoms with clients than the other prostitutes (M-W, p=0.03), but there is no significant difference with regard to self-efficacy.

There were 56 HIV+ DUs with current private partners (i.e. who report a steady and/or casual heterosexual partner(s) while not being a female prostitute), of whom 42' answered the questions concerning intention, and self-efficacy with regard to condom use with future casual partners. Most (n=37, 88%) have a strong or very strong intention to use condoms with casual partners, but a high self-efficacy score was obtained for only 12 (29%). There were no significant differences between the SR-group and the other subjects with regard to intention and self-efficacy.

Finally, the subgroup of 95 current injectors were asked about their behavioral intentions about needle sharing: 87 (93%) had a strong or very strong intention not to share. It is worth noting that all four needle sharers reported a very strong intention not to share.
Correlates of heterosexual risk behavior
Since unsafe sexual behavior was more prevalent than unsafe injecting behavior, we only examined demographic and drug use correlates of sex risk (SR) behavior. Four demographic variables were univariately related to SR behavior (p<0.05): female gender, younger age, a non-Dutch nationality and being a female prostitute. No significant correlations with drug use variables (like current cocaine use, alcohol use or injecting) were found. Since all prostitutes in the present sample are female, a new variable (gender/prostitution) was made with three categories: males, female prostitutes and other females. In a logistic regression analysis, this variable and nationality were independent predictors of unsafe vaginal sex (with p<0.05). No interaction was found. The model could not be improved by entering response efficacy or attitude. With both nationality and gender/prostitution in the model, persons of non-Dutch
nationality have an increased risk (OR=3.14, CI=1.07-9.24) when compared to Dutch DUs. Female prostitutes, when compared to females, have an increased risk of having unsafe vaginal sex (OR=3.49, CI=0.92-13.30). Males, when compared to females, have a decreased risk (OR=0.65, CI=0.18-2.31). However, the finding that female prostitutes are a high risk group does not mean that they have only unprotected contacts with clients. Four of the eight prostitutes in the SR-group had unsafe vaginal sex with clients, while the other four had safe sex with clients but unsafe sex with private partners.

Initially, the questionnaire was unclear at this point. Interviewers assumed at first that HIV+ DUs with a steady partner did not have to answer these questions, hence the 14 (56 minus 42) missing values.

DISCUSSION

With regard to current behavior, three quarters of our sample of HIV+ DUs inject and half are heterosexually active. This confirms other findings that a substantial proportion of HIV-infected DUs are heterosexually active [Van den Hoek et al. 1990, 1992; Schrager et al. 1991].

Before discussing our findings, we would like to reiterate that the present sample consists exclusively of HIV+ DUs aware of their serostatus, and that the dependent variable is unsafe vaginal sex (i.e. the risk of HIV transmission could not be excluded). Most research of heterosexual behavior among DUs concerns DUs with unknown serostatus and concerns condom use in general, irrespective of the likelihood of transmission. A further complication is that some studies are restricted to 100% condom use during heterosexual contacts as outcome variable, while others employ any condom use as outcome variable. We have tried to take these differences into account in comparing the results. Because the data are self-reported, our findings may be biased due to memory loss or a tendency to give socially desirable answers. Another limitation of our study is that the sample consists of DUs volunteering for an HIV test combined with an epidemiological study of HIV. Therefore, one should be careful in generalizing the present findings to the larger population of HIV+ DUs.

The vast majority of the present sample of HIV+ DUs have 'good' intentions with regard to their behavior. Nevertheless, one fifth knowingly put others at risk of HIV infection in the previous four months, the majority through sexual contact. The rate of condom usage among these HIV+ DUs is much higher than reported in surveys of DUs with unknown serostatus [Donoghoe et al. 1989, Paulussen et al. 1990, Magura et al. 1990, Klee et al. 1990, Saxon et al. 1991, Lewis & Watters, 1991]. This is in line with findings that HIV+ IVDUs are more likely to use condoms than HIV-negative IVDUs [McCoy 1990, Van den Hoek et al. 1990, 1992].

The proportion of DUs in the present sample who disclosed their HIV-positive status to their sexual and/or injecting partner is unknown. To our knowledge, there are no studies among DUs addressing this issue. In a study of sexually active HIV+ homosexual men, Marks et al. [1991] found a high prevalence of non-disclosure of HIV infection in combination with unsafe sex.

Although needle sharing is only reported by a minority of the present sample, this behavior is very effective in transmitting HIV. Unsafe vaginal sex was reported both with injecting and non-injecting partners. Among current IDUs, heterosexual transmission seems to play a minor role, as compared to transmission by injecting risk behavior [Des Jarlais et al 1987, Chaisson 1987, Schoenbaum 1989, Battjes 1990, Nelson 1991, Van Ameyden et al. 1992]. However, this does not imply that the risk of heterosexual transmission among current IDUs is zero. The considerable risk of heterosexual transmission from injectors to non-injectors, especially through male-to-female transmission, is well documented [France et al. 1988, Fordyce et al. 1991, Padian et al. 1991]. Therefore, the prevalence of unsafe vaginal sex in the present sample gives cause for concern, especially since almost half of the sample acknowledge that they could possibly transmit HIV through unsafe sex in the future. Such an acknowledgement comes close to being a behavioral expectation, and it has been argued that a behavioral expectation is a better predictor of behavior than intention [Warshaw & Davis 1985, Sheppard et al. 1988].

Approximately one third of these HIV-positive DUs report a clearly negative attitude toward condoms. This compares favorably to IVDUs with unknown serostatus - with a low level of condom use - of whom 77% expressed a strong dislike for condoms [Jones & Vlahov 1989]. Condom use among IVDUs with unknown serostatus has been found to be related to attitude toward condoms [Paulussen et al. 1990] and to a greater personal acceptance of condoms.
(Magura et al. 1990). In the present sample, no relation was found between unsafe vaginal sex and a negative attitude toward condoms.

The perceived self-efficacy with regard to condom use is low among the DUs in the present sample, which means that most of these HIV+ DUs do not feel confident about their ability to use condoms consistently, either with clients or with casual partners. Furthermore, response efficacy associated with condom use is low: half of these HIV+ DUs are not certain that condoms are an effective means to prevent HIV infection. Respondents most often referred to rupture or slipping off of condoms during intercourse.

Contrary to our expectations, the HIV+ DUs in the SR-group did not have lower levels of self- and response efficacy than the other HIV+ DUs. This appears to be similar to findings by Magura et al. (1990) and Huang et al. (1989) but differs from findings by Abdul Quader et al. (1990): the first study fails to find an association between condom use and perceived condom efficacy against AIDS, the second finds that health beliefs play a relatively minor role in predicting condom use among IVDUs as compared to situational factors, while the third finds health beliefs associated with self-reported sexual risk reduction. All three studies concern DUs with unknown serostatus.

In the present study, neither social cognitive characteristics nor drug use characteristics are associated with unsafe vaginal sex; the strongest indicators are 'being a female prostitute' and 'having a non-Dutch nationality'. The first risk indicator is in line with Van den Hoek et al. (1989b), who found that sexually transmitted diseases are highly prevalent among addicted female prostitutes in Amsterdam, despite a (self-reported) high frequency of condom use. Both risk correlates indicate a marginal social position, which supports the view that social and cultural factors often interfere with adoption of preventive health behaviors (Levine and Sorenson, 1984, Mondanaro 1987, Mays and Cochran 1988, Worth 1989, Korf et al. 1990, Singer et al. 1990, Sibthorpe et al. 1991). Although Schilling et al. (1991) find modest positive outcomes of an intervention aiming to improve condom use skills among 91 female methadone patients with unknown serostatus, the present findings suggest that the value of using persuasive methods and of skills training - to ameliorate attitude, response and self-efficacy - is yet uncertain among these Amsterdam HIV+ DUs. More detailed research seems necessary to investigate the underlying social and cultural processes that generate the observed relations and to develop an effective prevention approach. For example, Stone et al (1989) recommend to tailor information to the group, to aim interventions at couples (IVDUs and partners) and at their peer-groups, and to stress both self-protective and altruistic (i.e., other-protective) themes.

In general, it seems potentially worthwhile to focus prevention efforts at injecting and sexual HIV risk behavior of HIV+ drug users, especially since more and more DUs learn their serostatus after HIV-testing. Since the potential behavioral outcome of not using condoms is quite different for HIV-positives, HIV-negatives and persons unaware of their serostatus, the determinants of not using condoms are likely to differ between these groups (see Fishbein & Middlestadt 1989). However, in many of the above cited studies of condom use by IVDUs, no information is provided on serostatus nor on knowledge of serostatus, which makes it difficult to understand and interpret the results. For these reasons, it seems important to take serostatus and knowledge of serostatus into account in studying condom use among IVDUs and their partners and in developing effective intervention strategies with regard to condom use.

ACKNOWLEDGEMENTS

This study was supported by the Netherlands Foundation for Preventive Medicine (grant no. 28-1258). The authors thank B. Frblich, B. Scheeringa-Troost and R. Lopez Dias for interviewing and collecting blood samples; Dr. J. Goudsmit and M. Bakker for carrying out the laboratory tests; H.J.A. van Haastrecht for data-management and M. ter Pelle for preparing the manuscript.

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HIV RISK BEHAVIOR AND BELIEFS OF HIV-SEROPOSITIVE DRUG USERS


General Discussion

9.1 Introduction

Prior to the AIDS epidemic, many IDUs all over the world shared needles and syringes. The present research was directed at particular aspects of needle sharing in relation to HIV prevention, over the years 1985-1991. Before discussing the present findings, it seems important to focus on possible reasons for the high level of needle sharing before AIDS.

The sharing of drugs and other resources forms an important part of the drug subculture1, 2. This sharing should be seen in the context of the marginalization and criminalization of drug users, which forces members of the 'deviant' group to share in order to cope. Thus, sharing of specific items may be primarily related to their availability. It may also have become a ritual (i.e. a planned behavioral sequence invested with a special meaning for the person performing the sequence3, 4) or it may be a pleasurable experience in itself. When sharing is chiefly dependent on the availability of resources, one would expect an increase in available resources to lead to a decrease in sharing. However, if sharing is mainly a ritual, or experienced as pleasurable in itself, no such relation will be found. These possible causes of sharing also apply to the subject of this paper: needle sharing.

In general, post-AIDS studies have found strong links between needle sharing and limited equipment availability. Needle sharing, in one ethnographic study of drug taking rituals in Rotterdam1, appeared to be determined by a) the availability of needles and syringes, b) experience with the injecting ritual and c) drug craving. Needle sharing as a ritual was not observed. In Edinburgh, a policy of restricting injecting equipment from 1982 to 1985 led to high levels of needle sharing, which was followed by a Hepatitis B and HIV epidemics. On the other hand, Glasgow and other areas, which did not restrict equipment availability, had much lower levels of needle sharing and a smaller HIV problem6. In the U.S., IDUs with diabetes were found to have a significantly lower HIV seroprevalence than nondiabetic IDUs. Despite a similar duration and intensity of drug use, diabetic IDUs tended not to share injection equipment and were less likely to attend shooting galleries than nondiabetic IDUs. This was ascribed to the more ready access that diabetic IDUs have to sterile injection equipment7.

Further support for the link between sharing and availability of resources is that, since 1984, IDUs all over the world have reduced their risky injecting practices in response to health education and provision of means8, 9. When there is no structural scarcity of means, IDUs themselves tend to see needle sharing as a deviant act2, 3. Finally, unlike high risk sexual behavior for homosexual men (unprotected anal sex), injecting with a needle and syringe used by somebody else is not pleasurable in itself. Injectors generally prefer to inject with new sterile injection equipment, which functions better than used equipment, does not get clogged as easily and has a sharp needle. Adaptive behavior thus seems more pleasurable and rewarding than maladaptive behavior. For homosexual men, the opposite appears to be true: adaptive behavior (condom use during anal sex or abstinence of anal sex) is generally experienced as less pleasurable than maladaptive behavior.

All together, this suggests that the high prevalence of unsafe injecting at the start of the AIDS epidemic was mainly the result of scarcity of means, together with a lack of awareness, or a low level of perceived threat, of the known medical complications of unhygienic injecting procedures among injectors.

Against this background, the findings of the present research will be discussed in five sections. First, in section 9.2, an overview will be provided of the samples studied as part of the present research, and the generalizability and reliability of the collected data will be discussed. Section 9.3 discusses the contribution of the low threshold methadone programs to HIV-prevention, and section 9.4 compares syringe exchange attenders to non-attenders with regard to injecting risk behavior. The findings with regard to determinants of needle sharing are discussed in section 9.5. Section 9.6 focuses on HIV-seropositive drug users.
9.2 The present research: generalizability and reliability of data

In general, little is known about the representativeness of study samples of drug users or IDUs; the present research is no exception. Therefore, one should be careful in generalizing the present findings. Furthermore, participants are self-selected, and self-selection occurs again with respect to participation in the follow-up study. When compared to IDUs in low threshold methadone programs, IDUs who enter the cohort-study appear to have a slightly increased risk of being HIV-positive. On the other hand, there is evidence that behavioral risk reduction occurred especially among drug users participating in the follow-up study.

The samples studied in the present research differ from each other on a number of characteristics, for example with regard to seroprevalence, knowledge of serostatus, history of injecting, kind of visit in the epidemiological study (for the studies reported in chapters 3 to 8) and year of data collection. Table 1 summarizes these differences. The table suggests a decrease in borrowing and lending over time. However, chapters 3 to 6 concern only or partly intake visits, while chapters 7 and 8 concern only follow-up visits. As evidence exists that participation in the follow-up study is associated with behavioral changes, it seems likely that this apparent decrease is an artefact of sample selection.

Table 1 also shows that, apart from the study described in chapter 2, lending is in general less often reported than borrowing. Self-reports of injecting risk behavior may be unreliable due to memory problems or to answering biases. Long-term drug users may have impaired memory; apart from that, it may be extremely difficult to recall complex patterns of drug use accurately. Memory may be more impaired for some groups of users, e.g. drug users with coexisting psychopathology or HIV-infected drug users. Nevertheless, studies trying to validate self-reports of drug use with data obtained from other sources, mainly urinalysis, have generally found reasonably close agreement. The discrepancies found in the present research between self-reports of borrowing and lending suggest an answering bias rather than memory problems. Lending may be underreported, possibly because reporting lending is more threatening to one's self-esteem than reporting borrowing. As borrowing concerns potentially self-destructive behavior, it may be less embarrassing for drug users to admit to this. However, two alternative explanations are also possible: overreporting of borrowing, or the existence of a relatively small group of frequent lenders in combination with a large group of infrequent borrowers. Unfortunately, no data on frequency of lending are available.

Within the cohort-study, which operates strictly apart from the low threshold methadone program, measures aimed at improving reliability include anchoring to autobiographical events: for follow-up participants questions on behavior concern the period since their last visit. The interviews are done by trained interviewers who are experienced with drug users, and (potentially) threatening material is asked later in the interview. To minimize threat, questions assume risk behavior, instead of safe behavior, in order to give the respondent the impression that risk behavior is not unusual.

Despite these measures, self-reports of risk behavior may still not be reliable. Attempts can be made to check reliability by measuring the tendency to respond in a socially desirable way. However, it is questionable whether such a general inclination gives an indication about a response bias with regard to a specific behavior, i.e., borrowing or lending. Self-reports of injecting can be validated with unobtrusive measures, for example physical evidence of injection, while self-reported needle sharing, as suggested by Samuels et al., can be validated with measures of immune parameters, or with forensic testing of used syringes.

In order to obtain indications for risk reduction at a behavioral level, it is often thought that "hard" data, like the prevalence and incidence of hepatitis-B or HIV infection, are more objective measures than self-reports of behavior. However, this is a problematic assumption. The occurrence of (new) infections in injectors
is related not only to the sharing of needles and syringes or the sharing of other equipment (for example, spoons”) but also to other factors, like:
- the social network in which one shares (the chance to borrow from a seropositive person), 20-22
- the quality of the employed risk reduction strategies (e.g. refusing to share if there is visible blood in the syringe), 23
- the size and type of injection equipment used (e.g., t ml syringe versus 2 ml), 24,25
- the practice of ‘booting’ (i.e. the repeated withdrawal and re-injection of blood) by the person from whom a needle and syringe is borrowed, which leaves a blood residue in the syringe, -24,26,27
- the duration since the borrowed injection equipment has last been used, 28
- the efficacy of cleaning borrowed injection equipment (cleaning with water or with a disinfectant like bleach). 17,21,11

To a certain extent, these factors are related to chance, and therefore not stable over time. Furthermore, several factors are not under control of the person borrowing. Thus, it appears incorrect to conceptualize the prevalence and incidence of infections as more objective measures of behavioral change than self-reports. Instead, they should be seen as different measures, reflecting not only risk behavior itself but also network characteristics, mixing patterns, changes in the social context of drug use and the other factors mentioned above. Blower's argument 31 that stabilization of seroprevalence levels is possible without changes in behavior can be extended to incidence: a decreasing incidence does not necessarily reflect behavioral risk reduction, nor does an increasing incidence necessarily reflect increases in risk behavior. To conclude, although self-reports of injecting risk behaviors may be unreliable and are difficult to validate, they provide indispensable information next to information on the spread of infections transmitted through these risk behaviors. As Blower 31 suggests, mathematical models that are specific for a particular IDU community may be required in order to assess the epidemiological effects of certain behavioral changes.

9.3 The contribution of the low threshold methadone program to HIV prevention

No indications were found that long-term regular methadone users (LTM users) injected less often or had less injecting risk behavior than non-LTM users. Chapter 4 shows that, among drug users with a history of injecting who entered the cohort study through the low threshold methadone program, approximately 80% had injected, 35% had injected daily and 40% had borrowed in the six months preceding entry into the cohort study. When comparing LTM users with non-LTM users on these variables, no differences were found. Controlling for confounders, there was also no significant difference between the two groups with respect to HIV prevalence. Thus, no indication of a protective effect of LTM use on HIV risk was found. The study reported in chapter 2 failed to find a relationship between safe injecting and longterm contact with a methadone program; the study reported in chapter 6 failed to find a relationship between safe injecting and current daily methadone use. A study of incident HIV infections among participants in the cohort-study 32 failed to find a protective effect of daily methadone use on seroconversion rate. In view of the low average daily methadone dose (35 mg) prescribed by the low threshold methadone program, and the permitted use of other drugs, these findings are not really surprising.

The rationale for the low methadone doses in the Amsterdam program may have been unfulfilled expectations with regard to providing high dose methadone in the seventies. 33. 3 4. Through cross-tolerance, an adequate dose of methadone is supposed to block the effect of heroin. This would result in a gradual extinction of the drive to use heroin. However, Van Epen 33 reports that Dutch drug users who received 100 mg methadone daily still felt the "flash" of 10 mg morphine. Furthermore, addicts who were prescribed high doses of methadone kept using heroin on the side. Van Epen suggests that these findings were due to the relative high purity (30-50%) of Dutch street heroin, as compared to a lower purity of U.S. street heroin. However, Platt and Labate 34 mention several U.S. studies in the early seventies which also failed to find a sharp reduction of drugging and heroin use among high methadone dose maintained addicts. Based on his experience with prescribing high dose methadone, Van Epen decided to give doses so low that his clients stayed just above the level at which withdrawal symptoms would manifest themselves. Other factors which played a role in the Netherlands were resistance to high dose methadone maintenance, both among the staff of the programs and participants 3 6, .37. In the beginning of the 1970s, a number of methadone overdoses had occurred. Furthermore, staff members saw high dose maintenance as a treatment option only for those addicts who were judged hopeless cases with respect to other methods of treatment, and it was often felt that high dose maintenance in fact replaced one addiction by a more severe one. Many addicts did not want to see themselves as lifelong methadone addicts.

In the AIDS era, the main goal is to reduce injecting, rather than to stop or reduce heroin use. A study in the U.S. 38 which compared different methadone maintenance programs, found that methadone dose level has a strong negative relation to current injecting. Furthermore, an adequate methadone dosage was a much better predictor of current injecting than patient characteristics like length of addiction. Duration and quality of treatment were also important factors in reducing intravenous use. Other studies have confirmed these findings 39,40. With regard to the question of how methadone maintenance effects a reduction of injecting, Ball et al 38 stress that both the short-term pharmacological and the long-term rehabilitative aspects of methadone maintenance (i.e., counseling and other support services) are important, with high methadone doses being a necessary, but not sufficient factor, whereas rehabilitation is the sufficient factor. It can therefore be expected that a program, which provides high doses of methadone, prohibits the illicit use or 'injecting of drugs and provides - or intensifies - long-term counseling and other support services, will diminish injecting, and thereby sharing.

It needs to be noted that the findings reported in chapter 4 (and the results obtained in the study of incident HIV infections32) should be interpreted with some caution, since methadone data obtained in these studies are based on self-reports, which may be unreliable. For further studies of the effect of methadone use on injecting, sharing and HIV risk, it seems important to validate selfreport data, for example by comparison with data from the Central Methadone Registration. However, these data may also be biased, as methadone pills obtained through and registered by the program are sometimes sold in the streets.41 To test the validity of the above formulated conclusion, a possible study design would be random allocation of drug users applying for a new or a re-take in the low threshold methadone program to either the regular scheme or to a scheme such as described above. However, this would neglect the role of motivation. Another option is to offer the high dose methadone maintenance scheme to those addicts who wish to stop injecting: in the sample of HIV-negative current IDUs studied in chapter 7 this wish was reported by 16%.

9.4 Exchange program attenders versus non attenders

The first study (chapter 2) indicated that especially frequent long-term injectors participate in the exchange program. It was hypothesized that participation in the exchange program may not be exclusively dependent on the motivation to reduce one's risk. For example, as the cost of injection equipment is higher for frequent injectors, financial reasons may induce frequent injectors to participate in the exchange program more often than infrequent injectors. A later study (chapter 6) confirmed the earlier findings: especially frequent long-term injectors participated in the exchange program.
Contrary to common stereotypes, heroin users do not use heroin continuously\(^4\). The present research (chapter 6) corroborates this. Long-term heroin users reported a longest continuous period of nondependence (outside an institution) of, on average, 13 months. Results of the study reported in chapter 2 suggested that persons who are in a stopping or starting phase of their (intravenous) drug use may have objections against saving used equipment or against having a supply of new equipment. This was later partly confirmed: 16% of HIV-negative injectors reported the wish to stop injecting, and this wish was especially present among persons not participating in the exchange program (see chapter 7). These findings thus support the earlier formulated hypothesis: participation in the exchange program is not only dependent on a motivation to reduce one's risks, but also on financial motives and drug use characteristics, or on combinations of all three.

In chapter 2, exchange program attenders were found to inject more safely than nonattenders. However, in the later studies, these differences became less clear: in one study (chapter 7), a relation was found between participation in the exchange program and safe injecting, while another study (chapter 6) failed to find a significant relation, although the differences were in the expected direction. In an earlier study of risk reduction among participants in the cohort-study, Van den Hoek et al.\(^5\), conclude that the exchange program is an important starting point, but in itself not enough to produce the necessary drastic change in risk behavior; intensive counseling is also needed. This conclusion was partly based on the finding that, at intake in the cohort study, one form of needle sharing, borrowing used needles and syringes, did not decrease over the years 1985-1988, while the number of needles and syringes spread through the exchange program increased greatly in that same period. However, recent evidence suggests that drug users participating in the cohort study enter because of their increased risk\(^6\). This may go together with a relatively high and consistent level of borrowing reported at intake. Thus, self-selection of participants in the cohort study may have confounded the expected impact of the exchange program on borrowing. Another aspect of needle sharing, lending used needles and syringes to others, decreased over time, while single syringe use, indicating the availability of equipment, increased. These changes were not merely attributable to study participation (i.e., to received counseling), but were also related to time, indicating behavioral changes due to the impact of the exchange program. A recent study of incident HIV infections \(3\) failed to find a protective effect of 100% participation in the Amsterdam exchange program. However, these data suggested a time effect: exchanging of needles and syringes was protective at the beginning of the program in 1986/1987. Time effects were also suggested by two other studies, one in Amsterdam, the other in Great Britain. In Amsterdam, hepatitis B incidence declined rapidly over the years 1986-1989 \(3\). However, with regard to HIV incidence, an initial decline was found among injectors from 1986 to 1987, and after that a stabilized incidence until 1989. In England, find ings indicate a general decline in injecting risk behavior since 1987. This decline was strongest among non-exchangers, resulting in less difference between exchangers and non-exchangers over time\(^7\).

The present findings, in relation to the results obtained in the other mentioned studies, can be explained as follows. In 1984-1985, health education messages about the severity of HIV and about ways of transmission reached injectors who were most motivated to reduce their risks. These were the first clients of the exchange program. It can be assumed that the provision of health education and the distribution of new needles and syringes by the exchange program also indirectly influenced non-attenders. Although not studied in Amsterdam, English findings suggest that many attenders give new needles and syringes to friends if needed \(s\). Gradually, health education messages reached all injectors, either through the exchange program or through other prevention activities, while at the same time, the availability of free new needles and syringes increased tenfold from 1985 to 1991. At present, the motivation for risk reduction may not differ between attenders and nonattenders, as opposed to the situation at the start of the program. Furthermore, the findings indicate that frequent injectors generally exchange, while infrequent injectors mainly buy. This means that access to needles and syringes, relative to the amount and cost of those needed, is not greatly different for attenders as compared to non-attenders. To conclude, the exchange program makes one million needles and syringes freely available each year. Through taking away financial barriers, the response costs of adaptive behavior are diminished. The available evidence seems to indicate that the exchange program has contributed to reductions in injecting risk behavior and thus should be considered an important HIV prevention measure. However, the present findings also suggest that the program is especially attractive to frequent, long-term injectors and less attractive to injectors who wish to stop injecting. Since exchange program attenders differ from non-attenders, this implies that the impact of the exchange program on injecting risk behavior can no longer reliably be assessed by studying differences in risk behavior between attenders and nonattenders. It seems at present more relevant to study determinants of injecting risk behavior, both among attenders and nonattenders.
9.5 Determinants of injecting risk behavior

No indications were found for an increase in cocaine injecting or in daily injecting over the years 1985-1989 (chapter 3). Injecting cocaine by itself was rare; most IDUs injected heroin and cocaine together ("speedball"). Heroin smoking became more prevalent over the years, which, with respect to HIV prevention, can be interpreted as a favorable development. Smoking or inhaling of cocaine base (in chapter 3 indicated as cocaine freebasing) is similar to the use of crack. This behavior also became more prevalent over the studied years, but was, contrary to U.S. findings, not related to risky sexual behavior or to an increased HIV prevalence. It can be concluded that, among Amsterdam drug users, needle sharing remains the major risk factor for HIV transmission.

In line with other studies, a high level of (relatively mild) psychopathology was found among subjects. Similar to results of McKegney et al., HIV-positive drug users did not have higher levels of stress or psychopathology than HIV-negatives. Contrary to expectations, HIV-positives with psychopathology and/or stress did not report higher levels of lending, but lower. This could possibly be related to the fact that the employed GHQ-30 measures whether respondents experience themselves as problematic and unstable. Among IDUs with high GHQ-30 scores, self-esteem maintenance may cause underreporting of lending. Among HIV-negative injectors, psychopathology, but not stress, was associated with more HIV-risk injecting behavior. This is in accordance with a study by Metzger et al. among methadone-treated patients, who found that patients who continue to share needles are a more disturbed subgroup of the methadone maintenance population.

The study concerning demographic and drug use factors and HIV risk injecting behavior (chapter 6) focused on HIV-negative injectors. Although most subjects were aware of their serostatus, the main point of this analysis was to find out whether HIV-negatives with certain characteristics, regardless of knowledge of serostatus, were at increased risk. For the study of protection motivation (chapter 7), a sample was selected of HIV-seronegatives aware of their serostatus, since perceived risk can be expected to depend on this knowledge. Results of this last study show that perception of risk varies widely among HIV-negative subjects aware of their serostatus, and is related to perceived self-efficacy and to previous and subsequent risk behavior. Studies of the effect of counseling and testing on HIV risk behavior find little substantial behavioral risk reduction, and Higgins et al. suggest that this is possibly the result of too little counseling. However, the present findings suggest that risk behavior is also dependent on perception of risk. Therefore, it seems important to take cognitive factors into account in studies of the effect of testing and counseling on HIV risk behavior. Table 2 presents an overview of factors (apart from participation in the methadone or exchange program) studied as potential associates of HIV risk injecting behavior (because of earlier findings or theoretical assumptions) which were not confirmed in the present research. Several of these factors, notably a German nationality, time living in Amsterdam, duration of injecting and mainly speedball injecting, have been found as independent risk factors for HIV infection in IDUs (see Van den Hoek et al. and chapter 4). Time living in Amsterdam is also associated with a higher HIV seroconversion rate. This suggests that, rather than being related to higher levels of risk behavior, these factors are related to the earlier introduction of the virus in subgroups of injectors, to network characteristics or to other factors mentioned in section 9.2.

Factors which could be interpreted as predictive of HIV risk injecting behavior, and which were confirmed in at least one study, were the following: male sex and young age (chapter 2), psychopathology (chapter 5), previous borrowing, current cocaine injecting, long term moderate-to-heavy alcohol use, having no permanent housing (chapter 6) and a high perceived vulnerability to HIV infection (chapter 7).

In the first study (chapter 2), an indication was found that especially individuals who like to take risks (i.e., young and male drug users) inject unsafely more often. This was not replicated in the later studies, which may be due to differences in sample selection (see 1.8). Several of the other determinants of injecting

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<td>Nationality</td>
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<td>Time living in Amsterdam</td>
<td>6</td>
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<td>Having a currently injecting steady sexual partner</td>
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<td>Injecting characteristics</td>
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<td>Duration of injecting</td>
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<td>Current speedball injecting</td>
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<td>Frequency of injecting</td>
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<td>Duration of cocaine use (incl. injecting)</td>
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<td>Unrealistic optimism</td>
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Table 2: Factors studied as potential associates of HIV risk injecting behavior which were not confirmed (numbers between brackets refer to the chapter in which the study is reported).
risk behavior that were found are interrelated. Psychopathology among addicts has been found to be associated with alcoholism" 9-53. The alcohol use variable employed in the present research cannot be equated with alcoholism. However, it can be assumed that most alcoholics will fall under the category of long term moderate-to-heavy alcohol users. Excessive alcohol use among heroin users is associated with health risks, i.e. with an increased risk for a fatal overdose and with an increased general mortality54. Polydrug use and psychopathology also appear to be related 55,57. Korf and Hoogenhout41 suggest that the increase in polydrug use (especially tranquilizers and sleeping pills) among Amsterdam addicts from about 1984 on, may parallel an increase of these substances in the general population. However, according to van Brussel et al. 58 polydrug use existed from the beginning of the heroin epidemic in the Netherlands around 1972, but the abused substances changed over the years (e.g., from amphetamines in the seventies to cocaine in the late eighties). They see polydrug use as an attempt at self-medication". Van Brussel et al. report that multiple overdoses have been found to occur especially among polydrug users (of sleeping pills and alcohol) and that in many of these cases, psychiatric diagnosis and treatment seemed indicated. Results of a study by Joseph et al59 among homosexual men indicate that a high perception of risk with regard to HIV infection is associated with unsafe sexual behavior and with psychological and social distress. In the present research (chapter 7), we also found a relation between a high perceived vulnerability and unsafe injecting, which may be the result of feelings of hopelessness and/or fatalism. Finally, homelessness has been found related to psychopathology61.

To summarize, results of the present research indicate that unsafe injectors are especially alcohol and polydrug users, and subjects with (more) psychological and social (i.e. homelessness) problems. The results of a number of studies show that these characteristics are often related. In the introduction (section 1.6), drug use was described as a gradually failing attempt to cope with stressors. Evidence suggested that ineffective coping with the HIV threat could especially be expected among drug users with coexisting psychopathology. The present findings with regard to unsafe injecting behavior confirm this. Polydrug users or drug users with most psychological and social problems may share needles because of limited temptation coping skills, or because they have more problems in coping with general life strains, for example with managing to have new needle and syringes available at all times. Barriers of time and place in relation to the availability of needles and syringes can be expected to be especially problematic for these groups. Findings from chapter 7 suggest that perceptions of the HIV threat are realistic and based on previous risk behavior. However, a substantial number of IDUs appear to have given up coping adequately with the HIV threat, possibly as a result of feelings of hopelessness and/or fatalism. While the present unsafe injector may care about his or her health, the severity of the addiction together with psychological and social problems seem to determine behavior and lead to apparently 'irrational' actions. Thus, the presently existing risk behavior appears to be under limited volitional control. These findings may partly explain that, despite the early introduction of the exchange program in Amsterdam, the HIV incidence rate among participants in the cohortstudy has remained relatively high; in 1989 it was 5.5 per 100 person-years (95% confidence interval 1.7-9.4) 43.

Therefore, parallel to the "harm reduction" approach with regard to hard drug use in general, a similar approach, which makes little demand on drug users, appears at present to be most suitable with regard to HIV prevention. If the main obstacle for some injectors is the carrying around of needles and syringes, or having a supply of them at home, then the provision of bleach may be considered as an alternative, provided that these injectors do not have objections against carrying bleach or having bleach at home. As high levels of perceived risk may lead to maladaptive behavior, too much emphasis on risk seems undesirable. Health education, in particular counseling on safe use, may employ relapse prevention techniques62 to improve temptation coping skills. Other new prevention approaches may need to be developed to prevent the residual HIV risk injecting behavior. These approaches should focus in particular on IDUs who borrowed previously, on IDUs with moderate-to-heavy alcohol use, on cocaine injectors and on IDUs without permanent housing.

IDUs who do not participate in the exchange program appear to have good reasons for not participating, such as injecting infrequently, or the wish to stop injecting. This implies that trying to reach all injectors with an exchange program is not an adequate policy. Rather, facilities for buying needles and syringes, like pharmacies or vending machines, should be well spread throughout the various city districts, and vending machines should be in operation during the hours in which addicts are mainly active. For participants in the exchange program, exchange facilities should be optimized in the same way. It does not seem sensible to take away financial barriers, while at the same time leaving barriers of place and time intact.

9.6 HIV-seropositive drug users

Among HIV-seropositive current injectors, 8% (chapter 5) and 4% (chapter 8) reported lending used needles to others during a period of approximately four months. IDUs with psychopathology or high levels of stress did not report more lending than others. As discussed earlier (in section 9.2), lending may be underreported, due to a tendency to give socially desirable answers. Unsafe vaginal sex (chapter 8) was more prevalent. It was reported by 17% of the studied sample, and occurred both with injecting and non-injecting partners. Unsafe sex was not related to cognitive factors, such as attitude and selfefficacy with respect to condom use. Most unsafe vaginal sex was reported by female prostitutes (not only with clients) and by foreign drug users. Both are groups with a marginal social position. Social and cultural factors have often been found to interfere with the adoption of preventive health behaviors.

In general, the studied HIV-positive drug users reported a strong intention to use condoms and not to share needles and syringes. However, almost half of the sample thought they might infect someone with HIV in the future through sex, and one quarter of the current injectors thought this might happen through needle sharing. This suggests that these HIV-positive drug users expected to engage in unsafe sex and needle sharing in the future, despite their good intentions. While for HIV-negative drug users a motivation for self-protection is important, HIV-positive drug users need also to be motivated to protect others. An altruistic attitude may be unrealistic for drug users in a marginal social position, especially when means are scarce and maladaptive behavior is rewarded, financially or otherwise. For these reasons, it seems important, in addition to programs which aim at HIV-negative injectors or sexual partners of injectors, to provide counseling and means (i.e., needles and syringes and condoms) especially to HIV-positive drug users.

9.7 Concluding comments

The high prevalence of unsafe injecting at the start of the HIV epidemic appears to be caused mainly by scarcity of new needles and syringes, together with a lack of awareness or a small perceived threat among injectors of the infections which could be acquired through needle sharing at that time. The changes in injecting risk behavior which have taken place among injectors since 1984 suggest that a substantial amount of effective coping has occurred. When means became more easily available, together with health education, injecting risk behavior under volitional control seems to have changed rapidly. However, injecting risk behavior which is less under volitional control, and which is associated with addiction and with psychological and social problems, has remained. A wide range of measures to further diminish needle sharing has been discussed. It seems worth trying to offer drug users who wish to stop injecting high dose methadone maintenance facilities, and to develop prevention programs specifically for HIV-seropositive drug users. If a further reduction of HIV risk injecting behavior or of HIV incidence among injectors is wished for, it is recommended, in parallel to the harm reduction approach with regard to hard drug use in general, that both the threshold of health education and of other preventive measures such as the provision of needles and syringes are lowered even more than is presently the case.

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