

This is a pre-copy-editing, author-produced PDF of an article accepted for publication in Nordisk alkohol- & narkotikatidskrift with the title: Heroin smoking and heroin using trends in Norway following peer review. The definitive publisher-authenticated version Nordisk alkohol- & narkotikatidskrift 27(1) (2010) 1455-0725 is available online at: <http://nat.stakes.fi/SV/arkivet/arkivet.htm>

HEROIN SMOKING AND HEROIN USING TRENDS IN NORWAY

A study among recreational and heavy drug users

Short title: Heroin smoking in Norway

**Anne Line Bretteville-Jensen* and Astrid Skretting
SIRUS**

Number of pages: 21

Word count: 6356

Keywords: drug culture, heroin smoking, injection debut

***Address for correspondence:**

SIRUS

Post Box 565 Sentrum

0105 Oslo, Norway

Telephone: +47 22 34 04 33

Fax: +47 22 34 04 01

E-mail: alb@sirus.no

HEROIN SMOKING AND HEROIN USING TRENDS IN NORWAY

A study among recreational and heavy drug users

Abstract

The aim is to ascertain whether new ways of administering heroin have gained ground in Norway by examining three series of cross-sectional surveys (D1-D3). D1-D2 are based on postal questionnaires for which D1 is a representative sample of 15-20 year olds in Oslo (1968-2006) and D2 is a corresponding sample of 21–30 year olds (1998, 2002, 2006). D3 is based on personal interviews and consists of users of a needle-exchange service in Oslo (1993-2008). Despite a substantial rise in illegal drug use over the study period, there is no indication of increased heroin use by young people. The prevalence rates are relatively low for all heroin use (1-2%). Routes of heroin administration seem to have changed, however, as more young people (21-30 years) now report having smoked heroin and fewer report having injected the drug. There also seem to be changes in drug use patterns among current injecting drug users (IDUs). Splitting the sample by year of injection debut, we find among those starting since year 2000 i) a rise in average injection debut age of 10 years (25.6 versus 15.5 years); ii) a higher proportion with heroin smoking experience (74% versus 53%); and iii) a higher proportion having smoked heroin before injecting the drug (73% versus 16%), compared to the IDUs debuting before 1980. Consequently, the data suggest changes in drug use patterns, particularly heroin use, among recreational users and heavy drug users. So, in addition to an increase in the number of IDUs, it seems likely that the number of heroin smokers has risen too.

Introduction

Heroin separates itself from most other drugs in that the health consequences from use are more severe. In particular, use by mode of injection increases the health risks dramatically. In Norway, heroin injection is assumed to be involved in about 90 per cent of all drug related deaths (Steenftoft et al. 2001), which means that heroin has been involved in about 2150 premature deaths over the last decade. As deaths among 18–40 years old directly attributable to own drug use roughly equal deaths from cancer, AIDS, homicide and road accidents put together, heroin injection is obviously causing wide concern and public awareness. Further, drug injection also increases the risk of contracting blood-borne diseases like hepatitis C, hepatitis B and HIV and contaminated needles and incorrect injection routines are hazardous to the drug users' health. These latter problems relate to drug injection in general but heroin is the preferred drug by most Norwegian intravenous drug users (IDUs). It is also well-known that the rapidly increased tolerance for heroin and its addictive power causes huge problems socially as well as economically for the heroin users.

Heroin smoking, on the other hand, has received little public attention in Norway. Neither treatment centres, outreach workers, police nor media have offered the phenomenon much interest. Lack of public attention, however, does not necessarily mean that heroin smoking is absent from the drug scene. Given the reports from other European countries, USA and Australia (EMCDDA 2008, DASIS 2007, Darke and Hall 2003), one may expect also this form of heroin administration in Norway. Heroin is commonly smoked by inhaling the vapours produced when heroin is heated ("chasing the dragon"). According to Strang et al. (1997) "chasing the dragon" originated in or near Hong Kong in the 1950s and spread through East Asia to Europe. Of the Western industrial countries, only in the Netherlands was heroin reported to be widely administered by non-injection routes before 1980 (Diemel and Blanken 1999). In the 1980s heroin smoking gained ground in the UK (Strang et al. 1992) and some other European countries (Spain and Switzerland). It reached the US and Australia in the 1990s and appears to have increased since then (Neaigus et al. 2001; Swift et al. 1999). Smoking and other non-injecting routes of heroin administration are supposed to be substantially less harmful than injecting the drug although health damage has been reported for these consumption routes too (see e.g. Buster et al. 2002; Cygan et al. 2000).

As both the total number of heroin users as well as their routes of administering the drug affect the incidence of drug-related harm, changes in prevalence and drug using pattern will have noticeable effects. Only estimates for the size of the heroin injector group are available in Norway (Skog 1990, Bretteville-Jensen and Ødegård 1999, Amundsen and

Bretteville-Jensen and 2009). Based on a mortality multiplier method the number of IDUs was assumed to increase throughout the 1990ies until it peaked at 12,-15,000 individuals at the turn of the century. Now, the most recent estimate is 8,5-12,500 IDUs, of which about 85 per cent is assumed to inject heroin (Amundsen and Bretteville-Jensen 2009). It is of interest, however, to know whether the total population of heroin users differs widely from the estimated population of injectors and to improve our knowledge about heroin smoking. If this route of heroin administration has gained ground in the country it may in turn have consequences for prevention and treatment strategies, and heroin smoking may subsequently have an influence on the number of IDUs.

In the following we investigate possible changes in heroin use on the basis of three different data sets, two of which can be said to mainly cover probable recreational users, the third mainly heavy drug users. As new trends of drug use traditionally have started in Oslo before diffuse to other parts of the country, we will focus on data from Oslo. Data from the whole country show similar trends as those from the capital but show generally lower prevalence levels. The following section presents the data and the statistical methods applied. Our findings, which also illustrate trends in illicit drug use in the general population of young people back to 1968 and heroin smoking experience among IDUs, are set out in the third section. These findings and the cultural aspects of drug use are discussed in the final section.

Data and methods

The first data set is obtained from several representative samples of young people in Oslo aged 15–20 (D1). Postal questionnaires have been sent to 15–20 year olds annually since 1968; we examine trends in the use of illegal substances on the basis of responses to these questionnaires. In the second data set young, representative adults, aged 21–30, were targeted by postal questionnaires in 1998, 2002 and 2006 with questions aimed at eliciting a more detailed picture on personal drug use (D2). The third dataset is obtained through personal interviews with current drug injectors who were approached in the immediate vicinity of the needle exchange service in Oslo (D3). This latter data set is analysed to determine whether changes can be detected regarding heroin consumption among heavy drug users.

D1: Representative samples of young people aged 15–20.

The Norwegian Institute for Alcohol and Drug Research (SIRUS) has been conducting postal surveys on drug, alcohol and tobacco use among 15–20 year olds in Oslo for four decades

(Vedøy & Skretting 2009). Up to the mid 1990s the response rate hovered around 70 per cent, but has fallen off in recent years, and is now less than 40 per cent. The decline is probably related to the general proliferation of surveys conducted by opinion pollsters, and is quite worrying. Over the years girls have tended to answer the questionnaire more frequently than boys, which means that boys are generally underrepresented in the survey (the ratio in recent years is about 45 % for the boys and about 55 % for the girls). As there is no statistically significant difference in heroin use between the genders we have not weighted the results, however. The net sample size each year has been in the range 700–2,500 individuals.

D2: Representative samples of people aged 21-30.

In 1998, 2002 and 2006 the SIRUS survey was extended to include an additional random sample in the age range 21–30 (Lund, Skretting & Lund 2007). The samples counted 3,241, 4,561 and 2,282 individuals respectively. As the targeted group here was older, the latter two surveys included questions of a more detailed nature regarding the respondents' drug use. Even though many users are introduced to illegal intoxicants in their teens, some start after turning twenty and we expect therefore that life time prevalence rates to be higher here compared to those found in D1. In particular, if recreational use of heroin smoking has become widespread in Norway, we expect the prevalence of heroin use to be higher. As in the case of the 15–20 year olds, more women than men answered the questionnaire but again, there was no significant difference in heroin use. The response rates for the three studies are in the range of 40 to 50 per cent.

The use of questionnaires is always associated with methodological problems. One concerns the relatively low response rate. There is reason to assume that more habitual users of drugs, among them persons who regularly inject drugs, are underrepresented in the net samples both because a relatively large proportion of them are rarely found at home – and in consequence never get the questionnaire – and because those who are drug users are less inclined to fill in questionnaires than the average young person. We can therefore only expect to find consumption patterns in the general population, not those of the heavy users. That is, what we find is likely to concern the recreational use of illicit and licit drugs. On the other hand, people who do not take drugs or alcohol at all may also be underrepresented in the sample as many of those will feel that the questionnaire is not relevant to them. This may in particular apply to ethnic minorities with stronger moral resistance to drug use. Thus, both people with higher and lower drug use than average may be missing from the present sample.

Among those who do respond to such surveys there is also the problem of false negatives (people claiming not to have used illegal substances or reporting a lower consumption level or frequency than the real one) and false positives (people exaggerating their actual drug use). For phenomena with low frequency, like heroin use, the false positive is considered a bigger problem than the false negative (Skog 1992). The prevalence of false negatives are difficult to assess but the inclusion of the non-existing drug “Relevin” in the list of drugs the respondents are asked about, may give an indication of the presence of false positives. Very few reported to have used this non-existing drug (6 out of 5581 individuals in the age group 15-20 and 15 out of 6837 individuals in the 21-30 age group). The very low number of “Relevin-users” suggests that false positives is not a pervasive problem in this data.

D3: Interviews with current drug injectors

As the prevalence of heroin smoking among the general population of youths is expected to be relatively low, additional data sources are examined. Relevant data are rare, however. In Norway there is, for instance, no systematic differential monitoring of heroin administration methods among people seeking treatment. To compensate, therefore, we examine heroin smoking experience among current drug injectors. Current injectors' experience with heroin smoking and transition from smoking to injecting may shed some light on developments in heroin smoking in this country.

Since 1993, personal interviews with people attending the needle exchange service (NES) in Oslo have been conducted on a regular basis (first 4, then 2 sessions a year) (Bretteville-Jensen 2005). All respondent have been asked about alternative routes of heroin administration although more detailed questions regarding heroin smoking and initiation of heroin use were not added to the questionnaire before 1999. Still, more than 2200 interviews using the extended questionnaire have been conducted. 2–4 interviewers work 2–3 nights during each data collecting session and people are approached after they have used the needle exchange service. On each session as many IDUs as possible are asked to participate, but it is impossible to ask everyone as people often come and leave in groups. As the interviewees' identity is not recorded it is not possible to recognise them from one interview session to the next. Some individuals may therefore have been interviewed more than once, but precautions are taken to prevent this from happening during the same interview session. The mean age of the whole sample is 32.7 (30.4 for females and 33.8 for males). The youngest was 16 years old and the oldest 62. Females constitute 31 per cent of the sample.

It is difficult to substantiate the representativeness of the current sample. Comparison of variables like gender and age distribution, etc. with what is known about this group from other studies, suggests, however, that the sample is fairly representative of IDUs in the Oslo area (for more details see Bretteville-Jensen 2003).

Method

We apply the non-parametric Mann-Whitney test with the α -level set to 5 per cent to compare groups of users.

Results

We want first to establish whether any substantial changes in young people's heroin use has taken place. If it has, it will be a first indication of a rise in heroin smoking prevalence. We therefore examine long-term trends among the youngest age group (D1). People often start using drugs in their teens and we may therefore detect new modes of drug use by asking people aged 15 to 20. The prevalence of heroin use has been registered since 1977 (cannabis use since 1968).

(Figure 1 about here)

Over the 30 years heroin data has been collected, the life time prevalence of heroin use, either by injection or smoking, has remained relatively low and varied between 1–2 per cent (Figure 1). Hence, heroin use, and heroin smoking in particular, does not appear to have gained a foothold among "normal" youngsters in Oslo. More information has been available since 1998, and among those who claim to have tried the drug since then ($n=115$), 9 out of 10 state to have smoked heroin ($n=115$) and about one quarter of these report to also have injected the drug. Very few of the heroin users have only used it by injecting. Use of other illicit drugs in this age group, however, has varied substantially over the study period with cannabis reaching an all time high in 2000 when 28.6 per cent reported to have ever tried the drug. In 2008 the cannabis prevalence has dropped to 17 per cent. The prevalence for each of the other illicit drugs has also varied over the study period but never exceeded seven per cent.

One could expect heroin smoking to be more prevalent among people over their teens, but this is not confirmed by the data from people aged 21–30, see Figure 2.

(Figure 2 about here).

In 1998 1.1 per cent of the young adults reported to have tried heroin and in 2006 this share had increased to 1.6 per cent ($p < 0.08$). Figure 2 reveals that the route of administering the drug had changed as less people report to have injected the drug (0.8 in 1998 compared to 0.4 in 2002 and 2006, $p < 0.001$) The heroin smoking rate has increased from 0.3 to 1.5 per cent from 1998 to 2006 ($p < 0.001$). Nevertheless, the figures remain low and do not suggest that heroin smoking has become particularly widespread among young Norwegians in general. It might indicate, however, the start of an increasing trend. And further, if the figure of 1.5 per cent is the true value for this age group, it means that more than 8,500 young adults aged 21 to 30 years in 2006 had heroin smoking experience.

In order to increase our knowledge, heroin users in D2 were in the 2002 and 2006 surveys also asked about their age of debut, the total number of using occasions and using occasions the previous six months. In addition, every respondent was asked whether they would have tried heroin given that they didn't run the risk of being arrested for it. The average age of initiation in the sample of 2002/2006 was almost similar for heroin injection and smoking (19.8 and 20.4 years, respectively). The majority of those who report heroin smoking stated to have smoked it less than five times (54%, $n=98$) and 14 per cent reported to have smoked it more than 50 times. This pattern differed from the few with heroin injecting experience ($n=29$) for whom the majority stated to have injected the drug more than fifty times (57%) and 12 per cent had injected less than 5 times. When asking all respondents ($n=6,843$), very few stated that they would try the drug even if there was no risk for arrest (0.6%). We also note, as expected, that these young adults report higher life time prevalence for most drugs than the 15–20 age group, and the rates has grown between 1998 and 2006. In 2006, 47 per cent stated they had tried cannabis at least once and about 13 per cent had tried amphetamine and/or cocaine. The prevalence of ecstasy and LSD use is also higher here than among the 15–20 sample.

The data collected among current IDUs (D3) confirm that many have heroin smoking experience and show interesting changes in modes of heroin use over time. Focusing on the possible spread of heroin smoking we first examine whether current injectors have tried this route of heroin administration. Out of 2,089 heroin users interviewed between 1999 and 2008, 66 per cent reported heroin smoking experience and 43 per cent had either smoked or sniffed it at their first use of the drug (Table 1). The average age of smoking initiation is 23.5 years which is higher than the sample's initiation age for injection (19.4 years). Only one third of

current heroin injectors state to have injected heroin in their first “shot”, while about 60 per cent reported amphetamine, 7 per cent morphine and 2 per cent “other drugs”, respectively. Since September 2006, heroin users have also been asked about recent modes of heroin administration. Of the 378 heroin injectors interviewed in the 2006-2008 period, 21 per cent report to have smoked the drug in addition to injecting it during the four weeks leading up to the interview.

To get an impression of developments in heroin smoking over time, we subdivided the current injectors by year of injection debut. The mode of heroin use seems to have changed among the current drug injectors. Alongside with an increased proportion of injectors with heroin smoking experience, there is a change in how new heroin users administrate the drug. Among those who started their injecting career before 1980, 53 per cent have ever smoked the drug whereas the corresponding number within the group who started to inject since year 2000 is 74 per cent. A more dramatic change is seen for the mode of first heroin use. Relatively few report to have smoked heroin before injecting it among those who started to inject in the 1970ies compared to those who have started to inject more recently (16 versus 73 per cent).

(Table 1 about here)

The information supplied by 1,467 respondents regarding heroin smoking debut age, reveals that also the average debut age for heroin smoking has fallen from 27.9 in the group starting to inject before 1980 to 23.3 in the group starting to inject most recently. As can be seen in Table 1 the debut age was even lower among those who started to inject in the first part of the 1990s. One half of those who started to inject drug before 1980 had passed 30 years of age the first time they smoked heroin, whereas the same was true for only one out of six for those who started to inject after 2000. The average age of injection debut has, on the other hand, risen by 10 years from the 1970s to the last few years. Thirty per cent of those who started to inject since 2000 were 30 or older as against less than 1 per cent of the group starting before 1980. There is a twelve years age difference between heroin smoking and initiation of drug injection among those who started to inject in the 1970ies (27.9 versus 15.5 years). In comparison, the difference since year 2000 is switched so that drug injectors are on average older when they start to inject than when they smoke heroin for the first time (23.3 versus 25.6 years).

It is interesting to note the difference in heroin use also when it comes to what drug that is consumed at the injection debut. Heroin did probably only become available in Norway some time after 1970 (the first heroin seizures are registered in 1974, Bryhni 2008). Very few of those starting to inject drugs back then report to have started with heroin (8%), which is in contrast to people starting more recently for whom heroin has become more common than amphetamine. So, simultaneously to drug injectors being more familiar with heroin smoking also more users start their injecting career with heroin.

Data from current heroin injectors provide additional relevant information concerning changes in heroin use patterns, namely the prices of different drugs and quantities. Figure 3 illustrates the falling trend in heroin prices from 1993 to 2008.

(Figure 3 about here)

The median gram price is calculated on the basis of prices demanded for the smallest unit sold at the street level and for one half gram of heroin. Both price series are adjusted for CPI (1998=100). The prices for both quantities have dropped substantially and the figure illustrates the large price difference that existed between the two quantities before 1998. Brown heroin (heroin base), well suited for heroin smoking, has dominated the Norwegian heroin market all through the study period. Injectors heat the heroin with acid to produce an injectable substance. A fall in heroin prices is also observed elsewhere in Europe (EMCDDA 2008).

Discussion

Patterns of drug use change over time. National differences in the diffusion of new trends in drug using cultures are interesting inasmuch as their understanding could help improve the planning and implementation of prevention and harm reduction strategies. The introduction of a new route of administering heroin intake will increase the total number of heroin users if it attracts users who would not otherwise have started with heroin. Further, it may affect the number of IDUs. If people who otherwise would have injected now smoke the drug or if former injectors switch to heroin smoking, the number of IDUs will decrease. Alternatively, if more people initiate heroin use because they can smoke it and then subsequently go on to also inject drugs, the number of IDUs will increase after the introduction of heroin smoking in the country.

Ideally, to picture heroin smoking and its development in Norway we should have had better prevalence data and interviews with current heroin smokers. Unfortunately, for reasons mentioned earlier, our general surveys may underestimate the actual prevalence figures and there is, of course, no register of heroin smokers to help us get in touch with them. We therefore need to treat the available data with some caution and use alternative data from less ideal sources to analyse heroin smoking in Norway.

The postal questionnaires sent to young people aged 15–20 (D1) indicate no increased heroin use over the 30 years that registrations have been made. Although we see a rise in the use of amphetamine, cocaine, ecstasy and, in particular, cannabis, during the same period the prevalence of heroin use has remained remarkably stable, and at a relatively low level. There are no indications of an emerging heroin smoking culture among them either. As mentioned above, however, the prevalence rates shown in Figure 1 may be inaccurate due to the relatively low response rate and the (unknown) effect of selection mechanisms. The very low number of people reporting “Relevin” suggests little problems with false positives. Still, it is possible that heroin use patterns among Norwegian youngsters have changed without it being reflected in our present sample's prevalence rates. The fact that roughly every fourth youngster in the sample did admit illegal drug use indicate, however, that recreational users respond to postal surveys, and admitting heroin use is perhaps not much different from admitting use of other types of drugs. This may suggest that the stability in reported heroin use could be close to actual pattern among the respondents. The prevalence level should perhaps be treated with more caution, however.

The second data set (D2: three surveys among 21–30 years old) offers correspondingly low prevalence rates for heroin use. Very few report heroin using experience (1.6% in 2006 which was roughly similar to the prevalence of 1.1% in 1998). Still, the data indicates changes in the routes of administering the heroin. More heroin users claimed in 1998 to have injected than smoked the drug whereas the opposite was the case in 2006. Among the few heroin users heroin smoking seems to replace injection as there has been a significant increase in heroin smoking and a significant decrease in the prevalence of heroin injection from 1998 to 2006. With 47 per cent in 2006 reporting lifetime cannabis experience also recreational drug users in this age group seems to respond to postal surveys. The same precautions as mentioned above apply also here, however.

The data obtained from current drug injectors (D3) give further indications of changes in administering heroin. We see a rise in the rate of IDUs reporting having smoked heroin at all and who smoked the drug before their first injection with recency of injection debut. Also,

more people in the group that started their injection career recently injected heroin the first time they injected drugs. This changing drug use pattern finds further evidence in the sharp increase in the injection debut age of the drug injecting respondents. The debut age of 15.7 for those starting back in the 1970s seems very low and may have been affected by the selection mechanism. Other contemporary studies tend to corroborate, however, a much lower debut age in those days (Skretting and Skog 1989; Arner et al. 1995; Lauritzen et. Al 1997). Analyses of D3 can, of course, not answer whether there has been an increase in the total number of heroin users and heroin smokers, but the data clearly suggest changes in heroin use among heavy drug users in Norway.

The findings from the different data sets indicate that heroin smoking has become more widespread also in Norway. The overall prevalence of recreational heroin use (based on the D1 and D2 surveys) seems relatively low but most users report to smoke, not inject the drug. The population survey among 21-30 year olds further suggests an increasing prevalence of heroin smoking. The results based on D3 illustrate that smoking is a route of heroin administration well known to current drug injectors. When taking account of the weaknesses inherent in the data sets employed, it seems probable that, in addition to the growth in IDUs since 1990 and their extended experience with heroin smoking, there has been an increase also in the number of additional heroin users over the last decade.

There are various factors that support this claim. Historically, the price of heroin has been relatively high in Norway and may partly explain the present culture of drug injecting. As Figure 3 illustrates, however, the price fall since 1993 has been substantial, and may have made alternative and less efficient routes of heroin administration more economically viable. Heroin smoking is less efficient than injecting and the user needs about three times the amount of heroin to get the same "high". Hence, a heroin user who injected the drug in 1993 could switch to smoking a few years later and obtain the same level of intoxication without raising his/her drug expenditure. Heroin has also become relatively cheaper than other drugs; the price of amphetamine has not fallen as steeply and other drugs like non-prescribed benzodiazepines have become more expensive over the period. Hence, the fall in prices has made increased heroin smoking more probable.

The increasing prevalence rates for other drugs in D1 and D2 indicate that there is a recreational drug using culture in Norway. The relatively high prevalence of cannabis use is itself worrying with respect to future heroin use, if we give credence to the "gateway" or the "stepping-stone" hypotheses, where the use of a soft drug like cannabis is supposed to increase the risk of becoming a hard drug user. (see e.g. Kandel et al 2002). An increasing

number of studies have found support for the gateway theory, even after controlling for individual differences in proneness and availability (physically, culturally and economically) and employ statistical methods that also take unobserved factors into account (e.g. Fergusson et al. 2006, Bretteville-Jensen et al. 2008, Melberg et al. 2009). Not every gateway study, however, have found a substantially increased risk of subsequent hard drug use (Pudney 2003, van Ours 2003).

Further, new drugs have been introduced in recent years (for instance various forms of ecstasy and GHB). We are seeing a liberalisation of attitudes in general towards intoxicants with more Norwegians in favour of legalising cannabis and in opposition to the present system of wine and spirit monopolies than previously (Bryhni 2008; Østhus 2005). There is an increased cultural influence from abroad as more people travel more widely, more people have access to foreign TV channels and so forth. Hence, changes in drug use and administration elsewhere in Western societies will also affect the drug using culture in Norway. Increased prevalence of heroin smoking might be an expected consequence.

Given these changes, one could ask why heroin smoking is not more widespread than it seems to be and why it did not happen earlier. One reason may be the absence of influential ethnic minority groups with a tradition of heroin smoking. The role of emigrants from Surinam is held to be an important factor behind developments in the Netherlands (Grund and Blanken 1993), and in Great Britain large communities are made up of immigrants from its former colonies. Since the 1970s the population of people from Asia, and Pakistan in particular, has grown in Norway. To the extent that these immigrants partake of a heroin smoking culture, it seems to have had little effect on Norwegian drug users, as there are few non-ethnic Norwegians either of first or second generation among the total population of (known) heavy drug users in Norway. Another factor that might have contributed to the development of less and later heroin smoking, is the low HIV prevalence among Norwegian IDUs (Miller et al. 2001). Some have claimed that the increased popularity of heroin smoking coincided with increased awareness of HIV and AIDS and that heroin smoking could be seen as a timely response (Des Jarlais et al. 1994). We would suggest, however, that fear of HIV/AIDS has probably not been a particularly strong motivational factor in Norway as only about 4 per cent of IDUs are HIV-infected according to recent estimates (Miller et al. 2001) and 10 to 15 IDUs on average are annually registered with the infection (Hordvin 2008).

National governments have only a small and indirect influence on drug using cultures, including obviously the "new" heroin smoking trend. Whether heroin smoking would be welcomed if it replaced the more risky business of injecting the drug is another question,

however. Although heroin smoking does have adverse health effects, the reduced risk of dying from an overdose would probably be to its advantage. On the other hand, a rise in heroin smoking might subsequently lead to higher heroin injecting rates, and we cannot reject the possibility that such transactions in part can explain the Norwegian increase in IDUs. Three out of four of those who started to inject after 2000 had smoked heroin before they injected the drug. What we don't know however, is whether heroin smoking was just another step along an already established route to heavy drug use or whether individuals who otherwise may not have started to inject may have been prompted to do so after smoking the drug. More research is needed to understand changes in drug using cultures and to increase our knowledge of heroin smokers in particular.

References:

Amundsen, EJ, Bretteville-Jensen AL, Kraus L: Estimation of prevalence and incidence of intravenous drug users applying the mortality multiplier method – the Oslo/Norway case 1981-2006, Manuscript, SIRUS, 2009

Arner O, Lauritzen G, Waal H & Amundsen A: Forprosjekt til en nasjonal studie av stoffmisbrukere i behandling (Pilot for a national study of drug abusers in treatment). Norwegian Institute for Alcohol and Drug Research, 1995, Oslo, Report no. 3/95.

Bretteville-Jensen AL: Understanding the demand for illicit drugs: An empirical approach based on self-reported data, thesis, Department of Economics, University of Bergen, 2003.

Bretteville-Jensen AL: Økonomiske aspekter ved sprøytemisbrukeres forbruk av rusmidler. En analyse av intervjuer foretatt 1993-2004. (Economical aspects regarding IDUs consumption of drugs. Interviews 1993-2004), Norwegian Institute for Alcohol and Drug Research, 2005, Oslo, Report no. 4/2005.

Bretteville-Jensen, AL, Melberg, HO Jones, AM: A sequential pattern of drug use initiation – can we believe in the gateway theory? *The B.E Journal of Economic Analysis & Policy* 2008; 8(2) (Contributions), Article 1.

Bretteville-Jensen AL, Ødegård E: Injeksjonsmisbrukere i Norge (Intravenous drug users in Norway), Norwegian Institute for Alcohol and Drug Research, 1999, Oslo, Report no. 4/99.

Bryhni A (ed.): *Alcohol and Drugs in Norway*, Norwegian Institute for Alcohol and Drug Research, Oslo 2008.

Buster MCA, Rook L, van Brussel HA, van Ree J, van der Brink W: Chasing the dragon related to impaired lung function among heroin users, *Drug and Alcohol Dependence* 2002; 68: 221-228.

Cygan J, Trunsky M, Cobridge T: Inhaled heroin-induced status asthmaticus; five cases and a review from literature, *Chest* 2000; 117: 272-275.

Darke S and Hall W: Heroin overdose: Research and evidence-based intervention, *Journal of Urban Health* 2003; 80: 189-200.

DASIS: Heroin – Changes in how it is used: 1995-2005, Substance Abuse and Mental Health Services Administration Report, Office of Applied Studies, Rockville, MD, 2007.

Des Jarlais DC, Friedman SR: AIDS and the use of injected drugs, *Scientific American* 1994: Febr. 56-62.

Diemel S, Blanken P: Tracking new trends in drug use, *Journal of Drug Issues* 1999; 29(3): 529-548.

EMCDDA: Annual report on the state of the drugs problem in the European Union and Norway. European Monitoring Centre for Drugs and Drug Addiction, Lisbon, Portugal, 2008.

Fergusson DM., Boden JM, Horwood LJ (2006) Cannabis use and other illicit drug use: testing the cannabis gateway hypothesis. *Addiction* 101:556-569

Grund J-P, Blanken P: From chasing the Dragon to Chinezon. The Diffusion of Heroin Smoking in the Netherlands. CIP-Gegevens Koninklijke Bibliotheek: The Haag, 1993.

Hordvin O (ed): The drug situation in Norway 2008, Annual report to the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), SIRUS, Oslo 2009.

Kandel, D.B (ed.), 2002. Stages and pathways of drug involvement: Examining the gateway hypothesis. Cambridge, England: Cambridge University Press.

Lauritzen G, Waal H, Amundsen A, Arner O: A national study of Norwegian drug abusers in treatment. Methods and findings. *Nordic Studies on Alcohol and Drugs (NAT)* 1997; 14: 43-63.

Lund M. Ø, Skretting A, Lund K. Rusmiddelbruk blant unge voksne, 21-30 år. Resultater fra spørreskjemaundersøkelser 1998, 2002 og 2006. (Use of Alcohol and other drugs among young adults, 21-30 years. Surveys 1998, 2002 and 2006). Norwegian Institute for Alcohol and Drug Research 2007. Report no. 8/2007.

Melberg, HO, Jones AM and Bretteville-Jensen, AL: Is cannabis a gateway to hard drugs? *Empirical Economics* 2009 (in press)

Miller M, Eskild A, Mella I, Moi H, Magnus P: Gender differences in syringe exchange program use in Oslo, Norway. *Addiction* 2001; 96(11): 1639-1651.

Neaigus A, Miller M, Friedman SR, Hagen DL, Sifaneck SJ, Ildefonso G, Des Jarlais DC: Potential risk factors for the transition to injecting among non-injecting heroin users: a comparison of former injectors and never injectors, *Addiction* 2001; 96: 847-860.

Pudney S: The road to ruin? Sequences of initiation to drug use and crime in Britain, *Economic Journal* 2003; 113(486): C182-C198.

Skog O-J: Utviklingen av intravenøst misbruk i Norge. Anslag for insidens og prevalens (The development for intravenous drug abuse in Norway. Estimates for incidence and prevalence), Sifa report no. 1/90, National Institute for Alcohol and Drug Research, Oslo, 1990.

Skog O-J: The validity of self-reported drug use, *British Journal of Addiction* 1992; 87: 539-548.

Skretting A, Skog O-J: The Norwegian Injection Mark Study, *British Journal of Addiction* 1989; 84: 1021-1027.

Strang J, Griffiths P, Powis B, Gossop M: First use of heroin: changes in route of administration over time, *British Medical Journal* 1992; 304: 1222-3.

Strang J, Griffiths P, Gossop M: Heroin smoking by "chasing the dragon": origins and history, *Addiction* 1997; 92(6): 673-683.

Steentoft A, Teige B, Ceder G, Vuori E, Kristiansson J, Simonson KW, Holmgren P, Wethe G, Kaa E: Fatal poisoning in drug addicts in the Nordic countries, *Forensic Science International* 2001; 123: 63-69.

Swift W, Maher L, Sunjic S: Transitions between routes of heroin administration: a study of Caucasian and Indochinese heroin users in south-western Sydney, Australia, *Addiction* 1999; 94(1): 71-82.

van Ours J: Is cannabis a stepping-stone for cocaine? *Journal of Health Economics* 2003; 22: 539-554.

Vedøy TF, Skretting A: Ungdom og rusmidler. Resultater fra spørreskjemaundersøkelser 1968-2008. (Substance use among young people. Surveys 1968-2008). Norwegian Institute for Alcohol and Drug Research, Oslo 2009. Report no. 4/2009.

Østhus S: Befolkningens holdninger til alkoholpolitikken (Inhabitants' attitudes to the alcohol policy), SIRUS report no 3/2005, Norwegian institute for Alcohol and Drug Research, Oslo 2005.

Figure 1. The percentage of people aged 15–20 in Oslo reporting to have used heroin and cannabis (three years moving average).

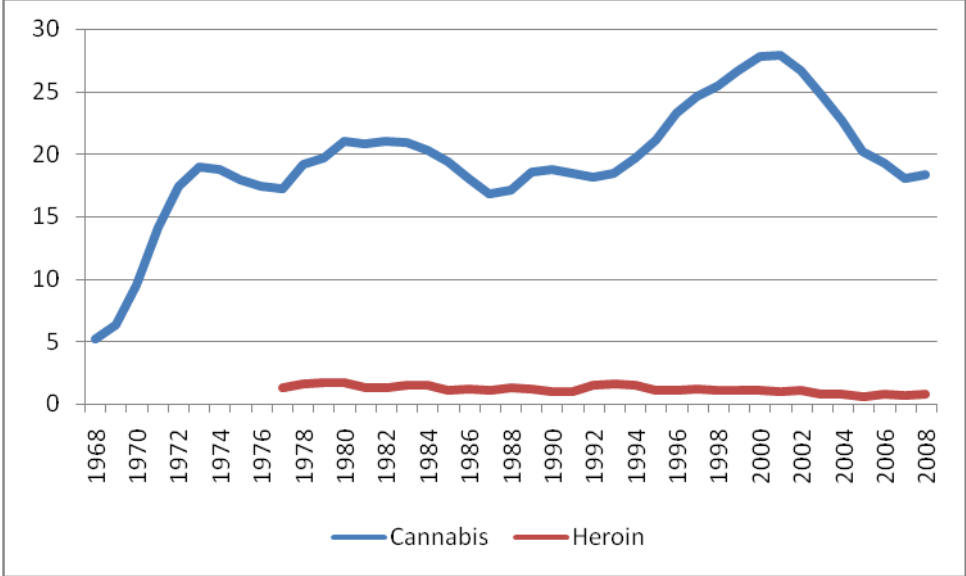


Figure 2. The percentage of people aged 21–30 in Oslo reporting to have smoked heroin and injected heroin, 1998-2006.

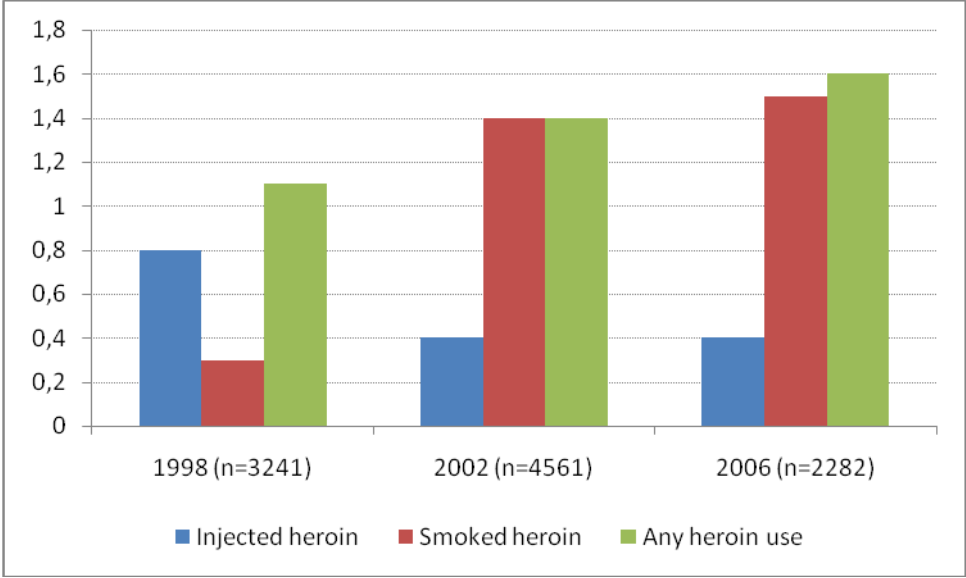


Figure 3. Median gram price for heroin based on small units and 1/2 grams, CPI adjusted. 1993-2008.

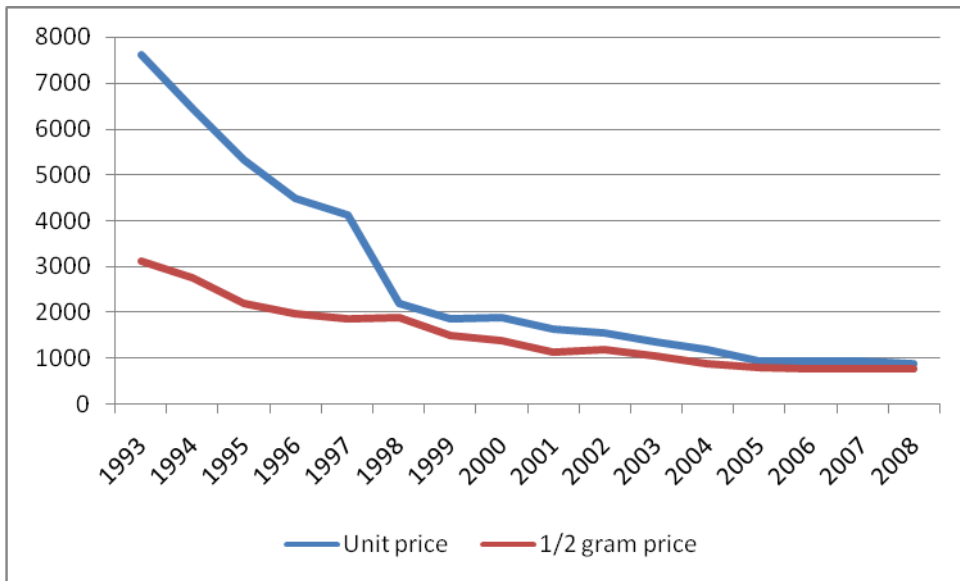


Table 1. Age of injection debut and injectors' experience of heroin smoking and use based on interviews conducted from 1999 to 2008 and grouped according to year of injection debut. Sample sizes in parentheses.

	Year of injection debut				
	In total	Before 1980	1980-1989	1990-1999	2000-2008
Per cent of sample with heroin smoking experience	66 (2089)	53 (334)	66 (452)	72 (274)	74 (319)
Smoked or sniffed heroin on their first heroin use	43 (2028)	16 (324)	33 (434)	58 (264)	73 (302)
Average debut age for heroin smoking	23.5 (1467)	27.9 (184)	23.2 (292)	21.8 (202)	23.3 (229)
Average debut age for injection	19.4 (2081)	15.5 (466)	17.4 (613)	21.6 (771)	25.6 (228)
What drug in first injection					
Heroin	32	8	26	37	52
Amphetamine	59	70	67	49	42
Morphine	7	20	5	3	4
Other drugs	2	3	2	2	3
	(1514)	(314)	(396)	(573)	(223)