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**Diversion of Methadone and Buprenorphine by Patients
in Opioid Substitution Treatment in Sweden:
Prevalence Estimates and Risk Factors**

Björn Johnson

(corresponding author)

Ph.D., Senior Lecturer

Department of Social Work

Malmö University

Email: bjorn.johnson@mah.se

Phone +46 40 6657690

Torkel Richert

Doct. Cand.

Department of Social Work

Malmö University

Email: torkel.richert@mah.se

Abstract

Background

Diversion—patients who sell or share their medication—is a hotly debated but relatively unresearched phenomenon. We have investigated the prevalence of self-reported diversion of methadone and buprenorphine at OST programs in Sweden. We have also examined if demographic, treatment, and social factors can be associated with an increased risk of diversion.

Methods

Structured interviews were conducted with 411 patients from eleven OST programs. A standardized questionnaire with 106 close- and five open-ended questions were used. 280 interviews were done on site, by the researchers, while 131 interviews were conducted by specially trained patients through privileged access interviewing. The data were analyzed through frequency- and averages-calculations, cross-tabulations, and logistic regression analysis.

Results

In total, 24.1% (n=99) of the patients reported diversion in the past month. 67.6% (n=277) stated that they had diverted at some point. The peer interviews showed significantly higher levels of diversion (37.4% past month) compared with the researcher interviews (17.2%). Neither demographic factors, dosages, nor collection routines were associated with diversion. The likelihood of diversion was higher for patients on mono-buprenorphine (OR=5.64) and buprenorphine-naloxone (OR=2.10), than among methadone patients. Other factors which increased the likelihood of diversion were current illicit drug use (OR=5.60), having had

patients as a primary source of illicit methadone or buprenorphine prior to treatment (OR=3.39), and mainly socializing with active drug users (OR=2.12).

Conclusion

Self-reported diversion was considerably higher than in previous studies. This is most likely due to the new methodological strategy we used, but may also partly be explained by low availability of OST in Sweden, leading to a high demand for the substances by heroin users outside treatment. Efforts to decrease diversion should primarily focus on psychosocial and lifestyle-changing interventions, and expanded access to treatment, rather than on control measures.

Keywords

methadone; buprenorphine; diversion; illicit use; opioid substitution treatment

Diversion of Methadone and Buprenorphine by Patients in Opioid Substitution Treatment in Sweden: Prevalence Estimates and Risk Factors

1 Introduction

Dependence on heroin or other opiates is a condition which is difficult to treat. Research has been unable to point to any clear evidence of lasting effects of medication-free treatment. The dominant treatment method is opioid substitution treatment (OST) with methadone or buprenorphine, the latter often combined with naloxone. Metastudies show that OST is effective in light of factors such as mortality, morbidity, illicit drug use, and criminality.¹⁻³

OST also carries risks. Methadone is a strong respiratory depressant, potentially fatal for individuals without sufficient tolerance.^{4,5} Buprenorphine is less potent, but if mixed with alcohol or sedatives there is a risk of polydrug intoxication.⁶ Both medications have high abuse potential and are sought after on the illicit drug market. Diversion—here defined as patients selling or sharing part or all of their medication—is therefore a significant risk. In several countries diversion has been linked to an increase in methadone-related fatalities and in extensive illicit use of buprenorphine.⁷⁻¹⁰

Measures have been taken to reduce these risks, such as developing safer versions of the medications.¹¹ The first one to reach the market was Subuxone, a sublingual tablet where buprenorphine was combined with the opioid antagonist naloxone, which reduces the potential for abuse. Buprenorphine-naloxone is now also available as a sublingual film.

In the research on diversion and illicit, three main strands emerge. One strand concerns illicit use, and the demand for methadone and buprenorphine on the illicit market. Illicit use of methadone and buprenorphine is common among opioid-dependent individuals. Lifetime prevalence of illicit methadone use among intravenous drug users outside treatment has varied

between 17% and 95% in different studies, but high prevalence is the rule rather than the exception.¹²⁻¹⁵ Illicit buprenorphine use is prevalent, as well,¹⁶⁻¹⁷ and in some countries this substance has become the most common opioid on the illicit market.¹⁷⁻¹⁹

Methadone and buprenorphine typically enter a user's drug career at a late stage, and they are rare among younger people, unless they have already developed severe drug problems.²⁰ The substances are mainly used by people with a long-standing opioid addiction. Very often these users are not in treatment, and employ them to avoid withdrawal symptoms, or as a means of performing self-detoxification, or managing substitution treatment on their own.^{14,16,20-24} However, among them are also OST patients dissatisfied with their prescribed doses.^{24,25} In addition, the substances are used for euphoria-inducing purposes, typically as part of a polydrug use.²⁰

The second strand of research is looking at the negative consequences of illicit use, mainly in the form of methadone- and buprenorphine-related mortality among users not in treatment.^{6,8,26-32} The majority of such fatalities are caused by polyintoxication involving a broad array of different substances, often sedatives and alcohol.^{6,29,31,32} Such deaths have made up a significant percentage of the opioid-related mortality in some countries, not least Sweden; since 2011 the combined number of methadone- and buprenorphine-related fatalities have exceeded heroin-related deaths.

Nevertheless, potential advantages to illicit use have been indicated, particularly in connection with heroin use. Harris and Rhodes argued that illicit methadone use may serve as a 'protection strategy' enabling people with an opioid dependence to control their drug use, improve social relations, and protect themselves against hepatitis C.³³ This is the case also for buprenorphine.^{17,34}

The third and final strand concerns the supply side; how the substances end up on the illicit market, and how common it is for OST patients to sell or share their medication. This is also

the main subject for our study, and therefore we will start by discussing previous research in greater detail.

Empirical evidence on the extent of diversion among OST-patients is not, however, available to any significant degree. In our research review we have identified only five peer-reviewed cross-sectional studies^{24,35–38} (see Table 1).

All the studies are self-report studies in which structured interviews or questionnaires were used. The proportion of patients who reported that they had at some point sold or shared varies from 9.6% to 34% in these studies. The one-year prevalence varies from 4.3% to 23.8%. Only one study measured diversion in the past month. There, 4% admitted to having shared, 2% to having sold, and 1% to having traded their methadone.³⁸ No study accounts for how great a proportion of the medication was diverted, but Spunt and colleagues categorized 10% of the patients as ‘regular diverters’.²⁴

The research accounts for few demographic and treatment-related factors associated with self-reported diversion. In two studies comparing substances, prevalence was markedly higher for buprenorphine than for methadone.^{35,36} Strict collection routines and supervised dosing were associated with lower levels of diversion in two studies,^{36,37} whereas two other studies found no such link.^{24,35} Personal experience of illicit use of methadone or buprenorphine was associated with an increased risk in two studies.^{35,36} One study found significant differences in the levels of diversion between countries.³⁷

Methodologically there is reason to question some of the aforementioned findings. Admitting use of methadone or buprenorphine outside treatment is unproblematic for most drug users, and as we have seen the prevalence of such use is often very high. However, the low numbers which have been reported for diversion may indicate disadvantages with this type of self-reported data. To tell a researcher that you have diverted your medication may be a delicate issue, even if you trust the researcher’s promises of confidentiality. Where the interviews take

place may also influence the answers—Duffy and Baldwin discovered that interviewees who had been recruited in clinics reported significantly lower diversion (11% in the past year) than those recruited elsewhere (28%).³⁸ Questionnaires also constitute a problematic data-gathering method, partly because of the risk of biased selection, as well as respondents' doubts regarding confidentiality since the honorarium is paid out afterwards.

The aim of this study is to examine the prevalence of self-reported diversion of methadone and buprenorphine in OST programs in the south of Sweden. We also investigate if demographic, treatment-related, or social factors can be linked to an increased risk of diversion. In order to assess the reliability of previous research we have used two different data-gathering methods: on-site interviews carried out by the researchers and peer interviews done by specially trained patients, so called 'privileged access interviewing'. The hypothesis is that the peer-interviewers, by virtue of being 'insiders' with personal experience of both drug use and treatment, may be able to obtain more honest answers to sensitive questions.

2 Methodology

2.1 Participants and Recruitment

A total of 411 participants (219 on methadone and 192 on buprenorphine) were recruited from nine public and two private OST programs in five cities and towns in southern Sweden.

Structured interviews were conducted between May and December of 2012. The inclusion criterion was that participants had been enrolled in OST for at least four weeks.

We utilized two different data-gathering methods: on-site interviews carried out by researchers and peer interviews done by patients. The on-site interviews (n=280) were conducted in five locations by the project coordinators, Johnson and Richert, and three project assistants. Posters were put up in the clinics one to two weeks before our arrival. Written

information and scheduling lists were left with a secretary. We then spent two to ten workdays at each program, carrying out scheduled interviews and recruiting additional participants among the visitors.

The peer interviews (n=131) were carried out in the two largest cities, in the form of ‘privileged-access interviewing’,³⁹⁻⁴¹ by nine specially trained patients. The interviewers, five women and four men, were all stable in their recovery and had extensive contact networks comprising various groups of patients. In one city we asked an acquaintance who was employed by the local OST program for suggestions of four individuals, whom we first interviewed and then asked if they would be interested in working on the project. In the other city we recruited five of the patients we had interviewed and of whom we had formed a favorable impression. All interviewers—the peer-interviewers as well as the project assistants—underwent training during which they were taught how to present the project and carry out the interviews.

The peer interviewers recruited interviewees from their respective social networks and conducted the interviews in various sites outside the programs—in homes, cafes, parks etc. Johnson and Richert had ongoing feedback sessions with the interviewers during the data-gathering phase.

2.2 Procedure

The interviews were conducted with a standardized questionnaire which we developed in collaboration with fellow researchers and representatives of the Swedish Drug Users Union. The questionnaire consisted of 106 close- and five open-ended questions which covered the following areas: demographic information, social situation, drug use (historical and current), experience of illicit use of OST medication, treatment experiences, views on their current

OST, opinions on diversion and, finally, personal experience of diversion. The interviews lasted 60 minutes on average.

Before the interviews the participants received oral and written information about the project and its aims. We explained that the study was completely confidential, that participation would not influence individual treatment, and that participants could choose to end the interview at any time. Participants were offered a gift voucher worth SEK 200 (about EUR 22) or a book, regardless of whether they completed the interview or not.

2.3 Non-Participation

As a result of the recruitment procedures, it was not possible to conduct any advanced analysis of non-participation bias, but at a group level we have gathered information regarding number of patients, gender, age, type of medication, average dosages, and collection routines from the eleven programs. In total, 1,006 individuals were enrolled in the programs at the time, which means that our 411 interviews represented 40.8% of the total population (lowest 24.3%, highest 65.3%). There are clear differences only in collection routines: in our data there was an over-representation of patients who collected their medication five to seven times a week (34.5% versus 21.2% in the population as a whole) and an under-representation of patients who collected once a week or less frequently (29.2% versus 42.3%). Seemingly, the variation can be explained by the fact that we conducted on-site interviews.

2.4 Variables and Statistical Analysis

In order to get a comprehensive picture of diversion, we asked the following questions: ‘Have you ever [alternatively, ‘In the last month, have you ...] a) given away your dose, b) sold part

of your dose, c) exchanged part of your dose for other substances?’ All questions had Yes/No answers. Two collective variables, ‘diversion, ever in OST’, and ‘diversion past month’, were computed based on the answers to questions a), b), and c). Furthermore, we enquired about the extent of the diversion activities (number of days per month). As dependent variable in the multivariate analyses of the article, we used ‘diversion past month’ (DPM), the most suitable variable to acquire a comprehensive picture of the current situation.

We used four types of independent variables: demographic factors, treatment factors, social factors, and type of interviewer (researcher or peer-interviewer). The choice of independent variables was partly based on the hypotheses investigated in previous research, partly based on the results from a preparatory interview study conducted with OST staff.⁴² In that study, among other things, we detailed staff views on factors which they felt contributed to an increased risk of diversion.

The demographic factors—age, civil status, country of birth, education, and housing—were based on the Swedish version of Addiction Severity Index (revised in 2009). This is also case with three of the social factors: current illicit drug problems, primary social interactions, and proximity to the labor market.

The treatment factors include five variables: type of medication, dose level, collection routines, treatment duration, and current psychosocial treatment. We formulated the questions based on these variables ourselves, as was the case with the last social variable, primary source for illicit methadone or buprenorphine before starting OST. The exact questions are given as notes to tables 4 and 5.

Calculations of frequencies, averages and cross-tabulations are used to describe the data.

Statistical differences between groups were calculated with χ^2 test and Fisher’s exact test. For multivariate analyses, we used logistic regression analysis. All significance tests were based on a 95% CI.

The analysis was performed in three steps. In the first step, the diversion variables were related to individual factors and type of interviewer, firstly in univariate analysis, and then in multivariate analysis with DPM as the dependent variable. In the second step, DPM was related to treatment factors in a new multivariate analysis, as well as to those variables which were linked to DPM in the first step. In the third step, finally, social factors were included in the analysis.

All analysis were performed in SPSS version 20 for Windows.

2.5 Ethics

The project was conducted in accordance with The Swedish Ethical Review Act (SFS 2004:460). The design and execution of the project, including the questionnaire, was approved by the Regional Ethical Review Board at Lund University.

3 Results

3.1 Levels of Diversion

Of the 411 patients, 24.1% (n=99) stated that they had diverted part of their medication in the past month. Giving it away was most common (16.1%, n=66), followed by selling (13.6%, n=56) and trading it for other substances (3.4%, n=14). The median extent of diversion activities (number of days in the past month) was two days for giving away and trading and four days for selling. A smaller group of patients, 8.5% (n=35), stated that they had diverted (giving away, selling and/or trading) more than five days in total. A majority of the patients, 67.6% (n=277), stated that they had diverted at some point.

3.2 Explaining Diversion: Demographic Factors

Diversion activities related to demographic factors and interviewer category (researcher or peer-interviewer) are summarized for in Table 2. The greatest disparities (χ^2 test, $p < 0.001$) are found between interviewer categories. The differences are significant in regard to combined diversion (past month and ever) and selling, respectively. The differences in regard to giving away are smaller and not significant.

When it comes to native country and age groups there are certain significant differences ($p < 0.05$). In order to check whether these remain after a multifactorial analysis we performed a logistic regression analysis with DPM as the dependent variable. The analysis is presented in Table 3. Seven independent variables were included in the equation: gender, age, marital status, native country, education, housing, and interviewer category. Two significant factors stand out after this analysis: the interviewer effect, where the peer interviewers found considerably more diversion than did the researchers (OR=2.851, $p < 0.000$), and age, where younger age was associated with higher levels of diversion (OR=0.967, $p = 0.017$).

3.3 Explaining Diversion: Treatment Factors

An overview of treatment factors (type of medication, dose level, collection routines, treatment duration, and current psychosocial treatment) in relation to DPM are found in Table 4.1.

In Table 4.2, we present our logistic regression analysis, where the following variables were included in the equation: medication (dummy variables of mono-buprenorphine and buprenorphine-naloxone), dose level, collection routines, treatment duration, psychosocial treatment, age, and interviewer category. The analysis shows that dose level, treatment duration, and psychosocial treatment are not associated with DPM. The likelihood of

diversion is clearly higher in patients with mono-buprenorphine (OR=3.110, $p<0.001$) than among patients taking methadone or buprenorphine-naloxone. Collection routines show a weak link to DPM, where more frequent collections are associated with higher rates of diversion (OR=1.127, $p=0.023$). The impact of interviewer category (OR=3.118, $p<0.001$) and age (OR=0.966, $p=0.021$) remain even when we control for treatment factors.

3.4 Explaining Diversion: Social Factors

An overview of social factors (incidence of current drug problem, primary social interactions, proximity to the labor market, and primary source of illicit methadone or buprenorphine before starting OST) in relation to DPM is given in Table 5.1.

Table 5.2 presents a logistic regression analysis, where we included social factors, treatment factors, age, and interviewer categories in the equation. The analysis reveals that both the interviewer effect (OR=3.289, $p<0.001$) and the increased risk for mono-buprenorphine (OR=5.419, $p<0.001$) remain even when social factors are taken into account. However, there is no longer any association between DPM and collection routines, nor any link between age and DPM.

The analysis also shows that three of the four social factors are associated with DPM. The connection is strongest for illicit drug use, which increases the risk of diversion considerably (OR=5.509, $p<0.001$). Having had OST patients as a primary source for illicit methadone or buprenorphine prior to treatment also increases the risk of diversion (OR=3.262, $p<0.001$). The association between DPM and mainly socializing with current drug users is weaker, but significant (OR=2.095, $p=0.030$). There is no relationship between DPM and our socioeconomic indicator, proximity to the labor market (we also examined two income variables, with the same results).

The impact of the social risk factors are clearly cumulative. For patients with no risk factor (n=69) DPM was 1.4%, with one risk factor (n=164) DPM was 18.3%, with two risk factors (n=108) DPM was 34.3%, and for patients who exhibited all risk factors (n=33) DPM was 54.5% (χ^2 test, $p < 0.001$).

4 Discussion

Diversion of methadone and buprenorphine may be significantly more common than has been indicated by previous research. The levels we present for patients who have sold or shared at some point in their lives, are two to three times higher than in previous cross-sectional studies. The prevalence of current diversion (DPM) is significantly higher than the one-year prevalence rates hitherto reported. The differences become even greater when accounting for the strong interviewer effects we have been able to demonstrate. It should be noted, however, that most of those who report diversion have sold or shared to a rather limited extent.

It is conceivable that the higher prevalence rates in our study may partly be due to country-specific differences; this is supported by the fact that Sweden for many years had a very limited access to OST.⁴³ Long waiting-times for treatment and involuntary discharges of patients who were unable to follow the program rules—previously common in Sweden—may have led to unusually high demand for OST-medications on the illicit drug market.

Most likely, however, the differences are primarily the result of our data-gathering methods. The hypothesis that peer interviewers would get more honest answers to sensitive questions than would the researchers is clearly confirmed. This indicates that ‘privileged access interviewing’ could contribute to an increased empirical validity in studies of illicit drug use, and issues related to it. Whether this is true also for other sensitive subjects, and not only for diversion, remains to be seen—further research is needed in this area.

Even in the researcher interviews we came across higher diversion levels compared to previous studies. One reason may be that our questionnaire was extensive and included a number of questions that had nothing to do with diversion, such as the patients' views on treatment quality. Creating a reassuring atmosphere is easier during a longer and more conversational interview than during a shorter one where sensitive topics are approached more rapidly.

In previous research only a few factors have been associated with a greater risk of diversion. A higher risk has been established for buprenorphine compared to methadone,^{35,36} which was confirmed by our study. This higher risk is most likely caused by the fact that buprenorphine, which is offered as sublingual tablets, is easier to smuggle out of the clinic than the liquid methadone solution (methadone pills are not used in Swedish OST). The lower diversion risk of methadone should, however, be weighed against its greater danger in non-medical usage.

The risk of diversion is clearly higher with mono-buprenorphine than with buprenorphine-naloxone. This confirms previous research, which has shown that buprenorphine-naloxone has lower abuse potential⁴⁴ and lower street-value⁴⁵ than mono-buprenorphine. Therefore, buprenorphine-naloxone should, as far as it is possible,⁴⁶ be given priority over mono-buprenorphine.

According to our analysis, treatment factors other than type of medication, such as collection routines and dose levels, are not linked with DPM. This does not mean that such factors are irrelevant. Previous research has indicated that a higher degree of control—more supervised dosing and fewer take-away doses—may be associated both with a lower prevalence of illicit methadone use⁴⁷ and with lower methadone-related mortality.^{8,28} Given a certain degree of control at program level, however, individual controls appear to carry less weight.

Demographic or individual factors—who you are—do not seem to influence the risk of diversion, which is in line with previous research. This is true with reservation for factors that

neither we nor previous researchers have been able to study (for example antisocial personality disorder).

We can demonstrate, however, that social factors—how you live—have great significance.

This differs from previous research, where no such risk factors have been identified.

Illicit drug use is the strongest social risk factor. To have used amphetamine, cannabis, cocaine, heroin, sedatives and/or novel psychoactive substances in the past month was associated with an increased risk of diversion. Illicit drug use requires money, and selling part of one's medication can be a way of financing this. In order to obtain the desired effect from heroin it may also be necessary to reduce or avoid the prescribed dose of methadone or buprenorphine, something which would result in a surplus that can be sold, traded, or given away.

Socializing with active drug users is also a significant risk factor. To primarily socialize with friends or family members with current drug problems can bring increased social pressure to share, but also the opportunity to make some extra money. The increased risk of diversion by people who in the past have had OST patients as their primary source for illicit methadone or buprenorphine prior to treatment can be interpreted in a similar way. In drug user subcultures a norm system is often developed, where it is considered unethical to not share drugs with friends in withdrawal—what Bourgois has termed 'a moral economy of sharing'.⁴⁸⁻⁵⁰ To break with such a norm system is very difficult and will not automatically happen when entering a treatment where other rules apply. A successful exit process often requires breaking away from old friends and acquaintances within the drug culture and creating a new and drug-free social network.^{51,52}

Finally, diversion may also be an expression of empathy; many of our interviewees described how at times they give away medication to 'dope sick' friends, since they themselves have had similar experiences and know how bad one feels.

That lifestyle factors such as current drug use and socializing with individuals with continuing drug problems have greater significance for diversion than control measures is an important result. It indicates that strategies to decrease diversion to a greater extent should be aimed at psychosocial and lifestyle-changing interventions, as a complement to the medical treatment. This may, for example, entail relapse prevention and other methods to reduce the risk of relapse, as well as interventions to aid patients in breaking away from a criminal lifestyle. Employment, occupational training and other activities that can provide opportunities for creating new social interactions with drug-free friends can also be important in order to prevent diversion.

Although this study demonstrates that diversion may be much more common than indicated by previous research, the results should not be used as an argument for general cut-backs or stronger controls within OST. OST programs generally have a high level of control.

Additional controls may therefore have only a limited impact, and moreover carry the risk of negative consequences for all patients—even for the majority who do not sell or share their medications.

Much points to diversion partly being a consequence of high demand for OST medication by heroin users not in treatment, in conjunction with a moral economy of sharing. If more individuals had access to treatment and fewer patients were involuntarily discharged, diversion would in all likelihood decrease.

References

1. Mattick RP, Kimber J, Breen C, Davoli M. Buprenorphine maintenance versus placebo or methadone maintenance for opioid dependence. *Cochrane Database Syst Rev* 2008; 2.
doi:10.1002/14651858.CD002207.pub3
2. Mattick RP, Breen C, Kimber J, Davoli M. Methadone maintenance therapy versus no opioid replacement therapy for opioid dependence. *Cochrane Database Syst Rev* 2009; 3.
doi:10.1002/14651858.CD002209.pub2
3. Amato L, Minozzi S, Davoli M, Vecchi S. Psychosocial combined with agonist maintenance treatments versus agonist maintenance treatments alone for treatment of opioid dependence. *Cochrane Database Syst Rev* 2011; 10. doi:10.1002/14651858.CD004147.pub4
4. Milroy CM, Forrest ARW. Methadone deaths: a toxicological analysis. *J Clin Pathol* 2000; 53: 277–81.
doi:10.1136/jcp.53.4.277
5. Fugelstad A, Stenbacka M, Leifman A, Nylander M, Thiblin I. Methadone maintenance treatment: the balance between life-saving treatment and fatal poisonings. *Addiction* 2007; 102: 406–12.
doi:10.1111/j.1360-0443.2006.01714.x
6. Mégarbane B, Hreiche R, Pirnay S, Marie N, Baud FJ. Does high-dose buprenorphine cause respiratory depression? *Toxicol Rev* 2006; 25: 79–85.
7. Piercefield E, Archer P, Kemp P, Mallonee S. Increase in unintentional medication overdose deaths: Oklahoma, 1994-2006. *Am J Prev Med* 2010; 39: 357–63. doi:10.1016/j.amepre.2010.05.016
8. Strang J, Hall W, Hickman M, Bird SM. Impact of supervision of methadone consumption on deaths related to methadone overdose (1993-2008): analyses using OD4 index in England and Scotland. *BMJ* 2010; 341: doi:10.1136/bmj.c4851
9. Obadia Y, Perrin V, Feroini I, Vlahov D, Moatti JP. Injecting misuse of buprenorphine among French drug users. *Addiction* 2001; 96: 267–72.
10. Otiashvili D, Zabransky T, Kirtadze I, Piralishvili G, Chavchanideze M, Miovsy M. Why do the clients of Georgien needle exchange programmes inject buprenorphine? *Eur Addict Res* 2010; 16: 1–8.

11. Fudala PJ, Johnson RE. Development of opioid formulations with limited diversion and abuse potential, *Drug Alcohol Depend* 2006; 83: S40–S47.
12. Vlahov D, O’Driscoll P, Mehta SH et al. Risk factors for methadone outside treatment programs: implications for HIV treatment among injection drug users. *Addiction* 2007; 102: 771–7.
13. Davis WR, Johnson BD Prescription, opioid use, misuse, and diversion among street drug users in New York City. *Drug Alcohol Depend* 2007; 92: 267–76.
14. Roche A, McCabe S, Smyth BR. Illicit methadone use and abuse in young people accessing treatment for opiate dependence. *Eur Addict Res* 2008; 14: 219–25.
15. Hall MT, Leukefeld CG, Havens JR. Factors associated with high-frequency illicit methadone use among rural Appalachian drug users. *Am J Drug Alcohol Abuse* 2013; 39: 241–6.
16. Håkansson A, Medvedeo A, Andersson M, Berglund M. Buprenorphine misuse among heroin and amphetamine users in Malmö, Sweden: purpose of misuse and route of administration. *Eur Addict Res* 2007; 13: 207–15.
17. Yokell MA, Zaller ND, Green TC, Rich JD. Buprenorphine and buprenorphine/naloxone diversion, misuse, and illicit use: an international review. *Curr Drug Abuse Rev* 2011; 4: 28–41.
18. Aalto M, Visapää JP, Halme JT, Fabritius C, Salaspuro M. Effectiveness of buprenorphine maintenance treatment as compared to a syringe exchange program among buprenorphine misusing opioid-dependent patients. *Nord J Psychiatry* 2011; 65: 238–43. doi:10.3109/08039488.2010.531762
19. Moatti JP, Vlahov D, Feroini I, Perri V, Odabia Y. Multiple access to sterile syringes for injection drug users: vending machines, needle exchange programs and legal pharmacy sales in Marseille, France. *Eur Addict Res* 2001; 7: 40–5.
20. Richert T, Johnson B. Illicit use of methadone and buprenorphine among adolescents and young adults in Sweden. *Harm Reduct J* 2013; 10:27.
21. Gwin MS, Kelly SM, Brown BS, Schacht Reisinger H, Peterson JA, Ruhf A, Agar MH, O’Grady KE, Schwartz RP. Uses of diverted methadone and buprenorphine by opioid-addicted individuals in Baltimore, Maryland. *Am J Addict* 2009; 18: 346–55.
22. Monte AA, Mandell T, Wilford BB, Tennyson J, Boyer EW. Diversion of Buprenorphine/Naloxone Coformulated Tablets in a Region with High Prescribing Prevalence. *J Addict Dis* 2009; 28: 226–31.

23. Schuman-Olivier Z, Albanese M, Nelson SE, Roland L, Puopolo F, Klinker L, Shaffer HJ. Self-treatment: Illicit buprenorphine use by opioid-dependent treatment seekers. *J Subst Abuse Treat* 2010; **39**: 41–50.
24. Spunt B, Hunt DE, Lipton DS, Goldsmith DS. Methadone diversion: A new look. *J Drug Issues* 1986; **16**: 569–83.
25. Schmidt CS, Schulte B, Wickert C, Thane K, Kuhn S, Verthein U, Reimer J. Non-prescribed use of substitution medication among German drug users: Prevalence, motives and availability. *Int J Drug Policy* 2013; **24**: E111–4.
26. Seymour A, Black M, Jay J, Cooper G, Weir C, Oliver J. The role of methadone in drug-related deaths in the west of Scotland. *Addiction* 2003; **98**: 995–1002.
27. Auriacombe M, Fatseas M, Dubernet J, Daulouede JP, Tignol J. French field experience with buprenorphine. *Am J Addict* 2004; **13**: S17–28.
28. Morgan O, Griffiths C, Hickman M. Association between availability of heroin and methadone and fatal poisoning in England and Wales 1993 to 2004. *Int J Epidemiol* 2006; **35**: 1579–85. doi:10.1093/ije/dyl207
29. Fugelstad A, Johansson LA, Thiblin I. Allt fler dör av metadon: ‘Läckage’ från dagens mer liberala behandlingsprogram kan vara en orsak. [More and more methadone deaths. ‘Diversion’ from more liberal treatment programs might be a cause.] *Läkartidningen* 2010; **107**: 1225–8.
30. Madden ME, Shapiro SL. The methadone epidemic: Methadone-related deaths on the rise in Vermont. *Am J Forensic Med Pathol* 2011; **32**: 131–5.
31. Seldén T, Ahlner J, Druid H, Kronstrand R. Toxicological and pathological findings in a series of buprenorphine related deaths. Possible risk factors for fatal outcome. *Forens Sci Int* 2012; **220**: 284–90.
32. Wikner BN, Öhman I, Seldén T, Druid H, Brandt L, Kieler H. Opioid-related mortality and filled prescriptions for buprenorphine and methadone. *Drug Alcohol Rev* 2014; **33**: 491–8.
33. Harris M, Rhodes T. Methadone diversion as a protective strategy: The harm reduction potential of ‘generous constraints’. *Int J Drug Policy* 2013; **24**: e43–50.
34. Bridge TP, Fudala PJ, Herbert S, Leiderman DB. Safety and health policy considerations related to the use of buprenorphine/naloxone as an office-based treatment for opiate dependence. *Drug Alcohol Dep* 2003; **70**: S79–85.

35. Winstock AR, Lea T, Sheridan J. Prevalence of diversion and injection of methadone and buprenorphine among clients receiving opioid treatment at community pharmacies in New South Wales, Australia. *Int J Drug Policy* 2008; 19: 450–8. doi:10.1016/j.drugpo.2007.03.002
36. Winstock AR, Lea T. Diversion and injection of methadone and buprenorphine among clients in public opioid treatment clinics in New South Wales, Australia. *Subst Use Misuse* 2010; 45: 240–52. doi:10.3109/10826080903080664
37. Dale-Perera A, Goulão J, Stöver H. Quality of care provided to patients receiving opioid maintenance treatment in Europe: results from the EQUATOR analysis. *Heroin Addict Relat Clin Probl* 2012; 14: 23–38.
38. Duffy P, Baldwin H. The nature of methadone diversion in England: a Merseyside case study. *Harm Reduct J* 2012; 9: doi:10.1186/1477-7517-9-3
39. Griffiths P, Gossop M, Pavis B, Strang J. Reaching hidden populations of drug users by privileged access interviewers: methodological and practical issues. *Addiction* 1993; 88: 1617–26.
40. Kuebler D, Hausser D. The Swiss hidden population study: Practical and methodological aspects of data collection by privileged access interviewers. *Addiction* 1997; 92: 325–34.
41. Elliot E, Watson AJ, Harries U. Harnessing expertise: involving peer interviewers in qualitative research with hard-to-reach populations. *Health Expect* 2002; 5: 172–8.
42. Johnson B, Richert T. Diversion of Methadone and Buprenorphine from Opioid Substitution Treatment—A Staff Perspective. *J Psychoactive Drugs* 2014; in press.
43. Johnson B. After the Storm. Developments in Maintenance Treatment Policy and Practice in Sweden 1987–2006. In Edman J, Stenius K (eds.), *On the Margins: Nordic alcohol and drug treatment 1885–2007*. Helsingfors: NAD; 2007.
44. Comer SD, Sullivan MA, Vosburg SK, Manubay J, Amass L, Cooper ZD, Saccone P, Kleber HD. (2010), Abuse liability of intravenous buprenorphine/naloxone and buprenorphine alone in buprenorphine-maintained intravenous heroin abusers. *Addiction* 2010; 105: 709–18. doi:10.1111/j.1360-0443.2009.02843.x
45. Simojoki K, Alho H. A Five-Year Follow-up of Buprenorphine Abuse Potential. *J Alcoholism Drug Depend* 2013; 1: 111. doi:10.4172/jaldd.1000111

46. Simojoki K, Vormaa H, Alho H. A retrospective evaluation of patients switched from buprenorphine (subutex) to the buprenorphine/naloxone combination (suboxone). *Subst Abuse Treat Prev Policy* 2008; 3:16 doi:10.1186/1747-597X-3-16
47. Ritter A, Di Natale R. The relationship between take-away methadone policies and methadone diversion. *Drug Alcohol Rev* 2005; 24: 347–52.
48. Bourgois P: The moral economies of homeless heroin addicts: confronting ethnography, HIV risk, and everyday violence in San Francisco shooting encampments. *Subst Use Misuse* 1998; 33: 2323–51.
49. Bourgois P, Schonberg J: *Righteous dopefiend*. Berkeley: University of California Press; 2009.
50. Havnes IA, Clausen T, Middleton A. ‘Diversion’ of methadone or buprenorphine: ‘harm’ versus ‘helping’. *Harm Reduct J* 2013; 10: 24. doi:10.1186/1477-7517-10-24
51. Ebaugh HR. *Becoming an ex: the process of role exit*. Chicago: University of Chicago Press; 1988.
52. Svensson B. *Pundare, jonkare och andra [Speedfreaks, junkies and others]*. Stockholm: Carlssons; 1996.

Table 1

Table 1
Previous cross-sectional studies of diversion

Study	Location	Sample	Method	Prevalence of self-reported diversion	Reported statistical associations
Spunt et al. 1986 ²⁴	Tristate area, USA	368 methadone patients from four programs	Structured interview (30 min.) plus longer follow-up interview (60-90 min.) that covered a range of topics. Compensation: \$10 plus \$15.	34% of the total 227 follow-up interviewed patients stated that they had ever sold their methadone. 10% did so frequently.	No significant group differences, other than current cocaine use being associated with increased risk for diversion.
Winstock, Lea & Sheridan 2008 ³⁵	New South Wales, Australia	508 patients (442 with methadone, 66 with buprenorphine) receiving supervised OST at 50 community pharmacies	Written survey that was left in a sealed box at pharmacies. Compensation: AU\$10.	Buprenorphine: 23.8% reported diversion or attempted diversion in the last 12 months (32.3% ever) Methadone: 2.2% reported diversion in the last 12 months (1.6% ever).	Patients with prior experience of illicit methadone and buprenorphine had increased risk of diversion, as did patients who had injected these substances. The number of take-away-doses was not associated with diversion.
Winstock & Lea, 2010 ³⁶	New South Wales, Australia	448 patients (350 with methadone, 98 with buprenorphine) from nine public OST-programs	Short structured interview (10 min.) done by a research assistant. Compensation: AU\$10.	Buprenorphine: 15.3% reported diversion in past 12 months (18% ever) Methadone: 4.3% reported diversion in past 12 months (9.6% ever).	Patients with prior illicit experience with the substances had increased risk of diversion (4 times for buprenorphine, 6 times for methadone).
Dale-Perera et al. 2012 ³⁷	Austria, Denmark, France, Germany, Greece, Italy, Norway, Portugal, Sweden	2,298 patients (1,371 with methadone, 484 with mono-buprenorphine, 335 with buprenorphine-naloxone, 159 other) from nine European countries	Extensive written survey that covered a range of topic was distributed in clinics, with SASEs for researchers. Compensation: Voucher for 25-40€, after survey was mailed.	24% reported ever having sold, exchanged, or shared (lowest 15.6% in Portugal, highest 39.1% in France; Sweden 24.3%). 11.1% reported ever having sold.	Significant differences between the countries. Higher degree of supervision was statistically related to lower levels of diversion.
Duffy & Baldwin 2012 ³⁸	Merseyside, England	886 methadone patients from 28 programs	Short structured interview (15 min.) done by researchers. Compensation: 4£.	In past year 13% reported that they had shared, 3% that they had traded and 5% that they had sold methadone. Past 4 weeks the numbers were: shared 4%, traded 1% sold 2%.	Patients recruited on the clinics reported less diversion (11% past year) than those recruited in other locations (28%). Women and patients with supervised dosing had lower risk for diversion. Dose levels was not associated with diversion.

Table 2

Table 2
Characteristics of self-reported diversion among 411 clients in OST

	Given away, past month	Sold, past month	Traded, past month	Diverted, past month	Diverted, >5 days past month	Diverted, ever in OST
Total (n=411)	16.1% (66)	13.6% (56)	3.4% (14)	24.1% (99)	8.5% (35)	67.6% (277)
Sex						
Male (n=307)	15.6% (48)	12.7% (39)	2.9% (3)	22.5% (69)	11.5% (12)	66.7% (204)
Female (n=104)	17.3% (18)	16.3% (17)	3.6% (11)	28.8% (30)	7.5% (23)	70.2% (73)
Age						
20–30 (n=79)	16.5% (13)	19.0% (15)	6.3% (5)	29.1% (23)*	10.1% (8)	62.0% (49)
31–40 (n=158)	20.9% (33)	15.2% (24)	3.2% (5)	28.5% (45)	9.5% (15)	70.9% (112)
41– (n=173)	11.5% (20)	9.8% (17)	2.3% (4)	17.8% (31)	6.9% 12	67.1% (116)
Civil status						
Married/cohabiting (n=131)	19.8% (26)	18.3% (24)	3.8% (5)	29.8% (39)	12.2% (16)	61.8% (81)
Single/divorced (n=280)	14.3% (40)	11.4% (32)	3.2% (9)	21.4% (60)	6.8% (19)	70.3% (196)
Native country						
Sweden (n=333)	16.8% (56)	15.6% (52)*	3.9% (13)	26.4% (88)*	9.6% (32)	70.2% (233)*
Other country (n=78)	12/8% (10)	5.1% (4)	1.3% (1)	14.1% (11)	3.8% (3)	56.4% (44)
Education						
Elementary school (n=195)	17.9% (35)	14.9% (29)	4.1% (8)	26.7% (52)	9.7% (19)	65.5% (127)
High school/College (n=216)	14.4% (31)	12.5% (27)	2.8% (6)	21.8% (47)	7.4% (16)	69.4% (150)
Housing						
Ownership/leasing home (n=278)	15.6% (43)	13.8% (38)	3.3% (9)	24.4% (67)	9.5% (26)	67.2% (184)
Other/no residence (n=133)	16.9% (23)	13.2% (18)	3.7% (5)	23.5% (32)	6.6% (9)	68.4% (93)
Interview made by						
Researcher (n=280)	14.6% (41)	7.9% (22)**	3.2% (9)	17.2% (50)**	6.8% (19)	61.4% (172)**
Peer-interviewer (n=131)	19.1% (25)	26.0% (34)	3.8% (5)	37.4% (49)	12.2% (16)	80.8% (105)

* χ^2 -test, significant at $p < 0.05$.** χ^2 -test, significant at $p < 0.001$

Table 3

Table 3

Logistic regression: past-month diversion, demographic factors and interviewer category

Factors added	OR	95% CI	Sign.
Age (years)	0.967	0.941–0.994	0.017
Gender (female)	1.171	0.688–1.991	0.561
Marital status (married/cohabiting)	1.407	0.852–2.323	0.182
Country of birth (other than Sweden)	0.583	0.286–1.185	0.136
Education (high school/college)	0.745	0.461–1.204	0.230
Housing (stable)	1.364	0.805–2.310	0.248
Interviewer (peer)	2.851	1.755–4.633	0.000

Nagelkerke R square=0.169. 411 cases included in the analysis.

Table 4.1
Characteristics of treatment factors and past-month diversion

Treatment factor	Diverted, past month
Medication	
Methadone (n=219)	16.9% (37)
Mono-buprenorphine (n=112)	38.4% (43)
Buprenorphine-naloxone (n=80)	23.8% (19)
Dose level^a	
Low (n=170)	20.0% (34)
High (n=241)	27.0% (65)
Collection routines^b	
7 days a week (n=105)	30.5% (32)
6 days a week (n=13)	30.8% (4)
5 days a week (n=24)	16.7% (4)
4 days a week (n=12)	41.7% (5)
3 days a week (n=47)	21.3% (10)
2 days a week (n=90)	24.4% (22)
1 days a week (n=102)	18.6% (19)
More seldom (n=18)	16.7% (3)
Treatment duration	
Less than 12 months (n=161)	19.3% (31)
1–3 years (n=136)	32.4% (44)
More than 3 years (n=112)	21.4% (24)
Current psychosocial treatment^c	
Yes (n=121)	24.8% (30)
No (n=290)	23.8% (69)

Table 4.2
Logistic regression: past-month diversion, age, interviewer category and treatment factors

Treatment factors added	OR	95% CI	Sign.
Medication (mono-bup)	3.110	1.782–5.429	0.000
Medication (bup-nax)	1.727	0.881–3.385	0.111
Dose level (high)	1.398	0.843–2.318	0.194
Collection routines (days/week)	1.127	1.017–1.248	0.023
Treatment duration (months)	1.004	0.997–1.011	0.281
Psychosocial treatment (yes)	0.746	0.430–1.293	0.296
Age	0.966	0.937–0.995	0.021
Interviewer (peer)	3.118	1.878–5.179	0.000

Nagelkerke R square=0.169. 409 cases included in the analysis.

^a A 'high dose' is defined as >90 mg methadone and >16 mg mono-buprenorphine or buprenorphine-naloxon.

^b Question: 'How often do you pick up your medication?'

^c Question: 'Are you in any other treatment or outpatient treatment, other than OST?'

Table 5.1
Characteristics of social factors and past-month diversion

Social factors	Diverted, past month
Primary socializing ^a	
Alone/Family or friends without current drug problems (n=332)	20.2% (67)
Family or friends with current drug problems (n=79)	40.5% (32)
Illegal drug use past month ^b	
No (n=220)	14.1% (31)
Yes (n=190)	35.8% (68)
Mainly obtained illegal methadone/buprenorphine from patients in OST ^c	
No (n=139)	12.2% (17)
Yes (n=236)	29.2% (69)
Proximity to labor market ^d	
Close (n=89)	23.6% (21)
Distant (n=322)	24.2% (78)

Table 5.2
Logistic regression: past-month diversion, age, interviewer category, treatment factors, and social factors

Treatment factors added	OR	95% CI	p-value
Medication (mono-bup)	5.419	2.612–11.240	0.000
Medication (bup-nax)	1.967	0.927–4.172	0.078
Dose level (high)	1.195	0.664–2.151	0.552
Collection routines (7 days/week)	1.013	0.897–1.143	0.836
Treatment duration (months)	1.005	0.996–1.015	0.282
Psychosocial treatment (yes)	0.790	0.427–1.460	0.452
Primary socializing (current drug users)	2.085	1.072–4.054	0.030
Current illegal drug use (yes) ^e	5.509	2.842–10.679	0.000
Previously bought from patients (yes)	3.262	1.672–6.364	0.001
Proximity to labour market (close)	1.367	0.647–2.886	0.412
Age	0.980	0.946–1.014	0.245
Interviewer (peer)	3.289	1.786–6.057	0.000

Nagelkerke R square=0.323. 373 cases included in the analysis.

^a Question: 'With whom do you spend most of your free time?' (ASI)

^b The variable has been operationalized as use of amphetamines, cannabis, heroin, cocaine, sedatives and/or novel psychoactive substances in the past month. (ASI)

^c Questions: 'Where do you usually get methadone/buprenorphine?' Most common source is identified. 'Yes' is from a person in OST, 'no' is from a dealer, from a patient in treatment other than OST, from a physician or other healthcare provider, from internet purchases or from any other source.

^d Question: 'What is your primary occupation?' The replies have been dichotomized: 'Close' is full- or part-time work, studies, or parental leave, 'distant' is unemployed, in vocational program, on (long-term) sick leave, or in early retirement. (ASI)

^e In the logistic regression we used an index of the six drug categories.