Hard to Reach?

Hepatitis B vaccination among high-risk groups

Jessica Baars

Hard to Reach?

Hepatitis B vaccination among high-risk groups

Moeilijk te bereiken?

Hepatitis B vaccinatie onder hoog-risicogroepen

ISBN 978-90-74234-79-5

The research described in this thesis was financially supported by ZonMw and the Netherlands Association for Community Health Services (GGD Nederland)

Illustration on the cover: Stanley Kastawi www.viakunst.nl

Design & print: Basement Graphics, Den Haag

Hard to Reach?

Hepatitis B vaccination among high-risk groups

Moeilijk te bereiken?

Hepatitis B vaccinatie onder hoog-risicogroepen

Proefschrift

ter verkrijging van de graad van doctor aan de
Erasmus Universiteit Rotterdam
op gezag van de rector magnificus

Prof.dr. S.W.J. Lamberts

en volgens besluit van het College voor Promoties.

De openbare verdediging zal plaatsvinden op
vrijdag 16 januari 2009 om 13:30 uur

door

Jessica Esmeralda Baars
geboren te Rotterdam

ERASMUS UNIVERSITEIT ROTTERDAM

PROMOTIECOMMISSIE

Promotoren
Prof.dr. H. van de Mheen
Prof.dr. H.F.L. Garretsen

Overige leden
Prof.dr. F. Sturmans
Prof.dr. H.L.A. Janssen
Prof.dr. R.A. Knibbe

Copromotor
Dr. B.J.F. Boon

CONTENTS

MANUSCRIPTS BASED ON THE STUDIES DESCRIBED IN THIS THESIS

Chapter 4
Baars, J.E., Boon, B.J., De Wit, J.B., Schutten, M., Van Steenbergen, J.E., Garretsen, H.F., Van de Mheen, H. Drug users' participation in a free hepatitis B vaccination program: demographic, behavioral and social-cognitive determinants. Substance Use & Misuse (in press)

Chapter 5
Baars, J.E., Boon, B.J., Garretsen, H.F., Van de Mheen, H. The reach of a free hepatitis B vaccination program: results of a Dutch study among drug users. Submitted for publication

Chapter 6
Baars, J.E., Boon, B.J., Garretsen, H.F., Van de Mheen, H. Vaccination uptake and awareness of a free hepatitis B vaccination program among female commercial sex workers. Women's Health Issues (in press)

Chapter 7
Baars, J.E., Boon, B.J., Garretsen, H.F., Van de Mheen, H. The reach of a free hepatitis B vaccination program among men who have sex with men. Submitted for publication

Chapter 8
Baars, J.E., Boon, B.J., De Wit, J.B., Van den Eijnden, R.J., Garretsen, H.F., Van de Mheen, H. Intention to obtain hepatitis B vaccination among drug users, commercial sex workers and men who have sex with men. Submitted for publication

chapter 1

Introduction

The scope of this thesis is to explore the reach of a free hepatitis B vaccination program among high-risk groups: drug users (DUs), commercial sex workers (CSWs) and men who have sex with men (MSM). Chapter 1 presents information on the prevalence of hepatitis B, the risk factors for getting infected with the hepatitis B virus, and the targeted vaccination program in the Netherlands. Also presented here are the main aims of the current work, behavior change theories that may predict vaccination uptake, and an outline of this thesis.

1.1 Hepatitis B

Hepatitis means inflammation of the liver. In case of hepatitis B (an infectious disease) this inflammation of the liver is caused by the hepatitis B virus. Hepatitis B is also referred to as the 'silent killer'. An infection with the hepatitis B virus can go undetected for several years, meanwhile severely damaging the liver of the patient. The virus is directly transmitted through unsafe sex and blood-blood contact. The hepatitis B virus is 50 to 100 times more contagious than HIV, the virus that causes AIDS (World Health Organization [WHO], 2000). Although hepatitis B virus infection among adults mostly recovers by itself (approximately 90% of adult infections resolve completely, leaving lifelong immunity), the infection can become chronic. About 10% of adult patients remain chronically infected and are infectious to others (so-called 'carriers'). These latter patients have an increased risk for developing liver cirrhosis and cancer of the liver (WHO, 2000). Treatment of chronic infection with the hepatitis B virus is possible in most cases, but requires a lot of effort and dedication from the patient, because the side-effects of one of the main drugs can involve

influenza-like symptoms, depression, and headaches. Some of the medications can provide a complete cure, whereas others decrease the risk of liver damage from hepatitis B virus infection by slowing down or stopping the virus from reproducing. However, it is better to prevent this disease than to treat it, given that a safe and effective vaccine against hepatitis B has been available since 1982 (Centers for Diseases Control and Prevention [CDC], 1982).

Over 350 million people worldwide are chronically infected with the hepatitis B virus (WHO, 2000). In the Netherlands, the prevalence of hepatitis B is considered low in the general population: 2.1% has been infected and 0.2% was chronically infected with the virus (Van Marrewijk et al., 1999). However, the prevalence of infection with the hepatitis B virus is higher among certain behavioral risk groups. For example, a study among DUs in South Limburg revealed that 43-64% of DUs showed markers of previous infection, and 1-7% was chronically infected (Hoebe et al., 2007). Among MSM 9.8% showed markers of previous infection (RIVM, 2002). Registries of STD clinics showed that in 2007 of n=244 current infections with hepatitis B virus (HBsAG-positive), n=15 (6%) were found among CSWs; the registration showed 1.2% positive hepatitis B virus diagnoses (HBsAG-positive) in CSWs (Personal communication, M.G. van Veen, F.D.H. Koedijk, RIVM, Centre for Infectious Disease Control, June 16, 2008). However, this number applied to a selective group of CSWs because not every sex worker visits an STD clinic.

Unsafe injection of drugs and unsafe sexual behavior are risk factors for hepatitis B virus infection. The hepatitis B virus is not only transmitted by sharing needles, but also by sharing injection equipment including cotton swabs, rinsing water, cookers, mixers, and sharing of drug solutions between two syringes (front-loading and back-loading) (Koester et al., 1996). In the Netherlands, the proportion of injecting DUs who share needles seems to be declining, probably due to the harm-reduction programs that have been implemented. For example, in Rotterdam (a city with many facilities for needle exchange programs), the percentage of injecting DUs that recently shared needles decreased from 18% in 1994 to 8% in 2002 (De Boer et al., 2004). However, risky sexual behavior among DUs remains prevalent through inconsistent condom use with casual and primary sexual partners (Booth et al., 2000; EMCDDA, 2001). Risky sexual behavior is also the main reason why MSM and CSWs constitute a high risk group for infection with the hepatitis B virus. Although most CSWs in the Netherlands use condoms during sex with clients, 36%-49% reported condom failure in the past 6 months (Van Veen et al., 2005a; Van Veen et al., 2005b, Van Veen et al., 2006); therefore, this group is still at risk of getting infected with the hepatitis B virus. Another Dutch study revealed that 31% of MSM reported one or more occasions of unsafe sex with casual sex partners in the past 6 months (Hospers et al., 2007).

1.2 Targeted hepatitis B vaccination approach in the Netherlands

Being a low-endemic country, the Netherlands does not have a universal hepatitis B vaccination policy but a vaccination program targeted at specific groups. These risk groups include for instance travelers to endemic countries, healthcare workers, and specific behavioral risk groups; these latter groups are the focus of this thesis. From 1998-2000 a pilot program was implemented that was directed at DUs, heterosexuals with multiple sex partners (amongst whom CSWs), and MSM. The goal of this pilot program was to evaluate strategies to enhance recruitment for hepatitis B vaccination and increase compliance (Van Steenbergen, 2002).

The pilot program was coordinated by the Dutch Centre for Infectious Disease Control and financed by the Dutch Ministry of Health. Seven Community Health Services within the Netherlands were selected for free distribution of hepatitis B vaccines to be implemented. In the participating areas the hepatitis B vaccination was promoted through flyers. In these flyers the local vaccination procedures were explained in different languages in order to reach those unable to speak or read Dutch. In four of the seven intervention regions enhanced outreach was undertaken, i.e. in Amsterdam, Tiel, Heerlen and Maastricht. This means that in those regions vaccination was performed mainly at on-site locations, such as sites for methadone outlet, needle exchange, and homeless shelters.

After the pilot program had ended, the vaccination program for behavioral risk groups was continued in 2002 by the Community Health Services and coordinated by the Netherlands Association for Community Health Services (GGD Nederland), and developed into a national campaign. During both the pilot program and the national program the hepatitis B vaccination (which consists of three injections), was offered free of charge according to the 6-month schedule. When receiving their first vaccination, participants were serologically tested for markers of previous or current hepatitis B virus infection. Those who were not positive for the hepatitis B virus received their first dose and were urged to get their second and third dose after one and 6 months, respectively, in order to comply with the vaccination procedure.

In the national approach, flyers and posters were distributed in all regions in the Netherlands, providing information about the hepatitis B vaccination program. This is referred to as a 'basic' approach (Waldhober et al., 2003). The flyers contained information about hepatitis B, about the hepatitis B vaccination, and the address and telephone number of the infectious diseases department of the local Community Health Service. For each target group, a separate brochure was developed.

In specific regions, enhanced outreach was performed in addition to the so-called 'basic' approach. A large proportion of the target groups is situated in these outreach regions, as well as a large number of meeting places and activities for the target groups. Each Community Health Service had to draw up a regional plan for vaccinating these high-risk groups. In the regions which provided extra activities (enhanced outreach), staff of Community Health Services periodically visit various locations where these risk groups gather. For DUs these locations include day shelters, night shelters, and drug consumption rooms and prisons, depending on the existence of these facilities in the regions. In 2005,

Community Health Services throughout the country collaborated with 36 prisons, 8 youth custody centers, and 4 institutions for placement under a hospital order; this represents more than half of the institutions situated in the Netherlands (Netherlands Association for Community Health Services [GGD NL], 2005). For CSWs, locations that were visited by the community health workers included street prostitution sites, prostitution clubs, brothels, 'erotic' bars and, in some regions, erotic massage salons. For gay men locations such as bars, gay parties, saunas, and cruising areas were visited in order to reach the target group. At all visited locations, the distribution of posters and/or flyers was part of the program (Waldhober et al., 2003). In July 2005 a website (www.homohep.nl) was installed on which MSM could make an online appointment for hepatitis B vaccination (Heijnen et al., 2006).

Vaccinations were offered on a regular basis at the Community Health Service, at STD clinics, and at some of the locations described above. Vaccination on location was common for DUs and CSWs, but not always for MSM. In order to increase compliance, in all regions participants received a vaccination card with the appointments noted, and DUs and CSWs were given a pocket radio after the third vaccination had been obtained. Additionally, in some regions, participants received an SMS text message from health professionals the day before the appointment to improve compliance. Because the Community Health Services with a basic approach could apply for funding related to outreach activities from 2004 onwards (GGD NL, 2004), the distinction between regions with an 'outreach' versus 'basic' approach is not as rigid as the definitions above may imply. In April 2004 (the year in which data collection for the cross-sectional studies presented in this thesis started), 18,738 participants obtained a free hepatitis B vaccination within the national program. Of these, 22% were DUs, 20% were male or female CSWs, 32% were MSM, and 26% were heterosexuals with multiple sex partners (Heijnen et al., 2004).

1.3 Aim of this thesis

The aim of this thesis is to explore the reach of the free hepatitis B vaccination program among three high-risk groups: DUs, CSWs and MSM.

The specific research questions are:

1) What are the proportions of those who are aware and those who are unaware of the possibility to obtain free hepatitis B vaccination; and what are their characteristics?
2) What are the proportions of those who actually obtained vaccination and those who did not; and what are their characteristics?
3) What are the proportions of those who complied with the hepatitis B vaccination schedule and those who did not; and what are their characteristics?
4) Which social-cognitive factors are associated with hepatitis B vaccination behavior?

The findings in this thesis provide insight in the demographic, behavioral and social-cognitive determinants of hepatitis B vaccination behavior among DUs, CSWs and MSM. Insight into the factors that underlie vaccination behavior can help future vaccination programs to better develop their campaign, as well as improve the current vaccination program.

1.4 Social-cognitive theories

Even though hepatitis B vaccination is promoted for behavioral risk groups, and is free of charge, some individuals that are aware of the vaccination program do not adhere to the advice to get immunized. Health behavior, such as obtaining hepatitis B vaccination, and health behavior changes are influenced by a number of so-called social-cognitive factors. A person can perceive a risk by performing or not performing a certain behavior, evaluate the advantages and disadvantages of the behavior (in a utilitarian and more social sense), and may experience difficulties performing the behavior. As yet, no single dominant model has emerged that conceptualizes (health) decision making. Several theoretical models have been developed to explain the adoption and maintenance of behavior, each model focusing on a different aspect. These models include the Theory of Reasoned Action (TRA; Fishbein & Ajzen, 1975; Ajzen & Fishbein, 1980), Theory of Planned Behavior (TPB; Ajzen, 1991), Social Cognitive Theory (Bandura, 1986), Transtheoretical Model (Prochaska & DiClemente, 1983; Prochaska et al., 1992) and the Health Belief Model (HBM; Rosenstock, 1965; Rosenstock, 1974).

In this thesis, hepatitis B vaccination uptake is seen as the target health behavior and we set out to find correlates of this vaccination behavior using concepts of two of the most widely used behavioral change models: the HBM and the TPB. These theories have provided a useful theoretical framework to predict health behavior, for example self-breast examination, condom use, smoking cessation, dietary change, health screening attendance, and compliance with medical regimens (e.g. Conner & Sparks, 2005; Abraham & Sheeran, 2005; Becker et al., 1977; Harrison et al., 1992). In this thesis, we used an integrated approach to identify theory-based correlates of hepatitis B vaccination behavior.
The HBM was chosen because it was specifically developed to address health behavior, i.e. in response to the failure of a free tuberculosis health screening program. The theory assumes that the extent to which a person thinks he or she is susceptible to a particular disease, and his or her perception of the severity of the health consequences of getting the disease, will influence the likelihood that the person engages in a given health behavior. According to the HBM, evaluation of the recommended behavior also depends on the beliefs about the benefits and barriers of performing this behavior (Rosenstock, 1965; Rosenstock, 1974).

In addition to the concepts of the HBM we used concepts of the TPB (a more general model of behavior change), to explain hepatitis B vaccination behavior. The TPB assumes that any given behavior is determined by the strength of the person's intention to perform that behavior and the amount of actual control that the person has over performing the behavior. Intention to perform a given behavior is determined by one's attitude towards the behavior, subjective norms regarding that behavior, and perceived behavioral control with respect to conducting the behavior. A person's attitude is defined as the subjective evaluation of self-performance of a given behavior; for example, is it positive or negative for me to perform a particular behavior? Subjective norms express the influence of beliefs

about the views of important other persons. Perceived behavioral control is the conviction of a person that he/she is able to control his/her own behavior and that he/she can successfully perform that behavior. For example, a person has total control if there are no practical constraints to perform the behavior (Ajzen, 1991).

A few studies have examined possible social-cognitive determinants of hepatitis B vaccination behavior, mostly among MSM. These studies assessed variables specified in the cognitive theories described above. For example, perceived susceptibility, perceived severity and perceived barriers were found to be predictors of vaccination behavior among MSM (De Wit et al., 2005; Rhodes & Diclemente, 2003).

The HBM and TPB are used in this thesis not to test the predictive value of the theoretical models, but to find specific ideas for improving campaigns in promoting hepatitis B vaccination uptake. The theories will be applied to examine what social-cognitive factors are associated with hepatitis B vaccination behavior.

1.5 Outline of this thesis

Chapter 2 introduces the prospective and cross-sectional research projects that the work presented in chapters 4 to 8 are based on. Information on the design, the procedures, the period of data collection, and the recruitment locations is provided.
Besides using data from a longitudinal study among DUs in the pilot program, we collected data ourselves among DUs, CSWs and MSM in the current vaccination program. Chapter 3 presents an overview of the international peer-reviewed literature in which correlates of hepatitis B vaccination amongst DUs, CSWs and MSM are explored. Chapter 4 reports the results of a prospective study conducted as part of the pilot program to examine demographic, behavioral and social-cognitive predictors of vaccination behavior among DUs. Chapters 5 to 7 describe which groups are reached by the current hepatitis B vaccination program in terms of awareness, vaccination uptake and compliance with the vaccination schedule among samples of DUs, CSWs and MSM. Reasons for non-participation and non-compliance with the vaccination schedule per risk group are also reported. The 'reach' of the ongoing Dutch vaccination program was explored cross-sectionally in three 'outreach' regions (Rotterdam, Utrecht and South Limburg). Chapter 8 of this thesis explores which demographic, behavioral and social-cognitive factors are associated with the intention to obtain hepatitis B vaccination among DUs, CSWs and MSM who have not (yet) been vaccinated. Finally, Chapter 9 discusses the findings of the different studies, and presents some recommendations for the present vaccination program and for future approaches derived from the results of the studies.

References

Abraham, C. and Sheeran, P. (2005). The health belief model. In: M. Conner and P. Norman (Eds.), *Predicting health behavior: Research and Practice with Social Cognition Models*, 2nd edition (pp. 28-80). Buckingham: Open University Press.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 179-211.

Ajzen, I., Fishbein, M. (1980). *Understanding Attitudes and Predicting Social behavior*. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1986). *Social foundations of thought and action: a social cognitive theory.* Englewood Cliffs, NJ: Prentice-Hall.

Becker, M.H., Haefner, D.P., Maiman, L.A. (1977). The health belief model in the prediction of dietary compliance: a field experiment. *Journal of Health and Social behaviour*, 18, 348-366.

Booth, R.E., Kwiatkowski, C.F., Chitwood, D.D. (2000). Sex related HIV risk behaviors: differential risks among injection drug users, crack smokers, and injection drug users who smoke crack. *Drug and Alcohol Dependence*, 58, 219-226.

Centers for Diseases Control and Prevention (1982). Inactivated hepatitis B vaccine. *Morbidity and Mortality Weekly Report*, 31, 317-318.

Connor, M., Sparks, P. (2005). The theory of planned behavior and health behavior. In M. Conner and P. Norman (Eds.), *Predicting health behavior.* Second Edition. (pp. 170-222). Buckingham: Open University Press.

De Boer, I.M., Op de Coul, E.L.M., Beuker, R.J., De Zwart, O., Al Taqatqa, W., Van de Laar, M.J.W. (2004). Trends in HIV prevalence and risk behaviour among injecting drug users in Rotterdam, 1994-2002. *Nederlands Tijdschrift voor Geneeskunde*, 148, 2325-2330.

De Wit, J.B., Vet, R., Schutten, M., Van Steenbergen, J. (2005). Social-cognitive determinants of vaccination behavior against hepatitis B: an assessment among men who have sex with men. *Preventive Medicine*, 40, 795-802.

European Monitoring Centre for Drugs and Drug Addiction (2001). *Workgroup review of qualitative research on the health risk associated with injecting drug use*. Lisbon, European Monitoring Centre for Drugs and Drug Addiction. Available: http://www.emcdda.eu.int. Accessed January 19, 2006.

Fishbein, M., Ajzen, I. (1975). *Belief, Attitude, Intention and behavior.* New York: Wiley.

GGD Nederland (2004). HBV-campagnebericht 42. Utrecht: GGD Nederland.

GGD Nederland (2005). HBV-campagnebericht 62. Utrecht: GGD Nederland.

Harrison, J.A., Mullen, P.D., Green, L.W. (1992). A meta-analysis of studies of the health belief model with adults. *Health Education Research*, 7, 107-116.

Heijnen, M., Waldhober, Q., Siedenburg, E., Al Taqatqa, W., Huijsen, R., De Vries, M. (2004). Hepatitis B vaccination project for behavioural risk groups in the Netherlands. *Eurosurveillance*, 8, 2609. Available: http://www.eurosurveillance.org. Accessed: January 19, 2006.

Heijnen, M., Vet, R., Nijman, A., Siedenburg, E., Waldhober, Q. (2006). Homohep.nl: homomannen werven voor gratis hepatitis B vaccinatie via internet. *SoaAids Magazine online*, 3,1. Available: http://www.soaaidsmagazine.nl. Accessed: May 16, 2008.

Hoebe, C.J.P.A., Ter Waarbeek, H.L.G., Rademaker, C.W., Smismans, A. (2007). Prevalence of HIV, hepatitis B and C and syphilis and risk behaviour among drug users inside and outside prison. *Journal of Thrombosis and Haemostasis*, 5, S1066.

Hospers, H.J., Dörfler, T.T., Zuilhof, W., Nijman, A.M. (2007). *Schorer monitor 2007.* Amsterdam: Schorer.

Koester, S., Booth, R., Zhang, E. (1996). The prevalence of additional injection-related HIV risk behaviors among injection drug users. *Journal of Acquired Immunodeficiency Syndrome and Human Retrovirology*, 12, 202-207.

Prochaska, J.O., DiClemente, C.C. (1983). Stages and processes of self-change of smoking: Toward an integrative model of change. *Journal of Consulting and Clinical Psychology*, 51, 390-395.

Prochaska, J.O., DiClemente, C.C., Norcross, J.C. (1992). In search of how people change: applications to addictive behaviors. *American Psychologist*, 47, 1102-1114.

Rhodes, S.D., DiClemente, R.J. (2003). Psychosocial predictors of Hepatitis B vaccination among young African-American gay men in the Deep South. *Sexually Transmitted Disease*, 30, 449-454.

RIVM (2002). Protocol infectieziekten: Hepatitis B. Available: http://www.rivm.nl/cib/infectieziekten/HepatitisB. Accessed: May 16, 2008.
Rosenstock, I.M. (1965). Why people use health services. *Milbank Quarterly*, 44, 94-127.

Rosenstock, I.M. (1974). Historical origins of the health belief model. *Health Education Monographs*, 2, 1-8.

Van Marrewijk, C.M., Veldhuijzen, I.K., Conyn-van Spaendonck, M.A.E.., Kooy, H., Van den Hof, S., Dorigo-Zetsma, J.W. (1999). *Prevalence of hepatitis B viral markers in the Dutch population: a population-based serosurveillance study (Pienter project)*. (Report 243680001). Bilthoven: RIVM

Van Steenbergen, J.E. (2002). Results of an enhanced-outreach programme of hepatitis B vaccination in the Netherlands (1998-2000) among men who have sex with men, hard drug users, sex workers and heterosexual persons with multiple partners. *Journal of Hepatology*, 37, 4, 507-13.

Van Veen, M.G., Beuker, R.J., De Brito, O., Goetz, H., De Koster, M., Al Taqatqa, W., De Zwart, O., Van de Laar, M.J.W. (2005a). *HIV-surveys among high risk populations in Rotterdam 2002-2003.* (report 441100019). Bilthoven: RIVM

Van Veen, M.G., Wagemans, M.A.J., Op de Coul, E.L.M., Fennema, J.S.A., Van der Helm, T.C.M., Walter, J., Prins, M., Van de Laar, M.J.W. (2005b). *HIV-surveys among high risk populations in Amsterdam 2003-2004.* (report 441100021). Bilthoven: RIVM

Van Veen, M.G., Wagemans, M.A.J., Van den Burg, I., Tonino-van der Marel, E., Van Leeuwen, A.P., Van de Laar, M.J.W. (2006). *HIV-surveys among high risk populations in The Hague 2005.* (report 441100023). Bilthoven: RIVM

Waldhober, Q., Heijnen, M-L. (2003). Landelijk bereik van HBV-vaccinatiecampagne risicogroepen. *Infectieziekten Bulletin*, 14, 249-253.

World Health Organisation (2000). Hepatitis B Fact sheet N°204. Available: http://www.who.int. Accessed: May 16 2008.

chapter 2

Study Designs

The chapters in this thesis are based on four studies (Table 2.1). Chapter 4 describes the first study; this was a prospective research project among DUs that was performed during the pilot program (1998-2000). Chapters 5 to 8 describe cross-sectional studies among drug users (DUs), commercial sex workers (CSWs) and men who have sex with men (MSM) that were conducted during the ongoing hepatitis B vaccination program; these latter chapters are all part of the same study design.

TABLE 2.1 **SUMMARY OF THE CHARACTERISTICS OF THE STUDIES USED IN THIS THESIS**

Campaign	Pilot program	Current vaccination program		
Study	1	2	3	4
Sample	DUs	DUs	CSWs	MSM
Recruitment	Recruited by health professionals	Ethnographic mapping, targeted sampling	Ethnographic mapping, targeted sampling	Ethnographic mapping, targeted sampling
Design	Prospective, based on vaccination registration	Cross-sectional, based on self-report	Cross-sectional, based on self-report	Cross-sectional, based on self-report
Method	Self-administered questionnaires	Face-to-face interviews	Face-to-face interviews	Face-to-face interviews
Chapters	4	5, 8	6, 8	7, 8

Before describing the prospective and cross-sectional study designs in more detail in sections 2.2 and 2.3, definitions of the different target groups are presented below.

2.1 Definition of the participants

In this thesis, DUs are defined as current chronic users of heroin, base coke/crack, amphetamine and methadone; CSWs as women who engage in sexual behavior for money; and MSM as men who (want to) have sex with men.

2.2 Prospective study on DUs as part of the pilot program

Chapter 4 reports on the outcome of the prospective study among DUs that was conducted during the pilot program (1998-2000). The objective of this study was to investigate demographic, behavioral and social-cognitive determinants of vaccination uptake. At baseline, a questionnaire was filled in by DUs that were recruited by health professionals. The follow-up of these participants consists of the actual vaccination uptake that was registered as part of the pilot program.

2.2.1 Selection of the study regions

The study reported in Chapter 4 was conducted in three intervention regions in the Netherlands that were included in the pilot program (Van Steenbergen, 2002). These three intervention regions are those in which enhanced outreach techniques were used to recruit DUs for vaccination. The study regions were Amsterdam, Tiel and Maastricht.

2.2.2 Recruitment procedure

The recruitment procedure of the first part of this study – the baseline questionnaire – was similar to the technique that was used to enroll participants for vaccination in the pilot program. DUs were recruited by health professionals at drug-assistance agencies, at sites for methadone outlet (in Amsterdam, Maastricht and Tiel), needle-exchange sites (in Maastricht), and homeless shelters (in Maastricht). At these locations, written questionnaires were administered by these health professionals. After the questionnaire had been handed in, DUs were informed about the possibility to obtain free vaccination against hepatitis B. A total of 379 DUs returned the questionnaire (response rate 55.5%): 282 were recruited in Amsterdam, 13 in Tiel, and 64 in Maastricht. Twenty DUs did not fill in an identification code and they were subsequently omitted from the analyses.

2.2.3 Follow-up

After filling in the baseline questionnaire, the DUs were informed that the hepatitis B vaccine was available free of charge for every DU (independent of participation in our study) at all the locations described above (Van Steenbergen, 2002). Actual vaccination uptake was registered as part of the pilot program, as well as the number of vaccines administered. DUs who showed up for vaccination were registered with a unique personal identification code which was also noted on the questionnaire. This enabled us to prospectively link the determinants as measured in the baseline questionnaire to actual vaccination uptake. For this procedure informed consent was obtained.

2.3 Cross-sectional studies within the current vaccination program

The studies among DUs, CSWs and MSM presented in Chapters 5 to 8 of this thesis were conducted during the ongoing nationwide hepatitis B vaccination program in three regions in the Netherlands, in order to explore the reach of the program. As was shown in Chapter 1, this included investigating associations between demographic and behavioral variables and awareness of the vaccination program, hepatitis B vaccination uptake and compliance with the vaccination procedure, as well as exploring social-cognitive factors associated with intention to obtain hepatitis B vaccination in those who were not (yet) vaccinated.

2.3.1 Selection of the study regions

The study regions were selected taking into account several characteristics: 1) the level of urbanisation, 2) the estimated size of the target groups, 3) the features of the target groups, 4) basic versus outreach recruiting activities, 5) duration of the vaccination program, and 6) participation in the pilot program.

1/2) The target groups (DUs, CSWs and MSM) are centered mostly in urbanized areas. In order to find a sufficient number of respondents for participation in our study, potential study regions had to have an estimated number of target groups that would be large enough to be able to collect a sample of approximately 100 respondents per target group.

3) In order to compare different subgroups within each target group (such as CSWs working behind a window versus those working at prostitution zones), the different regions together had to cover as many pre-known features of the target groups as possible.

4) As mentioned above, the vaccine was offered to the target groups (DUs, CSWs and MSM) in every region of the Netherlands from 2002 onwards. The vaccination program was supported by flyers and posters (the so-called 'basic' approach). A few Community Health Services were enabled from the beginning of the vaccination program to organize extra activities in their regions (the so-called outreach activities) to enlarge vaccination uptake.

5/6) From 1998 until 2000 a pilot program was implemented in the Netherlands to explore the reach of the vaccination program among DUs, heterosexuals with multiple sex partners (such as CSWs), and MSM.

For selection of the study regions, the above-mentioned characteristics were taken into account. The selection of the regions also depended on practical aspects. For example, for logistical reasons we selected regions that covered all three study groups. Based on the above-mentioned considerations, the following regions were selected for participation in our research: Rotterdam, Utrecht and East-South Limburg for DUs, and Rotterdam, Utrecht and entire South Limburg for CSWs and MSM. South Limburg had taken part in the pilot program as well, resulting in a longer exposure of outreach activities for the target groups as compared to the other two regions. In the analyses we will control for this effect

by including the study region as a variable in the regression analysis. In all the selected regions enhanced outreach activities for the three target groups was part of the program.

2.3.2 Recruitment procedure

Our recruitment procedure was based on 'ethnographic mapping' and 'targeted sampling' (Watters & Biernacki, 1989). To obtain an ethnographic map, the first step was to interview key figures such as community field workers, researchers familiar with the study groups, social workers, police officers, health professionals from the Community Health Services, members of related organizations and associations, and members of the study groups themselves, in order to get a sampling frame. Also, several policy documents of the local authorities regarding the registered sex locations were explored. In this stage, ethnographic maps of previous studies among DUs were used as well (Van de Mheen et al., 2006); for the other two groups, no previous ethnographic maps were available.

After the initial map was made, the second step was to visit these spots (if possible) multiple times at different hours. For example, in the case of gay parties that were held only occasionally this pre-visiting was not possible and we had to rely on information about the visitors as provided by the key informants. Managers of indoor and 'private' places (e.g. gay bars, methadone outlet, and prostitution clubs) were asked in advance if they would cooperate with us during the study. They were also asked to provide information, to let us observe their premises, and (in a later stage) to allow the interviewers to recruit and interview people. In the third step we used the information gathered from the interviews and the visits to map the number of people visiting the sites (educated guesses), and to note the socio-demographic characteristics of the visitors at these sites.

After we had acquired sufficient information about the locations and the (sub)populations visiting these sites, the approximate number of respondents to be recruited per location was determined. On the basis of this ethnographic map of each region, respondents were recruited at different locations by trained interviewers. For DUs these locations involved, for example, day shelters, night shelters, drug consumption rooms, street-based venues, addiction care institutions, and methadone outlets. The recruitment of CSWs would take place on the street (prostitution zones), at window prostitution sites, at sex clubs, brothels, erotic massage salons, and erotic bars. Escorts and CSWs who worked at home were also recruited by the interviewers via telephone after scanning sex advertisements on the internet and in (free) local papers. Finally, MSM were recruited at cruising areas (such as public parks), gay bars, gay discos, gay parties, sex cinemas, gay saunas, and several gay (or bisexual) societies. At the recruitment locations, randomization techniques were used to randomize the respondents. This included, for example, visiting recruitment locations several times at different hours, having every third person picked out by the interviewers for participation in our study, or (in case a large number of DUs was willing to participate) to draw a lottery (after inviting everybody to take part).

To avoid double interviews, the same pair of interviewers worked together as a team for the same study group in the same region. Also, double notation of non-responders was prevented by noting characteristics of both the interviewed persons and those who were not willing to participate in our study. For all the risk groups, the administration of the (non)respondents was an intensive (but valuable) task. During each visit a recruitment list was kept on which the date and time was noted. For example, in Utrecht at locations of window prostitution among CSWs, every window (of 4 or 5 windows/rooms on a boat) had a unique number which was noted by the interviewers together with the characteristics of the (non)respondents in order to calculate (non)response. Because of the day and night shifts of CSWs who worked on these boats, it was particularly important to record correctly who had been interviewed, who had refused to participate in our study, who was occupied at the moment of recruitment at the boat, and who was new at the work place. Also, among DUs it was very important to note who had already participated in our study. DUs were more mobile across different recruitment locations within one region than were CSWs and MSM. For example, homeless DUs shift from day shelters to night shelters or to the street.

2.3.3 Period of data collection

The data collection started in Rotterdam in 2004, followed by Utrecht and South Limburg. The duration of the vaccination program was at least two years in each region at the moment that data collection took place[1]. Data on DUs were collected between February and December 2005, data on CSWs between September 2004 and February 2006, and on MSM between August 2004 and May 2006. Thus, the duration of the vaccination program differed between the regions, depending on the period in which the data collection had started. Table 2.2 shows the periods in which the data were collected for each target group and region.

TABLE 2.2 **PERIOD OF DATA COLLECTION BY MEANS OF INTERVIEWS**

	Rotterdam	Utrecht	(East-)South Limburg
DUs	02/05 – 10/05	05/05 – 09/05	10/05 – 12/05
CSWs	09/04 – 07/05	05/05 – 11/05	09/05 – 02/06
MSM	08/04 – 10/04	05/05 – 11/05	10/05 – 05/06

The duration of the data collection for CSWs was longer than for the other two study groups. Recruiting and interviewing CSWs was more intensive both in terms of time and energy as compared to DUs and MSM. The questionnaire used for CSWs contained

[1] *In South Limburg the free vaccine had been offered for a longer period of time, since this region had taken part in the pilot program (1998-2000).*

more questions than the questionnaire used for DUs and MSM, in order to get a good picture of their (unsafe) sexual behavior with exchange partners. In some cases CSWs were interviewed in a foreign language (e.g. English, Spanish or French), and interviews were sometimes interrupted or temporarily postponed because of client contacts.

2.3.4 Recruitment locations

Participants were recruited per region on the basis of an ethnographic map as described above. In each region, approximately 100 respondents per risk group were recruited. The types of recruitment locations per risk group are presented in Tables 2.3 to 2.5; these tables show the numbers of respondents recruited at each type of location.

DUs

The types of recruitment locations for DUs varied between the regions depending on the network of facilities available for DUs. For example, day shelters (a shelter without an integrated drug consumption room) were not available in Utrecht. In East-South Limburg, where there are only few facilities for DUs, most DUs were recruited at the methadone outlet. In the table a distinction is made between day shelters, night shelters, drug consumption rooms, and a combination of those facilities. Each type of facility can attract different types of DUs visiting those locations (for example, daily and non-daily users of cocaine or heroin).

TABLE 2.3 **NUMBER OF RESPONDENTS (DUS) PER RECRUITMENT LOCATION TYPE PER REGION**

Location/region	Rotterdam	Utrecht	South Limburg	Total
Day shelters	31	X	4	35
Day shelters with drug consumption rooms	16	X	X	16
Night shelters	4	4	X	8
Drug consumption rooms	10	X	X	10
Day and night shelters with drug consumption rooms	19	28	16	63
Methadone outlet/bus	10	0	55	65
Work projects	0	0	5	5
Housing projects	12	20	7	39
Street	0	39	5	44
Other	1	14	9	24
Total	103	105	101	309

Notes: 'x' = does not exist in that region; 'o' = exists in the region but nobody was recruited to represent this particular location

A total of 309 DUs participated in our study (response rate: 83%). In Utrecht, recruitment among DUs could not be conducted entirely according to the plan indicated by the ethnographic map. This was because recruitment and interviews among DUs mainly took place indoors; for this, the study coordinator needed permission to perform these activities from the manager(s) of the facilities. However, because this permission was refused by the directors of the methadone outlet in Utrecht, it was not possible to recruit persons who only visited the methadone outlet and none of the other locations. Therefore, our sample may not contain the less-marginalized individuals with regular jobs in the Utrecht region.

CSWs

Table 2.4 shows the number of CSWs recruited per region and type of location. The interviews among escorts and CSWs who worked at home were performed by telephone; the other interviews took place at the locations. The number of respondents recruited per location type depended on the existing locations in the specific region and the number of CSWs working at these locations. For example, in Utrecht, many respondents were recruited in window prostitution section (n=68), because in the period the interviews were conducted this was the most common type of legal prostitution in Utrecht.

TABLE 2.4 **NUMBER OF RESPONDENTS (CSWS) PER RECRUITMENT LOCATION TYPE PER REGION**

Location/region	Rotterdam	Utrecht	South Limburg	Total
Brothel/private house	26	11	23	60
Club	37	4	19	60
Escort	6	4	2	12
Prostitution zone	7	12	8	27
Window	x	68	x	68
Home	3	3	3	9
Erotic massage salon	5	0	7	12
Erotic bar	8	x	x	8
Sex shop (with CSWs)	3	x	0	3
Total	95	102	62	259

Notes: 'x' = does not exist in that region; 'o' = exists in the region but nobody was recruited to represent this particular location

In some cases permission for our study was not granted by the managers of prostitution clubs and private houses in South Limburg. The 42 women who were interviewed in clubs/private houses were recruited at 8 different locations. In total, the face-to-face recruitment of CSWs took place at 12 different locations in South Limburg. In this region,

a total of 7 clubs/private houses, 1 massage salon, and 2 places that rented rooms to CSWs refused to participate in our study. A comparison of the information available on the clubs/private houses (the number of CSWs working in the clubs/private houses and the amount of contact with the Community Health Service) showed no differences between the clubs that participated in our study and those which did not. Although participation in our study was anonymous, the managers of the clubs who refused to participate appeared to be 'scared' of tax authorities and the police. The field notes made during informal talks with the managers of clubs show that the economic situation for some of these clubs was not at its best (declining number of clients visiting the locations, closing of sex clubs, partly due to the competition of prostitution via internet). As a result only 62 CSWs were interviewed in South Limburg. In total the response rate of CSWs at the visited locations was 64%; in brothels the response rate was the highest (90%), followed by clubs (78%), erotic massage salons (63%), erotic bars (57%), window prostitution (50%) and prostitution zones (46%).

MSM

The recruitment of MSM took place at various locations such as gay bars and gay saunas (Table 2.5).

TABLE 2.5 **NUMBER OF RESPONDENTS (MSM) PER RECRUITMENT LOCATION TYPE PER REGION**

Location/region	Rotterdam	Utrecht	South Limburg	Total
Gay bars	36	19	1	56
Gay discos	17	13	0	30
Gay parties	0	35	74	109
Cruising areas	18	17	9	44
Gay saunas	10	X	14	24
Sex cinemas	0	4	0	4
Gay sports societies	11	16	X	27
Diverse societies	11	4	11	26
Total	103	108	109	320

Notes: 'x' = does not exist in that region; 'o' = exists in the region but nobody was recruited to represent this particular location

The region of Rotterdam has many facilities for MSM. Unfortunately in Rotterdam we could not recruit respondents at gay parties, because the manager refused to cooperate with our study. Instead we recruited participants in a bar that was known to share the same type of visitors. In South Limburg one of the major cruising areas had been closed. Interviews with key experts showed that some of those visitors probably moved to areas over the Dutch border (e.g. towards Belgium and Germany) which were not part of our study regions. The most common gathering sites for MSM in South Limburg were gay parties, where we recruited most of our respondents (n=74). In total, 320 MSM participated in our study (response rate: 68%).

2.4 Interview procedure

Before the interview started, participants were informed about the nature of the questions to be expected, the amount of time the interview would take, and the fact that the study was based on anonymity. They were also informed that they had the possibility not to answer any question if they chose not to. The interviewer asked the participant if he or she would agree to take part in the interview based on these conditions (informed consent). With respect to the cost-related time of the CSWs, they were informed that if a client appeared they could take a break or end the interview at any time; this was to limit possible selection bias of those not able to stop working for the money (in fact it turned out that only a few CSWs used this option).

The interviews took place at the recruitment locations. Appropriate places for interviewing within the recruitment locations were established beforehand; the most important criterion for an interview location was privacy. If possible, respondents were interviewed in a separate room. If not, another suitable spot was selected, for example a separate table at the other end of a public room. Respondents should be able to answer any question without others being able to hear him/her speak, and without interruption and interference. Another basic condition for an interview area was that the interviewer and the respondents should be able to hear each other (asking and responding to the questions) when speaking in a 'normal' voice. For example, in gay discos interviews were held in a nearby empty and quiet room.

The interviews were semi-structured and addressed demographic variables (age, living situation, etc.), behavioral variables (regarding hepatitis B infection, such as sexual risk behavior and drug use), awareness of the vaccination program, vaccination uptake, and questions assessing social-cognitive variables. Interviewers who were selected for the study group of CSWs were able to speak fluent English, Spanish, German and/or French; for DUs and MSM the interviews could be conducted in Dutch and English. All participants received a small incentive (5 euros for DUs, a manicure set for CSWs, and a CD-holder for MSM) for taking part in the interview.

References

Van de Mheen, H., Coumans, M., Barendregt, C., Van der Poel, A. (2006). A Drug Monitoring System: keeping a finger on the pulse by triangulation of qualitative and quantitative methods. *Addiction Research and Theory*, 14, 461-473.

Van Steenbergen, J.E. (2002). Results of an enhanced-outreach programme of hepatitis B vaccination in the Netherlands (1998-2000) among men who have sex with men, hard drug users, sex workers and heterosexual persons with multiple partners. *Journal of Hepatology*, 37, 507-13.

Watters, J.K., Biernacki, P. (1989). Targeted sampling: Options for the study of hidden populations. *Social Problems*, 36, 416-430.

chapter 3

Overview of relevant literature on hepatitis B vaccination behavior

This chapter presents an overview of published studies which investigated the correlates of hepatitis B vaccination behavior among drug users (DUs), commercial sex workers (CSWs), and men who have sex with men (MSM). The correlates include awareness of the hepatitis B vaccine, intention to obtain hepatitis B vaccination, hepatitis B vaccination uptake, and compliance with the full hepatitis B vaccination schedule. To be included in this chapter, international peer-reviewed literature had to be relatively recent (published during the period 1997-2007), and had to explore correlates of the above-described vaccination behavior among either one or more of the groups under study in this thesis. English-language articles in PubMed and PsychInfo were found using (combinations of) the keywords: hepatitis B, HBV, vaccine, vaccination, uptake, compliance, adherence, determinants, social cognitive, drug users, sex workers, men who have sex with men, MSM. Subsequently, the reference lists of relevant articles were scanned for additional articles focusing on hepatitis B vaccination behavior among those risk groups. Some of the studies described in these articles have explored hepatitis B vaccination uptake and compliance with the vaccination schedule but not correlates of this behavior.
For example, Budd et al. (2004) reported on the serological responses among DUs and reported vaccination uptake; however, no correlates of vaccination uptake were presented. Manuscripts that did not study correlates of the target behavior are not eligible for inclusion in this overview. Similarly, studies that do not present statistical associations are excluded from this review. For example, on the basis of two studies among DUs, Des Jarlais et al. (2001) suggest that monetary incentives and convenient location greatly

increase compliance; however, no statistical associations were presented. Eligible articles are presented in Tables 3.1, 3.2 and 3.3; the associations presented in the Results column of these tables are based on multivariate analyses, unless reported otherwise.

Glossary

DUs: drug users
CSWs: commercial sex workers
MSM: men who have sex with men
Eligible for vaccination: no markers of (previous) hepatitis B infection and no immunity due to prior hepatitis B vaccination
GUM: Genitourinary medicine
HBM: Health Belief Model (Rosenstock, 1965; Rosenstock, 1974)
HBV: hepatitis B virus
PCDUs: public centers for drug users
RCT: Randomized Controlled Trial
SCT: Social Cognitive Theory (Bandura, 1986)
SEP: Syringe Exchange Program
STD: Sexually Transmitted Disease
TTM: Transtheoretical model (Prochaska & Diclemente, 1983; Prochaska et al., 1992)
TPB: Theory Planned Behavior (Ajzen, 1991)

TABLE 3.1 **OVERVIEW OF STUDIES AMONG DUS**

Authors	Study group and setting	Study design	Vaccination schedule	Investigated variables	Reported Rates	Results on associations
Altice et al., 2005	IDUs, N=212, of which n=134 eligible Response rate: not reported 4 neighbourhoods in 1 urban city (New Haven), USA	Recruitments at SEP/mobile health program (routine care) Duration: 1998-2002 Data collected on routine intake Provision of screening and vaccination Follow-up study	0, 1, 6 month	Independent variables: Demographic variables: age, gender, race, homelessness Drug use: daily injecting behavior, type of drug injected Hepatitis: HCV status Other: SEP client, health insurance Dependent variable: compliance with the vaccination schedule (registration based)	Vaccination uptake: 94% (n=126/n=134) Compliance: 2nd vacc: 77% (n=103/n=134) of total, or 2nd vacc: 82% (n=103/n=126) of those receiving the first vaccination 3rd vacc 66% (n=89/n=134) of total within a 12-month period, or 3rd vacc 71% (n=89/n=126) of those receiving the first vaccination	Compliance associated (+) with age, (+) with being homeless, (+) with injecting drugs daily Reasons noncompliance: no need, too busy, want their primary provider to vaccinate
Campbell et al., 2007	Young IDUs, N=3181 Response rate: not reported Multi site/region: 5 cities, USA	Part of larger intervention study Recruitment through street and agency outreach, targeted advertising and referrals from peers Duration: 2002-2004 Audio computer-administered risk behaviour self-interviews Provision of screening and vaccination Onsite availability and incentives for vaccination differed by site Follow-up study	Flexible 0,1,6 month	Independent variables: Demographic variables: age, race/ethnicity, sex, homelessness, sources of income Sexual behaviour: sexual orientation, male sex partners of males Drug use: injecting daily, needle sharing, type of drug injected Hepatitis: HCV status, HAV status, HIV, HBV status Other: vaccination venue, timing of vaccination in relation to baseline-visit, incentives, reasons for refusing the vaccine Dependent variables: vaccination uptake and compliance (registration based)	Vaccination uptake: 36% (n=1158/n=3181) * Compliance: 3rd vacc: 14% (n=162/n=1158) * * The rate includes those (previously) infected with HBV; of the total sample (n=3181, 22.6% showed markers of HBV	Vaccination uptake associated (+) with immediate vaccine accessibility after the interview was administered, or (+) with vaccination administered off-site with an incentive in multivariate analysis Compliance was not associated with demographic, drug risk behaviour, sexual behaviour nor with vaccine accessibility.

Authors	Study group and setting	Study design	Vaccination schedule	Investigated variables	Reported Rates	Results on associations
Carey et al., 2005	IDUs, N=334 Response rate: 95% Setting: 1 location in NY city	Recruitment at SEP Data collection 08/1999 – 01/2002. Staff administered questionnaire Reimbursement of $15 for study participation Cross-sectional study	Not reported	Independent variables: Demographic variables: age, gender, race/ethnicity, employment status, education Sexual behavior: condom use, intercourse with same sex and opposite sex, being paid for sex Drug use: type of drug, daily injecting, sharing of needles, and injecting attributions Hepatitis: knowledge about transmissions of hepatitis B (8 items), self-reported history of HBV screening and vaccination uptake Other: medical insurance, having visited a doctor's office, having been hospitalized, HIV testing and status, drug treatment, incarceration history, Dependent variables: awareness of hepatitis B vaccine, vaccination uptake (self-report)	Awareness: 54% (n=180/n=334) Vaccination uptake: 11% yes (n=31/n=292), 53% no (n=155/n=292), don't know/non-response: 36% (n=106/n=292)	Awareness associated (+) with white ethnicity, (+) with knowing one's HIV status, (-) with engaging in unprotected sex with an opposite partner within the past 6 months Vaccination uptake associated (-) with age, (+) with using the SEP for => 6 months, and (+) with having visited a doctor's office within the past 6 months
Hope et al., 2007	Two studies: Agency survey: current IDUs, N=11383 (≠ unique persons) Response rates: not reported Multiple regions, Great Britain Community survey: current IDUs, N=852 Multi-site in 1 city (London), Great Britain	Agency Survey: IDUs recruited at ~50 SEP or drug treatment services each year Duration: 1998-2004 Self-completed questionnaire Ongoing national unlinked anonymous survey of IDUs, testing for markers of HBV infection Community survey: in 5 locations outside London, recruitment at community settings (SEP, drop-ins, chain-referral, on the street) Duration: 2003 -2004 Interviews by fieldworkers, testing for markers of HBV infection Cross-sectional study	Not reported	Independent variables: Demographic variables: age, gender, region Drug use: main drug of use, no. of years injecting Other: drug treatment Dependent variables: hepatitis B vaccination uptake and compliance (self-report)	Vaccination uptake: Agency survey: in 1998: 27% (n=490/n=1800)* in 2004: 59% (n=17/n=1223)* * these rates include those infected with the virus; of those reporting vaccination uptake (n= 4519) among total sample N=11383, 22% had HBV markers Of n=4519 reporting vaccination uptake, n=1007 were anti-HBc positive, and n=3950 provided information on compliance Compliance: Agency study: 56% (n=1849/n=3291) Community Survey: Vaccination uptake: 63% (n=530/n=852)	Agency survey: Vaccination uptake associated with region of recruitment, (+) with being in treatment, (+) with injection duration in multivariate analysis, and (+) with age in univariate analysis Community Survey: Vaccination uptake associated (+) with imprisonment, and (-) with duration of injecting drug use Compliance associated (+) with injection duration,
Koblin et al., 2007	Noninjection female DUs, N=402 Response rate after screening: 75% (n=158/210) New York city, USA	Part of a larger intervention study incl providing screening and HBV vaccination Several recruitment strategies: referring by study participant or friend, through street outreach, by posters/flyers, other Inclusion period: 03/2005 – 06/2006 Computer assisted self-interviewing with an audio component Provision of screening and vaccination Follow-up study	Not reported	Independent variables: Demographic variables: age, race/ethnicity, area of residence, place of birth, years of education, employment and income, usual living situation Sexual risk behavior: oral, vaginal, or anal intercourse, condom use with steady partner, exchange partners, and casual partners Drug use: frequency of noninjection use of specific drugs (crack cocaine, cocaine, and noninjection heroin), history of injecting drugs Hepatitis: knowledge of hepatitis B Social-cognitive variables: motivators and barriers for receiving hepatitis B vaccination Other: incarceration history and staying overnight in a shelter or group home, jail, drug treatment, or on the street > once in past year, health insurance Dependent variable: vaccination uptake (registration based)	Vaccination uptake: 69% (n=109/n=158) started the hepatitis B vaccine series	Vaccination uptake was associated with region. After controlling for region, vaccination uptake associated (+) with the motivators not being very concerned about getting money at each visit, and (+) with getting vaccine at the office Reasons non-participation: mostly specific reason unknown; 20% desired to be vaccinated somewhere else
Kuo, 2004	Young IDUs, N=324, of which 200 IDUs and 124 non-injection DUs Response rate: not reported Baltimore, USA	Recruitment by street outreach workers, flyers and through word of mouth Duration: 03/1999 – 08/2002 Interviews, testing for markers of HBV infection Reimbursement of $20 for survey visits Cross-sectional study, nested in cohort	Not reported	Independent variables: Demographic variables: age, gender, educational status, race Drug use: frequency of injecting Other: drug treatment history, history of incarceration in detention center, jail or prison, use of needle exchange program, ever been tested for HIV, ever been diagnosed with STD Dependent variable: HBV vaccination status (based on serologic testing)	Hepatitis B vaccination status: 11%	Hepatitis B vaccination was associated (-) with age and (+) with drug treatment history

Authors	Study group and setting	Study design	Vaccination schedule	Investigated variables	Reported Rates	Results on associations
Lum et al., 2003	Young IDUs, N=404, of which n= 256 eligible Response rate after screening: 80% (n=211/256) 4 neighbourhoods in San Francisco, USA	Part of an intervention providing screening and HBV vaccination Recruitment by street-based outreach, in collaboration with community-based organizations Duration: 11/1997 – 02/1999 Anonymous interviews Reimbursement of $10 at enrolment and $10 at each visit Follow-up reminders by street-based outreach workers Follow-up study	Flexible: 0, 1-2, 4-6 month	Independent variables: Demographic variables: age, sex, ethnicity, education, no. months living in San Francisco Sexual behavior: condom use, number of sex partners, sex with an IDU, exchange partners, sexual orientation, years sexually active Drug use: no. of years injecting, frequency of injecting, sharing needles, sources of receiving new needles (exchanged at SEP, exchanged with outreach worker or friends, received from friends, on the street) Hepatitis: HCV status Other: social support of family, main sexual partner, friends, outreach worker, SEP staff, history of STD infection, prior HIV test, serologic test of HIV antibody Dependent variable: compliance (registration based)	Vaccination uptake: 81% (n=170/n=211) Compliance: 2nd vacc: 75% (n=128/n=170) 3rd vacc: 47% (n=80/n=170) within 12 month period	Compliance was associated (+) with geographic stability (living in San Francisco for 3 or more months), (+) with prior HIV testing, (+) with outreach worker social support and (-) with kickdowns (persons receiving new needles from friends)
McGregor et al., 2003	IDUs, N=211 of which n=207 eligible Response rate: 96% (n=211/n=220) 1 location in large urban area in England	Recruitment at a drop-in SEP Inclusion period: 05/2000 – 06/2000 Provision of screening and vaccination clinic records of eligible IDUs were reviewed Semi-structured interviews with needle exchange staff Retrospective cross-sectional survey	Not reported	Independent variables: Demographic variables: age, gender, ethnicity, employment Drug use: sharing of injecting equipment (past and current), years spent injecting drugs Hepatitis: HCV status Other: length of contact with the service, prescribed substitute or other drug treatments for addiction, and prison sentences, mental ill-health, social support, literacy Dependent variables: offering the vaccine, vaccination uptake, and compliance (registration based)	Being offered vaccination: 87% (n=180/n=207) Vaccination uptake: 59% (n=123/n=207) of total, and Vaccination uptake: 68% (n=123/n=180) of those offered vaccination Compliance: 3rd vacc: 27% (n=55/n=207) of total, and 3rd vacc: 45% (n=55/123) of those receiving the first vaccination	Offering the vaccination was (-) associated with sharing injecting equipment and (-) with HCV infection in multivariate analysis. Vaccination uptake was (-) with age, (-) associated with current needle sharing, and (+) with the length of contact with the service in multivariate analysis Compliance was not significantly associated with any of the independent variables in a multivariate analysis Staff reported chaotic lifestyle of DUs and their lack of awareness of the risks of hepatitis B as one of the barriers to vaccine uptake
Ompad et al., 2004	Young DUs (14-40 yrs) N=1117, vaccination offered to n= 466 eligible DUs Response rate: not reported Setting: 2 health clinics in Harlem and Bronx in New York city, USA	Recruitment based on outreaching techniques Duration: 08/2000 – 01/2004 Provision of screening and vaccination $20 to participate in the study and $5 after each dose of vaccine Follow-up study	0,1,6 month	Demographic variables: age, race, sex, socioeconomic status (main source of income: employed, illegal, public assistance), ever being homeless Drug use: drug use, injecting drug use, sexual partners Dependent variables: vaccination uptake, and compliance (registration based)	Vaccination uptake: 54% (n=251/n=466) Compliance: 3rd vacc: 41% (n=98/n=240)	Vaccination uptake associated (+) with age, (+) with having public assistance, (+) with being recruited in the Bronx and (-) with daily crack use Compliance associated (-) with daily IDU, (-) with recruited in Harlem (-), and (-) with being Hispanic Interpretation: Health clinic in Bronx was more convenient (e.g. less waiting time)
Quaglio et al., 2002	Heroin users, N=9871 were screened, n= 4442 were eligible, of which n=1175 heroin users were selected Exclusion criteria were pregnancy and severe medical illnesses Response rate: not reported 9 sites, North-Eastern Italy	Part of a large a large-scale hepatitis B vaccination program in 9 PCDUs Duration: 01/1989 – 12/1998 Selected participants were screened and vaccinated with a recombinant vaccine using two schedules which followed the customary procedures at the different PCDUs (not randomized)	Two different schedules: 0, 1 ,2 month and 1, 2, 6 month	Independent variables: Demographic variables: age, sex Drug use: duration (year) of drug use, route of heroin administration Hepatitis: HCV status Other: HIV status, treatment at PCDU Dependent variables: compliance with the vaccination schedule (registration based) Furthermore variables regarding immune response are reported, but these fall out of the scope of this overview	Compliance: 2nd vacc: 94% (n=1102/n=1175) 3rd vacc: 88% (n=1038/n=1175)	Compliances was not associated with the length of the vaccination schedule or whether the patient was still in drug abuse treatment at the end of the series, but was (+) associated to the number of patients enrolled at each PCDU Reasons for non-compliance: no reported reason for non-adherence, admission to a therapeutic community, change of address, hepatitis infection, imprisonment, hospitalization, other causes

Authors	Study group and setting	Study design	Vaccination schedule	Investigated variables:	Reported Rates	Results on associations
Seal et al., 2003	IDUs, N=366 screened, n=149 eligible, and n=96 returned for enrolment n=48 monetary incentive n=48 weekly contact with an outreach worker Response rate: not reported San-Francisco, USA	Recruitment: from the streets using targeted sampling techniques Inclusion period: 10/1998 - 12/1999 Structured interviews by trained interviewers Provision of screening and vaccination One arm in which $20 was given every month at a specific location, one arm in which outreach workers sought weekly contact with the participants RCT, Follow-up study	0,1,6 months	Independent variables Demographic variables: age, sex, ethnicity, homelessness Drug use: injecting drugs, shared syringes, alcohol use, use of heroin, speedballs and speed Hepatitis: knowledge of hepatitis B (6 items), knowledge of HBV transmission (6 items) Social-cognitive variables: Beliefs about vaccines: (3 separate items) Other: utilisation of health services, drug treatment, outreach activities and monetary incentives Dependent variables: vaccination uptake and compliance (registration based)	Vaccination uptake: 64% (n=96/n=149) Compliance: Monetary incentive: 2nd vacc: 96% (n=46/n=48) 3rd vacc: 69% (n=33/n=48) Outreach: 2nd vacc: 63% (n=30/n=48) 3rd vacc: 23% (n=11/n=48)	Vaccination uptake was not associated with demographic, sexual or injecting drug related variables, HBV knowledge or attitudes regarding vaccines Compliance was associated (+) with with receiving monetary incentives

TABLE 3.2 **OVERVIEW OF STUDIES EXPLORING CORRELATES OF VACCINATION BEHAVIOR AMONG CSWS**

Authors	Study group and setting	Study design	Vaccination schedule	Investigated variables	Reported Rates	Results on associations
Wouters et al., 2006	CSWs, N=615, both men and women n=322 (52%) in 0,1,4 schedule n=293 (48%) in the 0,1,6 schedule n=258 were interviewed; n=357 missing Response rate: not reported 7 different health centers for CSWs, Belgium	Recruited by outreach workers in or nearby their working places, then randomly included in one of the two vaccination schedules Inclusion period: 07/2003-09/2004 At first consult, information was collected on STD and risk behavior. In addition, in all but two centers structured interviews were taken (n=258) Provision of screening and vaccination Follow-up study	0,1,4 and 0,1,6 month	Independent variables: Demographic variables; gender, age, region of origin, working sector, health centre Sexual behavior: hiv-status, syphilis Separate sample (n=258 CSWs): Drug use: current drug use, smoking and alcohol use Dependent variable: compliance (registration based)	Compliance: Overall: 3rd vacc: 57% (n=348/615) 0,1,4 month: 3rd vacc:59% 0,1,6 month: 3rd vacc: 54%	Compliance associated (+) with age, health centers, (-) with drug use

TABLE 3.3 **OVERVIEW OF STUDIES EXPLORING CORRELATES OF VACCINATION BEHAVIOR AMONG MSM**

Authors	Study group	Study design	Vaccination schedule	Investigated variables	Rates	Results
Dufour et al., 1999	MSM, N=653 Response rate: not reported Montreal, Canada	Part of larger cohort study Recruited primarily at the Centre des Gais et Lesbiennes de Montréal. Duration: - as of 07/1997 – not reported Questionnaires with both an interviewer-administered and a self-administered component, screening for HBV markers Cross-sectional study	Not reported	Independent variables: Demographic: age, number of years living in Montreal, living situation, education, annual income Sexual behavior: sexual behaviour in the past 6 months (with casual and regular partners), having had sex for drugs, ever having given goods or services for sex Drug use: injecting drug use Other: having consulted a physician who was aware of their sexual orientation in the previous 6 months) and Dependent variables: vaccination uptake and compliance (self-report)	Vaccination uptake: 46% (299/ 653) Compliance: 1st vacc: 14% 2nd vacc: 26% 3rd vacc: 59%	Vaccination uptake associated (-) with a high lifetime number of regular partners, (-) injection drug use, (+) with living on Montreal Island, (+) with sex in bathhouses, and (+) with having consulted a physician aware of the participant's sexual orientation during the previous 6 months Compliance was associated (+) with age, (+) with annual income, (-) with having had sex for drugs, (-) with ever having given goods or services for sex, (-) with unprotected anal sex with regular partners during the previous 6 months, (-) less than 20 casual partners lifetime, (+) history of STD, and (+) alcohol use before sex, and (+) with a trip to endemic countries
Rhodes et al., 2001	MSM, N=381, n=336 eligible Reponse-rate: not reported Internet sample, USA	Recruitment through linkages on gay sites and guestbook notices at homo oriented sites Internet data collection site Duration: not reported Cross-sectional study	Not reported	Demographic variables: age, ethnicity, education, estimated yearly income, health insurance coverage Sexual behavior: number of sex partners, condom use Other: tattoo, piercing, needle sharing, health insurance coverage Hepatitis: knowledge about HBV transmission and prevention, information and communication about hepatitis B (and their sources). Dependent variable: vaccination uptake (self-report)	Vaccination uptake: >40% (n=not reported)	Vaccination uptake was associated (-) with age, (+) with vaccine knowledge, (+) with communication with a health care provider about hepatitis, and (+) with receiving information about hepatitis through professional training
Rhodes et al., 2002	African American MSM, N=170 Gay bar patrons Response rate: not reported 2 sites in Birmingham, Alabama, USA	Recruitment of gay bar patrons in two gay bars Data collection: in 2001 Self-administrated anonymous questionnaire Reimbursement of $ 10.00 after participation in the survey Cross-sectional study	Not reported	Independent variables: Demographic variables: age, ethnicity, education, estimated yearly income Sexual behavior: no. sex partners, sex with women, a lifetime history of STD diagnosis Drug use: ever having injected drugs or steroids; ever having shared injecting drug equipment. Other: HIV status, having received blood or blood products before 1992, timing of the most recent health care provider visit, health insurance coverage Hepatitis: sources of information about hepatitis B Dependent variable: vaccination uptake (self-report)	Vaccination uptake: 40% (n=67/n=170)	Vaccination uptake associated (-) with age, (+) with higher educational degree, (+) with being homosexual as opposed to bisexual, (+) with timing of the most recent health care provider visit
Rhodes & Diclemente, 2003	African American MSM, N= 143 Gay bar patrons Response rate: not reported 1 site in Birmingham, USA	Recruitment in one gay bar Data collection: in 2001 Self-administrated anonymous questionnaire Reimbursement of $ 10.00 after participation in the survey Cross-sectional study	Not reported	Independent variables: Social-cognitive variables: HBM, SCT: Perceived susceptibility to HBV infection Perceived medical severity of HBV infection Perceived personal severity of HBV infection Perceived benefits of HBV vaccination Perceived practical barriers Healthcare provider communication barriers Perceived general medical self-efficacy to complete the 3-dose series Perceived personal self-efficacy to complete the 3-dose series Dependent variable: vaccination uptake (self-report)	Vacination uptake: 42% (n=60/n=143) reported being vaccinated against hepatitis B.	Vaccination uptake associated (-) with perceived practical barriers, (+) with perceived medical severity of HBV infection, (+) perceived general medical self-efficacy to complete the 3-dose series, (+) perceived personal self-efficacy to complete the 3-dose series

Authors	Study group	Study design	Vaccination schedule	Investigated variables	Rates	Results
Rhodes, Grimley & Hergenrather, 2003	MSM, N=358 Gay bar patrons Response-rate: 96% (of n=425 approached to complete the survey, n=398 participants completed it), of those, n=358 were MSM) 2 sites in Birmingham, Alabama, USA	Recruitment in two gay bars Data collection: in 2001 Self-administrated anonymous questionnaire Reimbursement of $ 10.00 after participation in the survey Cross-sectional study	Not applicable	Social-cognitive variables: HBM, SCT: Perceived susceptibility to HBV infection Perceived medical severity of HBV infection Perceived personal severity of HBV infection Perceived benefits of HBV vaccination Perceived practical barriers Healthcare provider communication barriers Perceived general medical self-efficacy to complete the 3-dose series Perceived personal self-efficacy to complete the 3-dose series Dependent: increased readiness to complete the 3-dose series (intention to obtain HBV vaccination, HBV vaccination, compliance; according to the TMC) (self-report)	Not applicable	Increased readiness to complete the 3-dose series of the HBV vaccine associated (-) with perceived practical barriers, (+) with perceived benefits, (+) with perceived severity, and (+) with self-efficacy to complete the vaccine series
Rudy et al., 2003	MSM attending an STD-clinic N=656 visitors of STD-clinic agreed to participate Response rate: 78% N=495 MSM, and n=425 eligible MSM 1 site in Los Angeles, USA	Recruitment in waiting room of an STD-clinic (sexual health clinic of gay and lesbians center) Duration: 06/1999 – 01/2000 Survey, self-administered Provision of screening and vaccination Cross-sectional study	Not reported	Independent variables: Demographic: age, ethnicity, education, income Sexual behavior: no. of sex partners in past 6 months, STD history, sex for drugs or money, STD diagnosed at that visit Drug use: ever injected drugs Social-cognitive variables (expanded HBM): Health motivation Perceived severity of and susceptibility to disease Perceived evaluation of the vaccine Clinical barriers Personal barriers Social influence Dependent variable: vaccination uptake (registration-based)	Vaccination uptake: 62% (n=265/n=425)	Vaccination uptake was associated (-) with age, (-) with educational level (high school vs college), (-) with number of sex partners Those who indicated screening for their visit (health motivation) were more likely to accept HBV vaccination as compared to those who reported symptoms as the reasons for their visit to the STD-clinic. Those who agreed with the item: HBV is serious enough to worry about: were more likely to obtain vaccination as compared to those who strongly disagreed. Not having enough time this evening (practical barrier) was (-), want to talk to my own doctor first (clinical barrier) was (-) associated with vaccination uptake
Schutten et al., 2002	MSM, N=433 n=307 eligible Response rate: 48% Multi-site/region: 6 regions, The Netherlands	Recruitment by health professionals and volunteers Data collection: in 1998 Self-administered questionnaire Cross-sectional study	0,1,6 months	Independent variables: Demographic: age, education Sexual behaviour: number of sex partners past 6 months Social-cognitive variables: TPB: intention, knowledge HBV, attitude, subjective norm, perceived behavioral control; HBM: perceived severity, perceived vulnerability Dependent variable: intention to obtain vaccination (self-report)	Not applicable	Intention: mean of 5.1 on a 7-point scale Intention was associated (+) with attitude, (+) with subjective norm, and (+) with perceived vulnerability
Sethi et al., 2006	Male CSWs/MSM N=797, n=489 eligible Nearly all reported sex with male clients Response rate: not reported 1 site in London, Great Britain	Recruitment: men attending a clinic were registered when enrolled with the GUM service at their first visit Duration: 1994-2003 Provision of screening and vaccination Follow-up study	0,1,2 months	Independent variables: Demographic: country of birth, sexual orientation, recruitment period, IDU, HIV-status Hepatitis B: compliance through registration Dependent variable: compliance (registration-based)	Compliance: 59.8% (n=292/n=489)	Compliance associated (+) with early recruitment in the study (recruited up to 1999)
De Wit et al., 2005	MSM, N=432, of which n=290 eligible with complete date Response rate: 48% Multi-site/region: 6 regions, The Netherlands	Recruitment by health professionals and volunteers Self-administered questionnaire, linked to vaccination registration Duration: 1998-2000 Follow-up study	0, 1, 6 months	Independent variables: Demographic: age, education, homosexuality Sexual behavior: steady partner, number of sex partners past 6 months Social-cognitive variables: TPB: intention (2 items), subjective norm (4 items), pbc (4 items), HBM: perceived severity 91 item), perceived vulnerability (1 item), perceived benefit (1 item), perceived barriers (6 items) Dependent variable: vaccination uptake (registration based)	Vaccination uptake: 86% (n=248/n=290) Compliance: 3rd vac: 89% (n=221/n=248)	Vaccination uptake associated (-) with age, (+) with having a steady partner, (-) with number of sex partners Separate analysis: Vaccination uptake associated (+) with perceived severity, (+) with perceived susceptibility, (+) with perceived barrier

3.1 Overview of studies

The overview in this chapter presents 22 studies exploring correlates of vaccination behavior among behavioral risk groups (i.e. DUs, CSWs and MSM). The designs of these studies and relevant results are discussed in the following sections.

3.2 Study groups and study designs

The second columns in Tables 3.1, 3.2 and 3.3 present the study samples and the numbers of recruited participants. The overview of the study designs shows that (apart from studies among MSM) in most of the articles reporting on correlates of hepatitis B vaccination behavior, the intervention (i.e. offering the hepatitis B vaccine) is part of the study design; other studies have recruited members of behavioral risk groups to reflect the prevalence of hepatitis B vaccination uptake within the population. Within large-scale community interventions in which, for example, free hepatitis B vaccination is offered among high-risk groups in community settings (such as 'red light' districts among CSWs) it is extremely difficult, if not impossible, to register how many participants were offered the vaccine, and how many rejected it. It would be a huge burden for healthcare professionals to register these non-respondents; this is probably the reason why most studies do not provide any information (or only incomplete information) on non-response. Therefore, information on selection effects that may influence the results of these studies is missing.

Nearly all studies described in this overview were convenience samples; this is probably because the behavioral risk groups belong to so-called 'hidden' populations and a reference population does not exist. One study among DUs (Seal et al., 2003) and one among CSWs (Wouters et al., 2006) randomly assigned individuals to one of two study groups (randomized controlled trial). Because the characteristics (and perhaps populations) of the risk groups (DUs, CSWs and MSM) differ across studies it is difficult to compare the results. For example, Rhodes et al. (2002) focus on African-American MSM who were recruited in a bar, whereas the MSM sample of Rhodes et al. (2001) was recruited via the internet. When interpreting the results, we have to bear in mind how and where these samples were collected.

The number of recruited respondents differed according to the study design, ranging from n=96 in a randomized controlled trial among intravenous drug users (IDUs) (Seal et al., 2003), to for example n=143 in a cross-sectional survey among African-American MSM (Rhodes et al., 2002) and to n=11,383 in an ongoing unlinked survey among IDUs (Hope et al., 2007).

Most of the studies among DUs have focused specifically on IDUs (n=7), and some specifically on young IDUs/DUs (n=4). One study included only female non-injection DUs (Koblin et al., 2007). Furthermore, our literature search detected only one study that focuses on associations of vaccination behavior among female CSWs (Wouters et al., 2006); the respondents in this latter study are participants of a hepatitis B intervention (n=615), both male and female. They were recruited by outreach workers close to their workplace. We found one other study that focused on male CSWs (Sethi et al., 2006), most of whom have sex with men; this study will be discussed with the other studies on MSM.

Besides the study of Sethi et al. (2006) which focused on male CSWs (most of whom had sex with men), 9 articles were found that addressed correlates of hepatitis B vaccination behavior among MSM. In only 2 of these 10 articles was the recruitment of participants part of a hepatitis B intervention (Rudy et al., 2003; Sethi et al., 2006). Although De Wit et al. (2005) prospectively followed their respondents in the registration system of the vaccination program, the recruitment procedure at baseline was independent of the program.

3.3 Comparison of study results

3.3.1 Associations with awareness of the hepatitis B vaccine

Only one study reported findings on awareness of the hepatitis B vaccine. Carey et al. (2005) found that awareness of the hepatitis B vaccine was associated with knowing one's HIV status, engaging in unprotected sex with an opposite-sex partner within the past 6 months, as well as with ethnicity among DUs.

3.3.2 Associations with intention to obtain hepatitis B vaccination

Among DUs and female CSWs correlates of intention to obtain hepatitis B vaccination are not reported in the international peer-reviewed literature. Among MSM, only one study showed predictors of intention to obtain hepatitis B vaccination (Schutten et al., 2002); these authors reported that intention to obtain hepatitis B vaccination was positively associated with attitude, subjective norm, and perceived susceptibility in a multivariate model. Rhodes et al. (2003) studied increased readiness to complete the 3-dose series of the hepatitis B vaccine based on the stages of change of the Transtheoretical Model (Prochaska & Diclemente, 1983; Diclemente et al., 1992). Intention to obtain hepatitis B vaccination within the next 30 days, and within the next 6 months, was part of the stages of increased readiness. Increased readiness was negatively associated with perceived practical barriers, and positively with perceived benefits, perceived severity, and self-efficacy to complete the vaccine series.

3.3.3 Associations with hepatitis B vaccination uptake

Of the articles reported in the overview, 8 articles reported associations between vaccination uptake and demographic or risk behavioral variables among DUs. Associations between vaccination uptake and demographic variables do not always show similar results. For instance, one of the most frequently reported correlations is that of age and hepatitis B vaccination uptake. Whereas two studies reported no association between age and vaccination uptake, Carey et al. (2005), Kuo et al. (2004) as well as McGregor et al. (2003) found a negative association between vaccination uptake and age, whereas Hope et al.

(2007), and Ompad et al. (2004), found a positive association with age. These differences in results can probably be explained by differences in study designs and in study populations (e.g. younger IDUs versus the whole group of DUs).

Some associations with vaccination uptake will be discussed here, since they provide similar outcomes. For example, two studies suggest that convenience is an important predictor of hepatitis B vaccination uptake among DUs. Immediate vaccine accessibility after recruitment of participants for hepatitis B vaccination was reported by Campbell et al. (2007) to be positively associated with vaccination uptake. Ompad et al. (2004) reported that, at the health center in the region that was the most convenient, vaccination uptake and compliance were indeed higher.

Another example of the results of different studies pointing to the same direction is illustrated by Kuo et al. (2004) who reported that those in drug treatment were more likely to be vaccinated against hepatitis B. Others have shown that DUs with sustainable contact with the needle exchange service (Carey et al., 2005; McGregor et al., 2003), or in prison (Hope et al., 2007) were also more likely to be vaccinated against hepatitis B. Thus, easier contact with certain facilities that can provide vaccination is an important tool to increase vaccination uptake among DUs.

Only two studies among DUs (Koblin et al., 2007; Seal et al., 2003) explored associations between vaccination uptake and social-cognitive variables. The results of the first study among female DUs showed that those least concerned about money, and those who wanted to get vaccinated at the office, were more likely to obtain vaccination. The latter study found no relationship between three separate beliefs about vaccines (such as 'hepatitis B vaccine is safe') and vaccination uptake.

We found no studies reporting on correlates of vaccination uptake among CSWs. Among MSM, many articles have reported a negative association between age and vaccination uptake (De Wit et al., 2005; Rhodes et al., 2001; Rhodes et al., 2002; Rudy et al., 2003); indicating that older MSM were more likely to refuse the vaccine. An association between vaccination uptake and educational level was found in two studies; MSM with a higher education level weree more likely to obtain vaccination (Rhodes et al., 2002; Rudy et al., 2003).

Social-cognitive correlates of vaccination uptake among MSM were reported by De Wit et al. (2005), Rhodes & Diclemente (2003), and Rudy et al. (2003). All three articles reported perceived susceptibility, and two studies reported perceived practical barriers as correlates of hepatitis B vaccination uptake among MSM. Furthermore, in the Dutch study of De Wit et al. (2005) perceived susceptibility was also an important predictor of vaccination uptake.

3.3.4 Associations with compliance

Table 3.1 shows that 8 of 11 studies among DUs focus on correlates of compliance with the hepatitis B vaccination schedule. Two of those studies (Campbell et al., 2007; McGregor et al., 2003) found no association between demographics and risk behavior, and compliance with the vaccination schedule in multivariate analyses.

Although in most studies ethnicity was not associated with compliance, Ompad et al. (2004) found that Hispanic DUs were less likely to complete the vaccine series.

Injecting drugs daily was found to be positively (Altice et al., 2005) as well as negatively (Ompad et al., 2004) associated with compliance among DUs. However, the first study was performed among IDUs and the second among DUs in general, which makes it difficult to compare the results.

The effect of providing monetary incentives on compliance rates was reported in two articles. A randomized controlled trial showed that receiving a monetary incentive on a regular basis increases compliance with the vaccination schedule as compared to weekly visits of outreach workers (Seal et al., 2003). Although Campbell et al. (2007) showed that receiving vaccination off-site with an incentive was positively associated with hepatitis B vaccination uptake, no relationship between receiving incentives and compliance was found. However, Seal et al. (2003) showed that monetary incentives were superior to outreach work in increasing compliance. This indicates that monetary incentives are more efficient than personal contact. However, this does not mean that a relationship between personal contact and vaccine completion does not exist. For example, Lum et al. (2003) showed that social support from an outreach worker was also associated with a higher compliance. Personal contact and monetary incentives may thus increase compliance.

Table 3.2 reports on the only study among CSWs focusing on correlates of vaccine compliance. Compliance with the vaccination schedule was positively associated with age (persons younger than 20 years of age were less likely to complete the vaccine series). Also, some healthcare centers showed higher compliance rates than other centers. Finally, compliance was negatively associated with drug use (Wouters et al., 2006).

Two of 9 articles focusing on MSM have reported associations with vaccine completion (Dufour et al., 1999; Sethi et al., 2006). Dufour et al. (1999) reported that compliance was negatively associated with exchanging sex for drugs, ever having given goods or services for sex, unprotected anal sex with regular partners during the previous 6 months, a lower annual income, and positively with the number of casual sex partners, history of STD, and alcohol use before sex. Sethi et al. (2006) found that compliance was positively associated with early recruitment in the study (recruited up to 1999).

3.4 Discussion

The literature overview presented in this chapter shows that most studies did not report on any correlates of awareness of the hepatitis B vaccine. Insight into the associations with awareness of the free hepatitis B vaccination program might also contribute to a higher uptake of the vaccine, and will be studied in chapters 5 to 7 of this thesis. The rationale is that information on the groups that have been reached and those who have not can provide valuable data and ideas to improve the hepatitis B vaccination program.

Furthermore, the overview shows that vaccination uptake and the completion of the hepatitis B vaccination schedule were associated with different variables, some of which depend on the context in which the study has been conducted. For example, the association of hepatitis B vaccination with younger age could represent a cohort effect that reflects, for example, recent efforts in the USA to target infants and adolescents for hepatitis B vaccination. Similar effects have also been reported in studies conducted in largely Caucasian populations (MacKellar et al., 2001). However, in the Dutch vaccination program such an effect is not likely because we do not have a universal hepatitis B vaccination policy.

Among DUs, visiting facilities that provide hepatitis B vaccinations can increase vaccination uptake. Those in drug treatment (Kuo et al., 2004), with sustainable contact with the needle exchange service (Carey et al., 2005; McGregor et al., 2003), or in prison (Hope et al., 2007) are more likely to be vaccinated against hepatitis B. Also, convenience, such as immediate vaccine accessibility was reported by Campbell at al. (2007) to be positively associated with vaccination uptake. Ompad et al. (2004) reported that vaccination uptake and compliance were higher in the health center that was the most convenient. As described in Chapter 1 of this thesis, the 'outreach' regions within the Dutch vaccination program offer vaccination on location for DUs, and the Community Health Services cooperate with prisons in order to offer vaccination within those settings. It is of interest to know which facilities are most effective in reaching DUs; this will be studied in Chapter 5 of this thesis.

The vaccination behavior of CSWs has not been studied frequently. Only one study (Wouters et al., 2006) focuses on correlates of compliance with the hepatitis B vaccination schedule among this specific behavioral risk group. Wouters et al. showed that age was negatively associated with compliance. They suggest this could be due to older CSWs working much longer in the sex industry compared with younger CSWs (under 20 years); as a result, compliance of the young CSWs is lower. Mak et al. (2003) focused on CSWs but did not report any correlates of vaccination behavior; therefore, their study was not included in the overview. They suggested that mobility among CSWs reduces compliance rates. It would be interesting to explore whether that hypothesis is valid and to investigate whether mobility of CSWs does play a role in the vaccination behavior of CSWs. Correlates of vaccination uptake, as well as social-cognitive factors that may predict motivation to obtain hepatitis B vaccination, have not yet been explored among CSWs. To our knowledge, this thesis contains the first publications in which associations with vaccination uptake and intention to obtain vaccination have been studied among female CSWs (see Chapters 6 and 8).

Two studies in the overview (Schutten et al., 2002; and De Wit et al., 2005) were part of the hepatitis B vaccination pilot program implemented in 1998 in the Netherlands. These studies reported on factors associated with intention and vaccination uptake among MSM. For example, de Wit et al. (2005) showed positive associations with perceived susceptibility and perceived severity. It would be of interest to establish whether the predictors of vaccination uptake among MSM are also predictors among DUs and CSWs, and whether the findings are replicated among MSM within the current vaccination program.

Very few studies presented in this overview have explored the social-cognitive factors of vaccination behavior, and none of them among female CSWs. In Chapter 4 we present our findings with regard to these factors among DUs, and in Chapter 8 we present our results of a study investigating the association between social-cognitive variables and intention to obtain vaccination among all three risk groups.

The overviews presented in this chapter reveal that demographic, behavioral and social-cognitive correlates of hepatitis B vaccination behavior have never previously been studied among three communities within the same study. Although many factors have been investigated in separate studies, knowledge on these correlates appears to be far from complete. This thesis will contribute to the understanding of these determinants by investigating these correlates among three risk groups using one study design; this increases the comparability of the findings.

References

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes,* 50, 179-211.

Altice, F.L., Bruce, R.D., Walton, M.R., Buitrago, M.I. (2005). Adherence to hepatitis B virus vaccination at syringe exchange sites. *Journal of Urban Health,* 82, 151-161.

Bandura, A. (1986). *Social foundations of thought and action: a social cognitive theory.* Englewood Cliffs, NJ: Prentice-Hall.

Budd, J., Robertson, R., Elton, R. (2004). Hepatitis B vaccination and injecting drug users. *British Journal of General Practice,* 54, 444-447.

Campbell, J.V., Garfein, R.S., Thiede, H., Hagan, H., Ouellet, L.J., Golub, E.T., Hudson, S.M., Ompad, D.C., Weinbaum, C. (2007). Convenience is the key to hepatitis A and B vaccination uptake among young adult injection drug users. *Drug and Alcohol Dependence*, 91, S64-72.

Carey, J., Perlman, D., Friedmann, P., Kaplan, W., Nugent, A., Deutscher, M., Masson, C., Des Jarlais, D. (2005). Knowledge of hepatitis among active drug injectors at a syringe exchange program. *Journal of substance abuse treatment,* 29, 47-53.

De Wit, J.B., Vet, R., Schutten, M., Van Steenbergen, J. (2005). Social-cognitive determinants of vaccination behavior against hepatitis B: an assessment among men who have sex with men. *Preventive Medicine,* 40, 795-802.

Des Jarlais, D.C., Fisher, D.G., Newman, J.C., Trubatch, B.N., Yancovitz, M., Paone, D., Perlman, D. (2001). Providing hepatitis B vaccination to injection drug users: referral to health clinics vs on-site vaccination at a syringe exchange program. *American Journal of Public Health,* 91, 1791-1792.

Dufour, A., Remis, R.S., Alary, M., Otis, J., Mâsse, B., Turmel, B., Vincelette, J., Lavoie, R., LeClerc, R., Parent, R. (1999). Factors associated with hepatitis B vaccination among men having sexual relations with men in Montreal, Quebec, Canada. Omega Study Group. *Sexually Transmitted Diseases,* 26, 317–324.

Hope, V.D., Ncube, F., Hickman, M., Judd, A., Parry, J.V. (2007). Hepatitis B vaccine uptake among injecting drug users in England 1998 to 2004: is the prison vaccination programme driving recent improvements? *Journal of Viral Hepatitis,* 14, 653-660.

Koblin, B.A., Xu, G., Lucy, D., Robertson, V., Bonner, S., Hoover, D., Fortin, P. Latka, M. (2007). Hepatitis B Infection and Vaccination Among High-Risk Noninjection Drug-Using Women: Baseline Data From the UNITY Study. *Sexually Transmitted Diseases,* 34, 917-922.

Kuo, I., Mudrick, D.W., Strathdee, S.A., Thomas, D.L., Sherman, S.G. (2004). Poor validity of self-reported hepatitis B virus infection and vaccination status among young drug users. *Clinical Infectious Diseases*, 38, 587–590.

Lum, P.J., Ochoa, K.C., Hahn, J.A., Page Shafer, K., Evans, J.L., Moss, A.R. (2003). Hepatitis B virus immunization among young injection drug users in San Francisco, Calif: the UFO Study. *American Journal of Public Health,* 93, 919-923.

MacKellar, D.A., Valleroy, L.A., Secura, G.M., McFarland, W., Shehan, D., Ford, W., et al. (2001). Two decades after vaccine license: hepatitis B immunization and infection among young men who have sex with men. *American Journal of Public Health*, 91, 965–971.

Mak, R., Traen, A., Claeyssens, M., Van Renterghem, L., Leroux-Roels, G., Van Damme, P. (2003). Hepatitis B vaccination for sex workers: do outreach programmes perform better? *Sexually Transmitted Infections,* 79, 157-159.

McGregor, J., Marks, P.J., Hayward, A., Bell, Y., Slack, R.C.B. (2003). Factors influencing hepatitis B vaccine uptake in injecting drug users. *Journal of Public Health,* 25, 165-170.

Ompad, D.C., Galea, S., Wu, Y., Fuller, C.M., Latka, M., Koblin, B., Vlahov, D. (2004) Acceptance and completion of hepatitis B vaccination among drug users in New York City. *Communicable Disease and Public Health,* 7, 294-300.

Prochaska, J.O., DiClemente, C.C. (1983). Stages and processes of self-change of smoking: Toward an integrative model of change. *Journal of Consulting and Clinical Psychology*, 51, 390-395.

Prochaska, J.O., DiClemente, C.C., Norcross, J.C. (1992). In search of how people change: applications to addictive behaviors. *American Psychologist*, 47, 1102-1114.

Quaglio, G.L., Talamini, G., Lugoboni, F., Lechi, A., Venturini, L.G., Jarlais, D.C., Mezzelani, P. (2002). Compliance with hepatitis B vaccination in 1175 heroin users and risk factors associated with lack of vaccine response. *Addiction,* 97, 985-992.

Rhodes, S.D., DiClemente, R.J. (2003). Psychosocial predictors of Hepatitis B vaccination among young African-American gay men in the Deep South. *Sexually Transmitted Disease,* 30, 449-454.

Rhodes, S.D., DiClemente, R.J., Yee, L.J., Hergenrather, K.C. (2001). Correlates of hepatitis B vaccination in a high-risk population: An internet sample. *The American Journal of Medicine,* 110, 628-632.

Rhodes, S.D., Grimley, D.M., Hergenrather, K.C. (2003). Integrating behavioral theory to understand hepatitis B vaccination among men who have sex with men. *American Journal of Health Behavior,* 27, 291-300.

Rhodes, S.D., Hergenrather, K.C., Yee, L.J. (2002). Increasing hepatitis B vaccination among young African American men who have sex with men: Simple answers and difficult solutions. *AIDS Patient Care and STDs*, 16, 519-525.

Rosenstock, I.M. (1965). Why people use health services. *Milbank Quarterly,* 44, 94-127.

Rosenstock, I.M. (1974). Historical origins of the health belief model. *Health Education Monographs,* 2, 1-8.

Rudy, E.T., Detels, R., Douglas, W., Greenland, S. (2003). Factors affecting hepatitis vaccination refusal at a sexually transmitted disease clinic among men who have sex with men. *Sexually Transmitted Diseases,* 30, 411-8.

Schutten, M., De Wit, J.B.F., Van Steenbergen, J.E. (2002). Why do gay men want to be vaccinated against hepatitis B? An assessment of psychosocial determinants of vaccination intention. *International Journal of STD & AIDS*, 13, 86-90.

Seal, K.H., Kral, A.H., Lorvick, J., McNees, A., Gee, L., Edlin, B.R. (2003). A randomized controlled trial of monetary incentives vs. outreach to enhance adherence to the hepatitis B vaccine series among injection drug users. *Drug and Alcohol Dependence*, 71, 127-131.

Sethi, G., Holden, B.M., Greene, L., Gaffney, J., Ward, H. (2006). Hepatitis B vaccination for male sex workers: the experience of a specialist GUM service. *Sexually Transmitted Infections*, 82, 84-85.

Wouters, K., Leuridan, E., Van Herck, K., Van Ardenne, N., Roelofs, I., Mak, R., Prévost, C., Guérin, P., Denis, B., Van Damme, P. (2007). Compliance and Immunogenicity of two hepatitis B vaccination schedules in sex workers in Belgium. *Vaccine*, 7, 1893-1900.

chapter 4

Drug users' participation in a free hepatitis B vaccination program: demographic, behavioral and social-cognitive determinants

Abstract

The present study was conducted as an evaluation of a two-year pilot program started in 1998 in the Netherlands to provide free hepatitis B vaccination targeted at drug users. In order to identify which demographic and social-cognitive factors predict vaccination uptake, written questionnaires were distributed in three pilot regions (Amsterdam, Tiel, and Maastricht) amongst all drug users that were invited to participate in the program during a two month period. Vaccination behavior two years later was anonymously and prospectively linked to the questionnaire data, which allowed us to investigate which factors predict vaccination behavior. Of the 207 drug users eligible for vaccination (i.e. who were not immune and/or had no current infection with the virus), 93 drug users had obtained vaccination in the two years following the questionnaire. More than half of them (N = 50) had completed the full program (3 injections). As possible predictors of vaccination uptake, the questionnaire included constructs of the Theory of Planned Behavior, as well as of the Health Belief Model. Our results show that attitude towards obtaining hepatitis B vaccination was positively associated with intention towards obtaining hepatitis B vaccination. However, perceived behavioral control was found to be the only construct related to actual vaccination uptake. None of the demographic variables were related to vaccination uptake. Our findings suggest that future interventions aimed at increasing uptake of vaccination against hepatitis B in drug users should address DUs (perceived) control concerning this behavior. The study's limitations are noted.

4.1 Introduction

Hepatitis B is an infectious disease of the liver caused by the hepatitis B virus. It is directly transmitted through unsafe sex and blood contact. The hepatitis B virus is 50 to 100 times more contagious than HIV (WHO, 2000). Approximately 90% of adult infections resolve completely, leaving life-long immunity; 10% remain chronically infected. These latter patients have an increased risk for developing liver cirrhosis and cancer of the liver (WHO, 2000). A safe and effective vaccine against hepatitis B is available since 1982 (CDC, 1982) and consists of three injections. Hepatitis B is a serious global health problem with 2 billion people who have been infected, and more than 350 million chronically infected (WHO, 2000).

Drug users (DUs) are at risk for hepatitis B through unsafe injecting drug use, as well as through unsafe sexual behavior. In Europe, 20 to 60% of DUs show markers of previous infection (EMCDDA, 2003). Sharing needles, but also sharing injection equipment like cottons, rinse water, cookers, mixers, as well as the sharing of drug solutions between two syringes (front-loading and back-loading) may carry a risk of transmitting blood-borne viruses like the hepatitis B virus (Koester et al., 1996). In the Netherlands, the percentage of injecting DUs who share needles seems to be declining. For example in Rotterdam, a city with many facilities for needle exchange programs, the percentage of injecting DUs that recently shared needles decreased from 18% in 1994 to 8% in 2002 (De Boer et al., 2004). Risky sexual behavior among DUs, however, remains prevalent through inconsistent condom use with casual and primary sexual partners (Booth et al., 2000; EMCDDA, 2001).

After the Health Counsil of the Netherlands advised the Dutch Ministry of Health to vaccinate risk groups for hepatitis B, in 1998 a targeted vaccination approach was directed at men who have sex with men, heterosexuals with multiple sex partners (i.e. sex workers) and DUs (Van Steenbergen, 2002). The goal of this two year pilot program was to evaluate strategies to enhance recruitment for hepatitis B vaccination and improve compliance (Van Steenbergen, 2002). It was coördinated by the Dutch Centre for Infectious Disease Control and financed by the Dutch Ministry of Health. The present study evaluates this pilot program. After the pilot program ended, the vaccination campaign was continued by the Netherlands Association for Community Health Services in 2002, and developed into a national campaign. The results of our study were taken into account in the development of their policy towards the vaccination of DUs against hepatitis B.

During the pilot program the hepatitis B vaccination was offered free of charge according to the 6-months schedule: at 0, 1, and 6 months. When receiving their first vaccination, participants were serologically tested for markers of previous hepatitis B infection. Those who were not positive for hepatitis B virus, received their first dose and were urged to get their second and third dose after one and 6 months in order to comply with the vaccination procedure. Seven Community Health Services within the Netherlands were selected for free distribution of hepatitis B vaccines to be implemented. In all participating Community Health Services area's hepatitis B vaccination was promoted through flyers that explained local vaccination procedures in different languages in order to reach those who do not speak or read Dutch. Moreover, enhanced outreach was undertaken in four of the seven intervention regions: Amsterdam, Tiel, Heerlen and Maastricht. For DUs, enhanced outreach meant that vaccination was performed mainly at onsite locations, such as sites for methadone outlet, needle exchange, and homeless shelters. Our study was directed at measuring the effect of this outreaching approach.

Previous studies among DUs have reported completion rates of hepatitis B vaccination, varying from low completion rates (20%-31%; Christensen et al., 2004; Des Jarlais et al., 2001; Seal et al., 2003), to intermediate (41%-63%; Christensen et al., 2004; Lum et al., 2003; McGregor et al., 2003; Ompad et al., 2004; Van Houdt et al., 2006; Van Steenbergen, 2002), to high compliance rates (66% to 88%; Altice et al., 2005; Budd et al., 2004; Christensen et al., 2004; Des Jarlais et al., 2001; Lugoboni et al., 2004; Quaglio et al., 2002; Rogers & Lubman, 2005; Seal et al., 2003) depending on the use of different vaccination schedules, onsite vaccination possibilities, and the use of monetary incentives. However, only some of these studies identified demographic factors (age, ethnic background, and homelessness), and risk factors concerning drug use (i.e. injecting drug use) associated with vaccine completion (Altice et al., 2005; Lum et al., 2003; Ompad et al, 2004, Seal et al., 2003). Our study is the first to explain vaccination behavior of DUs in the light of constructs of the Theory of Planned Behavior (TPB; Ajzen, 1991) and the Health Belief Model (HBM; Rosenstock, 1965; Rosenstock, 1974). These theories have provided a useful theoretical framework to predict health behavior, such as self-breast examination, condom use, smoking cessation, and dietary change (Conner & Sparks, 1996; Sheeran & Abraham, 1996). TPB assumes that (health) behavior and health behavior change result from cognitive processes. The attitude towards a target behavior, combined with subjective norms regarding that behavior and perceived control with respect to conducting the behavior are expected to predict (motivation of) actual behavior. A person's attitude is defined as the subjective judgment of the target behavior: is it good, bad, sensible or pleasant to obtain a hepatitis B vaccination? Subjective norm expresses the way the individual expects important others like family, friends or partner to think about his performing the behavior. Perceived control is the conviction of the individual that he is or is not able to control his own behavior and that he can successfully perform this behavior. The HBM is an eclectic model with perceived severity and perceived susceptibility of the health consequences that may result from not performing the target behavior, in this case obtaining vaccination, as key variables. According to the HBM a person who rates hepatitis B as a serious disease and who assumes that his own chance of getting infected with this disease is high, is more likely to obtain hepatitis B vaccination, as compared to those who rate it as a less serious disease and/or those who assume that their own risk of getting infected with hepatitis B is low.

The results of our study can contribute to improve future campaigns directed at promoting vaccination (against hepatitis B) among DUs. Insight will be presented in the predictive value of demographic, risk-behavioral (sexual and drug-related) and social-cognitive determinants regarding hepatitis B vaccination behavior.
The main questions addressed in the present study are:

1) Which percentage of the DUs that took part in this study had the intention to obtain hepatitis B vaccination, which part actually obtained vaccination, and which part shows vaccination completion?
2) Which (demographic, risk-behavioral, and social-cognitive) determinants explain intention, vaccination uptake, and compliance with the full vaccination schedule among DUs?

4.2 Methods

4.2.1 Procedure

The present study was conducted as an evaluation of the hepatitis B vaccination pilot program. It took place in the regions in which the enhanced outreaching approach was used to invite DUs to participate in the vaccination program. A total of 379 DUs were recruited: 282 in Amsterdam, 13 in Tiel, and 64 in Maastricht; of twenty DUs information about the recruitment area is unavailable, because they did not fill in a zip code (those participants were later excluded from further analysis, see section participants).

Our recruitment procedure was equal to that in the pilot program. DUs were recruited by health professionals at drug-assistance agencies, at sites for methadone outlet (in Amsterdam, Maastricht and Tiel), needle-exchange sites (in Maastricht), and homeless shelters (in Maastricht). Written questionnaires were distributed by health professionals among DUs who visited these locations. After administration of the questionnaire, DUs were informed about the possibility to obtain free vaccination against hepatitis B. This procedure ensured us that respondents had not yet been informed about the possibility of getting a free vaccination at the time of filling in the questionnaire, and had thus not (yet) been influenced by information about the free hepatitis B campaign (through flyers or outreach activities).

During the two year pilot program hepatitis B vaccination was free of charge and available at all the locations described above. In methadone clinics screening and vaccination against hepatitis B was integrated in the usual routine, with vaccine offered to all those who knew the Dutch or English language, could provide a zip code, and planned at least 6 months residence in the area. If the DUs showed up for vaccination, they were registered with a unique personal identification code (which was also noted on the questionnaire). This enabled us to prospectively link the determinants as measured in this study to actual vaccination behavior. Informed consent for this procedure was obtained. The implications of collecting data from individuals who are not likely to benefit directly from their participation in our study were taken into account (Kleinig and Einstein, 2006).

4.2.2 Measurement

The written questionnaire that was used in our study contained several demographic variables, as well as variables related to risk behavior such as sexual behavior and drug intake, variables that measured vaccination uptake and infection, and social-cognitive constructs of the HBM and TPB.

Operationalisation of the demographic and risk behavioral factors
Table 4.1 shows the measurement of the demographic and risk behavioral factors.

TABLE 4.1 **OPERATIONALISATION OF DEMOGRAPHIC, DRUG USE AND SEXUAL BEHAVIOR FACTORS**

Variable	Question	Answer
Demographic factors		
Gender	"What is your gender?"	Male, Female
Religion	"What is your religion?"	.....
Education	"What is the highest educational degree that you have obtained?"	I have not finished any school (also not primary school), ..., University
Ethnicity	"What is your place of birth?"	.....
Age	"How old are you?"	... years
Drug use behavior		
Drug use	"In general, how many times did you use the following drugs: heroin, cocaine, speedballs, speed?"	Never, Less than 1 time per month, A few times per month, A few times per week, (Almost) daily
Injecting drug use	"Do you (occasionally) inject drugs?"	No, Yes
Sexual behavior		
Steady partner	"Do you have a steady partner?"	No, Yes
No. of sex partners	"How many different sex partners did you have in the past 6 months, do you think?"	About ... sex partners
Being paid for sex	"Have you ever been paid for sex?"	Never, Sometimes, Regularly, Often, Always
Having paid for sex	"Have you ever paid for sex?"	Never, Sometimes, Regularly, Often, Always

Operationalisation of hepatitis B infection and vaccination
Infection with the hepatitis B virus was detected by self-report (Table 4.2). In addition DUs who accepted the offer of vaccination had a blood sample taken for hepatitis B. If DUs were (ever) infected with the virus, the hepatitis B test showed markers of previous infection. The questions that are shown in Table 4.2 and the results of the blood sample were used in our study to select those participants that were eligible to obtain hepatitis B vaccination.

TABLE 4.2 **OPERATIONALISATION OF VARIABLES CONCERNING HEPATITIS B INFECTION AND VACCINATION**

Variable	Question	Answer
Infection with hepatitis B	"Did you ever get infected with hepatitis B?"	No, Yes
Vaccination against hepatitis B	"Did you ever obtain hepatitis B vaccination?"	No, Yes

Operationalisation of the social-cognitive constructs

Table 4.3 shows how the social-cognitive factors were operationalised, the possible scores of the answers, and more information about their internal consistency.

TABLE 4.3 **OPERATIONALISATION OF SOCIAL-COGNITIVE FACTORS OF HEPATITIS B VACCINATION BEHAVIOR**

Construct	Question	Answer	Internal consistency
Perceived severity	"How serious would you find it to be infected with hepatitis B?"	1-7 (not serious-very serious)	
Perceived susceptibility	"What is the probability of you getting infected with hepatitis B within the next 6 months?"	1-7 (very low- very high)	
Perceived behavioral control	"How hard is it for you to comply with the vaccination procedure (receiving 3 shots)?"	1-7 (difficult-easy)	Cronbach's alpha for these three items was 0.66
	"Do you think you are capable of finishing the vaccination according to the procedure?"	1-7 (certainly not-certainly yes)	
	"Are there any aspects of your lifestyle that make it harder for you to comply with the vaccination procedure?"	1-7 (certainly not-certainly yes)	
Attitude	"What do you think about getting vaccinated against hepatitis B within the next 6 months?"	1-7 (unimportant-important)	Cronbach's alpha for this scale was 0.83
		1-7 (bad-good)	
		1-7 (unwise-wise)	
Intention	"If it is free of charge, are you planning to get vaccinated against hepatitis B within the next 6 months?"	1-7 (certainly not-certainly yes)	The Pearson correlation between the items was r = 0.60
	"What is the probability that you will get vaccinated against hepatitis B in the next 6 months, if it is free of charge?"	1-7 (low-high)	

4.2.3 Participants

DUs were defined as frequent users of illicit drugs (i.e. heroin, cocaine, and/or amphetamines). Although the use of other substances, such as ecstasy, is also related to unprotected sex (Choi et al., 2005) this study is limited to the goal population of the pilot program.

A total of 379 DUs returned the questionnaire (response rate 55.5%). Forty-seven respondents were omitted from the analyses because of insufficient data (19 had invalid information on drug use, and 28 did not fill in an identification code in the questionnaire). Analyses (t-tests) and Chi-square tests comparing participants who did not provide an identification code with those who did show that DUs who did not provide a code were more likely to describe themselves as religious (Chi-square (1) = 4.39, p=0.036, two-tailed) as compared to those who did provide the zip code, but that there was no significant difference in the other variables that are shown in Table 4.1 between the two groups.

Furthermore, 125 respondents were excluded as ineligible for vaccination on the following grounds: 29 reported previous vaccination, 76 reported previous infection, and 20 tested positive for hepatitis B markers. The remaining 207 respondents were included in the analyses.

4.2.4 Statistical analyses

Associations between demographic and behavioral variables (such as drug use) and the dependent variables were analyzed using univariate statistics such as the Chi-square test and Student´s t-test. The demographic and behavioral variables with a p-value below 0.1 and all social-cognitive variables were included in multivariate regression analyses with intention to obtain vaccination, vaccination uptake, and compliance with the full vaccination schedule as the dependent variable. A p-value of 0.05 was considered significant.

4.3 Results

The majority of the 207 subjects in our sample was male (79.4 %), with a mean age of 38.5 years (SD=7.2). Participants had a low educational level, 31.8 % having only finished primary school or no education at all. The majority lived in Amsterdam (83.2 %) and had Dutch nationality (59.7 %). Most DUs used heroin and/or cocaine. Daily heroin use was reported by 47.9 %; 37.6 % used cocaine every day; and 19.2 % injected drugs. More than half of the DUs did not have a steady partner (64.5%). Of the female DUs, 25.0 % had been working as a prostitute and got paid for sex, compared to 3.6% of male DUs. Of men, 22.9% had paid for sex themselves, but almost none on a regular basis (21.8% of DUs answered "sometimes"). Of the 39 men who report to have paid for sex, 18 did not have any sex partners in the preceding four months of entering the study. Modus of number of sex partners (for both male and female DUs) in the preceding 6 months is 0, the median is 1, the mean is 1.7 and the range till 40. For further details, see Table 4.4.

TABLE 4.4 **BACKGROUND CHARACTERISTICS OF PARTICIPANTS (N=207)**

Background characteristics		Percentage/ Mean Score (SD)
Demographic factors		
Gender:	Men	79.4
Religion:	Yes	62.1
Education:	<= Primary school	31.8
Ethnicity:	Dutch	59.7
Age:	Mean	38.5 (7.2)
Drug use behavior		
Heroin use:	Daily	47.9
Cocaine use:	Daily	37.6
Amphetamine use:	>=Sometimes	7.1
Speedballs:	>=Sometimes	13.2
Injecting drug use:	Yes	19.2
Sexual behavior		
Steady partner:	Yes	35.5
No. of sex partners:	Mean	1.7 (4.0)
Being paid for sex:	Yes	8.0
Having paid for sex:	Yes	18.7

On average, DUs who were eligible for vaccination had a high intention to obtain hepatitis B vaccination at the start of the pilot program (DUs scored at a scale from 1 to 7 a mean of: 5.32, SD: 1.86, N=207, Table 4.5). By the end of the program in late 2000, 93 (44.9%) of 207 DUs had been vaccinated. More than half of them (n=50) completed the full program and received three injections; 14 DUs had received two injections (14%); and 29 DUs had received only one injection (31%). More than half of the DUs (n=114) obtained no vaccination.

To understand DUs' motivation for obtaining vaccination, mean scores and standard deviations for factors of the TPB and HBM were calculated (Table 4.5). Mean scores show that DUs think that their chance of becoming infected with the hepatitis B virus is low, but that they would find it very serious if they became infected with the virus. Attitude, perceived behavioral control and intention towards vaccination are high.

TABLE 4.5 **MEAN SCORES (SD) AND RANGE FOR SOCIAL-COGNITIVE FACTORS OF VACCINATION BEHAVIOR (N=206)**

	Mean (SD)	Range
Perceived severity	6.27 (1.45)	1-7
Perceived susceptibility	2.23 (1.76)	1-7
Perceived behavioral control	5.66 (1.37)	1-7
Attitude	6.31 (1.25)	1-7
Intention	5.32 (1.86)	1-7

4.3.1 Predicting intention to obtain vaccination

Next we examined the association between demographic, behavioral and social-cognitive determinants of intention to obtain a hepatitis B vaccination (Table 4.6). Those who identified with a religion had a higher intention to obtain vaccination. Attitude was positively associated with intention to obtain vaccination. This means that DUs who have a positive attitude towards vaccination have a higher intention to obtain vaccination against hepatitis B. Perceived severity and perceived susceptibility were marginally significant predictors of intention to obtain vaccination.

TABLE 4.6 **SUMMARY OF LINEAR REGRESSION ANALYSIS FOR VARIABLES PREDICTING INTENTION TO OBTAIN HEPATITIS B VACCINATION (N=206)**

		B	SE B	B	P-value
Step 1	Ethnicity	-0.06	0.31	-0.02	0.85
	Religion	0.93	0.31	0.24	0.003
	Amphetamine use	-0.85	0.54	-0.12	0.12
Step 2	Ethnicity	-0.32	0.28	-0.08	0.26
	Religion	0.68	0.28	0.18	0.02
	Amphetamine use	-0.25	0.50	-0.03	0.61
	Attitude	0.66	0.10	0.43	0.000
	Perceived behavioral control	0.07	0.09	0.05	0.45
Step 3	Ethnicity	-0.27	0.28	-0.07	0.34
	Religion	0.65	0.28	0.17	0.02
	Amphetamine use	-0.19	0.49	-0.03	0.70
	Attitude	0.60	0.10	0.39	0.000
	Perceived behavioral control	0.09	0.09	0.07	0.31
	Perceived susceptibility	0.13	0.07	0.12	0.07
	Perceived severity	0.15	0.09	0.11	0.09

Note. R-square = 0.08 for step 1; R-square = 0.27 for step 2 (p = 0.0001); R-square = 0.29 for step 3 (p = 0.07).

4.3.2 Predicting uptake of vaccination (none vs 1, 2, 3 vaccinations)

Univariate analyses show no significant differences between vaccinated and unvaccinated DUs for the variables that are shown in Table 4.4. Our results show that only perceived behavioral control was a significant predictor of vaccination uptake in a logistic regression analyses with vaccination (1, 2 or 3) versus no vaccination as a dependent variable. Attitude, intention, perceived susceptibility, and perceived severity were not. In our model, 7% of the variance in vaccination uptake is explained (Table 4.7).

TABLE 4.7 **SUMMARY OF LOGISTIC REGRESSION ANALYSIS FOR VARIABLES PREDICTING VACCINATION UPTAKE (N=206)**

		OR	95% CI
Step 1	Attitude	0.97	0.76-1.23
	Perceived behavioral control	1.34	1.07-1.67
Step 2	Attitude	0.92	0.70-1.20
	Perceived behavioral control	1.33	1.07-1.67
	Intention	1.07	0.91-1.28
Step 3	Attitude	0.91	0.69-1.19
	Perceived behavioral control	1.34	1.06-1.67
	Intention	1.08	0.91-1.29
	Perceived susceptibility	0.91	0.79-1.08
	Perceived severity	1.16	0.93-1.44

Nagelkerke R-square = 0.05 for step 1; Nagelkerke R-square = 0.05 for step 2 (p= 0.40); Nagelkerke R-square = 0.07 for step 3 (p= 0.17). Hosmer Lemeshow Chi-square= 9.95, p=0.27

4.3.3 Predicting compliance with full vaccination (1, 2 vs 3 vaccinations)

DUs who complied with the full vaccination schedule did not differ from those who did not with regard to gender, age, having a steady partner, or number of sex partners. Neither were behavioral determinants concerning drug use, i.e. the frequency of using heroin, speedballs, or speed significantly different between DUs who did comply and those who did not. However, injecting drug use was found to be univariately (Chi-square (1) = 4.55, p=0.03, two-tailed) as well as multivariately related to vaccine completion. None of the following social-cognitive factors: attitude, intention, perceived susceptibility, and perceived severity could predict compliance with the vaccination procedure (Table 4.8).

TABLE 4.8 **SUMMARY OF LOGISTIC REGRESSION ANALYSIS FOR VARIABLES PREDICTING COMPLIANCE WITH THE VACCINATION SCHEDULE (OBTAINING 3 HEPATITIS B VACCINATIONS) (N=92)**

		OR	95% CI
Step 1	Injecting drug use	0.33	0.12-0.91
Step 2	Injecting drug use	0.31	0.11-0.88
	Attitude	1.23	0.86-1.78
	Perceived behavioral control	0.80	0.55-1.15
Step 3	Injecting drug use	0.30	0.11-0.86
	Attitude	1.31	0.83-2.04
	Perceived behavioral control	0.80	0.55-1.16
	Intention	0.94	0.71-1.24
Step 4	Injecting drug use	0.34	0.12-0.98
	Attitude	1.20	0.74-1.95
	Perceived behavioral control	0.79	0.54-1.16
	Intention	0.93	0.70-1.24
	Perceived susceptibility	0.91	0.68-1.21
	Perceived severity	1.37	0.91-2.06

Nagelkerke R-square = 0.07 for step 1; Nagelkerke R-square = 0.10 for step 2 (p = 0.27); Nagelkerke R-square = 0.11 for step 3 (p= 0.66); Nagelkerke R-square = 0.15 for step 4 (p= 0.21). Hosmer Lemeshow Chi-square= 8.80, p=0.36.

4.4 Discussion

Our prospective study shows that most DUs who participated in the survey had not yet been vaccinated against hepatitis B and had not been infected with the hepatitis B virus. The participants in our study had a high intention to obtain vaccination at the start of the pilot program. After two years, 93 of the 207 DUs who were eligible for vaccination had been vaccinated. By receiving three injections, more than half of them completed the program.

Our results showed that DUs who described themselves as being religious had a higher intention to obtain vaccination within the next 6 months. In addition, those who had a positive attitude towards obtaining vaccination had a higher intention to obtain vaccination against hepatitis B. Perceived severity and perceived susceptibility to be infected with hepatitis B were marginally related to intention to obtain hepatitis B vaccination. Perceived behavioral control was the only social-cognitive construct that was related to vaccination uptake, illustrating that DUs who found themselves more capable of receiving a vaccination were more likely to obtain vaccination later in time. Injecting drug use was the only variable significantly related to vaccine completion in the multivariate logistic regression analysis.

Among men who have sex with men more is known about social-cognitive factors that influence vaccination behavior. De Wit et al. (2005) reported that in this heterogeneous group perceived threat of hepatitis B infection was related to vaccination behavior against hepatitis B. Rhodes et al. (2003) showed that men with increased readiness to complete the 3-dose series of the hepatitis B vaccine perceived lower practical barriers and greater benefits to vaccination, perceived higher severity of infection, and had higher self-efficacy to complete the vaccine series. Although our study found that demographic variables, perceived severity, perceived susceptibility and attitude were not significantly related to vaccination behavior, the latter was associated with intention. We did not find a relation between intention and behavior. Others have paid attention to the great discrepancy between behavioral intentions and actual behavior in social-cognitive models (Orbell & Sheeran, 1998; Abraham et al., 1999; Sheeran & Abraham, 2003). The weak relationship between intention and behavior is largely due to people having good intentions, but failing to act on them (Orbell & Sheeran, 1998; Gollwitzer, 1999). This discrepancy has been labeled the "intention-behavior gap". Sheeran (2002) showed in a meta-analysis that 47% of participants with positive behavioral intentions failed to perform the goal behavior. Contrary to the general population, most DUs live in an environment in which the primary necessities of life play a more important role than obtaining a hepatitis B vaccination. Although DUs have a positive attitude and intention towards obtaining vaccination, different barriers may play a role in their ability to obtain vaccination. Such barriers may include finding a place to sleep, craving for drugs, or a period spent in jail; such activities are urgent and time consuming, leaving little room for planning to obtain a hepatitis B vaccination. The vaccination behavior of DUs should be explored further by investigating the benefits and barriers to obtain vaccination – two constructs of the HBM. Benefits and barriers may also influence compliance, since none of the demographic and social-cognitive factors as described in the present study were able to predict compliance with the vaccination schedule. Results of Des Jarlais et al. (2001) and Seal et al. (2003) suggest that among DUs financial incentives and convenient location greatly increased adherence to hepatitis B vaccination among DUs.

Although Quaglio et al. (2002) showed among injecting DUs who participated in a large cohort study, suboptimal vaccine responses when short vaccine protocols are used (0,1, 2 moths), different studies have indicated the use of accelerated vaccination schedules (3-week or 2-month schedule) to be an acceptable alternative of the routine 6-month schedule, because of a high and fast vaccine completion (Budd et al., 2004; Christensen et al., 2004; Wright et al., 2002). It should however be kept in mind that booster vaccinations are recommended after 12 months to ensure long-lasting immunity if accelerated vaccination schedules are being used (Bock, 2003; Budd, 2004; Nothdurft, 2002). The same barriers that influence vaccination completion rates at the 6-month schedule could influence the uptake of the booster vaccination.

Completion rates were similar to those in earlier studies focusing on hepatitis B adherence rates using the 6-month schedule among DUs, varying from 41% to 83% (Altice et al., 2005; Des Jarlais et al., 2001; Lum et al., 2003; Ompad et al., 2004; Seal et al., 2003; Van Houdt et al., 2006; Van Steenbergen, 2002), and in concordance with the fact that within the Dutch pilot program nearly all vaccinations were received onsite, and no monetary incentive was given. Lugoboni et al. (2004) showed that in Italy 88% of 320 DUs had received three or more vaccinations; however, in that cohort study, participants were studied over 15 years, and were followed up every four months. The extensive screening and the longer period that free vaccination was available in that study may explain the higher compliance among Italian DUs.

Our study has several limitations that may influence the results. First, although the registration of the codes in order to be able to connect the questionnaire data to the vaccination behavior was done with great care, it is possible that in some cases the registration system failed. Consequently, the number of DUs that obtained vaccination may actually be greater than the 93 (44.9%) that were reported here. A second limitation is that some of the respondents did not provide an identification code. Those who did not provide the code were more likely to be religious. It is not clear whether or how this selection bias influenced our results. Third, compliance was not associated with any of the demographic, behavioral and social-cognitive determinants as measured in this study. This could be partly due to insufficient power, since only 50 participants finished the full vaccination schedule. Fourth, since DUs are a so-called hidden population (Watters & Biernacki, 1989) it is extremely difficult to recruit a representative sample. Our study is a convenience sample, which is most likely not fully representative of the total DU population. However, the sample does reflect the population that was targeted in the pilot project, because the same recruitment procedures were used for both the study and the pilot program. Additional study limitations include an inadequate description of the sample and their adaptation skills and abilities. In our study endogenous factors that influence vaccination behavior, i.e. social-cognitive factors, are explored. Since exogenous factors, i.e. the frequency of visiting drug-assistance agencies are not colleted as part of this study we can not draw conclusions about their interaction with social-cognitive factors.

In conclusion, our findings indicate that targeted free hepatitis B vaccination will increase the uptake of vaccination against hepatitis B for DUs. Almost half of the 207 DUs who were eligible for vaccination (i.e. who were not immune and/or had no current infection with the virus) got vaccinated against hepatitis B as a result of the pilot program, and over half of them completed the full vaccination schedule. Our study is the first in which social-cognitive determinants were used to explain vaccination behavior against hepatitis B among DUs. Our advice for future health interventions directed at increasing uptake of vaccination against hepatitis B among DUs is to address perceived behavioral control, which we have demonstrated to have a significant effect on vaccination uptake. Our research findings might be useful for other vaccinations among DUs, for example

vaccination against pneumococcus, the influenza vaccine, or a possible future HIV vaccination.

Glossary

Compliance: Finishing the hepatitis B vaccination schedule by receiving 3 or more vaccinations within 6 months.
Eligible: for vaccination In this study by eligible for vaccination we mean people who are not immune for hepatitis B (those who have not been infected with the virus, and have not been fully vaccinated). They are qualified for hepatitis B vaccination.
Hepatitis B: Hepatitis B is a disease of the liver caused by the hepatitis B virus. The virus can cause lifelong infection, cirrhosis of the liver, liver cancer, liver failure, and death.

References

Abraham, C., Sheeran, P., Norman, N., Conner, P., De Vries, N., Otten, W. (1999). When good intentions are not enough: Modeling post-intention cognitive correlates of condom use. *Journal of Applied Social Psychology,* 29, 2591-2612.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes,* 50, 179-211.

Altice, F.L., Bruce, R.D., Walton, M.R., Buitrago, M.I. (2005). Adherence to hepatitis B virus vaccination at syringe exchange sites. *Journal of Urban Health,* 82, 151-161.

Bock, H.L. (2003). Rapid hepatitis B immunization for the traveler: comparison of two accelerated schedules with a 2-month schedule. *BioDrugs,* 17, 11-13.

Booth, R.E., Kwiatkowski, C.F., Chitwood, D.D. (2000). Sex related HIV risk behaviors: differential risks among injection drug users, crack smokers, and injection drug users who smoke crack. *Drug and Alcohol Dependence,* 58, 219-226.

Budd, J., Robertson, R., Elton, R. (2004). Hepatitis B vaccination and injecting drug users. *British Journal of General Practice,* 54, 444-447.

Centers for Diseases Control and Prevention (1982). Inactivated hepatitis B vaccine. *Morbidity and Mortality Weekly Report,* 31, 317-318.

Christensen, P.B., Fisker, N., Krarup, H.B., Liebert, E., Jaroslavtsev, N., Christensen, K., Georgsen, J. (2004). Hepatitis B vaccination in prison with a 3-week schedule is more efficient than the standard 6-month schedule. *Vaccine,* 44, 3897-3901.

Choi, K.H., Operario, D., Gregorich, S.E., McFarland, W., MacKellar, D., Valleroy, L. (2005). Substance use, substance choice, and unprotected anal intercourse among young Asian American and Pacific Islander men who have sex with men. *AIDS Education and Prevention,* 17, 418-429.

Connor, M., Sparks, P. (1996). The theory of planned behavior. In M. Conner and P. Norman (Eds.), *Predicting health behavior.* (pp. 121-162). Buckingham: Open University Press.

De Boer, I.M., Op de Coul, E.L.M., Beuker, R.J., De Zwart, O., Al Taqatqa, W., Van de Laar, M.J.W. (2004). Trends in HIV prevalence and risk behaviour among injecting drug users in Rotterdam, 1994-2002. *Nederlands Tijdschrift voor Geneeskunde,* 148, 2325-2330.

De Wit, J.B., Vet, R., Schutten, M., Van Steenbergen, J. (2005). Social-cognitive determinants of vaccination behavior against hepatitis B: an assessment among men who have sex with men. *Preventive Medicine,* 40, 795-802.

Des Jarlais, D.C., Fisher, D.G., Newman, J.C., Trubatch, B.N., Yancovitz, M., Paone, D., Perlman, D. (2001). Providing hepatitis B vaccination to injection drug users: referral to health clinics vs on-site vaccination at a syringe exchange program. *American Journal of Public Health,* 91, 1791-1792.

European Monitoring Centre for Drugs and Drug Addiction (2001). *Workgroup review of qualitative research on the health risk associated with injecting drug use*. Lisbon, European Monitoring Centre for Drugs and Drug Addiction. Available: http://www.emcdda.eu.int. Accessed January 19, 2006.

European Monitoring Centre for Drugs and Drug Addiction (2003). *The state of the drugs problem in the European Union and Norway.* Lisbon, European Monitoring Centre for Drugs and Drug Addiction. Available: http://www.emcdda.eu.int. Accessed January 19, 2006.

Gollwitzer, P.M. (1999). Implementation intentions. Strong effects of simple plans. *American Psychologist,* 54, 493-503.

Kleinig, J., Einstein, S. (Eds.) (2006). *Ethical challenges for intervening in drug use: policy, research and treatment issues.* Huntsville, TX: OICJ.

Koester, S., Booth, R., Zhang, E. (1996). The prevalence of additional injection-related HIV risk behaviors among injection drug users. *Journal of Acquired Immunodeficiency Syndrome and Human Retrovirology,* 12, 202-207.

Lugoboni, F., Migliozzi, S., Mezzelani, P., Pajusco, B., Ceravolo, R., Quaglio, G. (2004). Progressive decrease of hepatitis B in a cohort of drug users followed over a period of 15 years: the impact of anti-HBV vaccination. *Scandinavian Journal of Infectious Diseases,* 36, 131-133.

Lum, P.J., Ochoa, K.C., Hahn, J.A., Page Shafer, K., Evans, J.L., Moss, A.R. (2003). Hepatitis B virus immunization among young injection drug users in San Francisco, Calif: the UFO Study. *American Journal of Public Health,* 93, 919-923.

McGregor, J., Marks, P.J., Hayward, A., Bell, Y., Slack, R.C.B. (2003). Factors influencing hepatitis B vaccine uptake in injecting drug users. *Journal of Public Health,* 25, 165-170.

Nothdurft, H.D., Dietrich, M., Zuckerman, J.N., Knobloch, J., Kern, P., Vollmar, J., Sänger, R. (2002). A new accelerated vaccination schedule for rapid protection against hepatitis A and B. *Vaccine,* 20, 1157-1162.

Ompad, D.C., Galea, S., Wu, Y., Fuller, C.M., Latka, M., Koblin, B., Vlahov, D. (2004). Acceptance and completion of hepatitis B vaccination among drug users in New York City. *Communicable Disease and Public Health,* 7, 294-300.

Orbell, S., Sheeran, P. (1998). 'Inclined abstainers': a problem for predicting health-related behaviour. *British Journal of Social Psychology,* 37, 151-165.

Quaglio, G.L., Talamini, G., Lugoboni, F., Lechi, A., Venturini, L.G., Des Jarlais, D.C., Mezzelani, P. (2002). Compliance with hepatitis B vaccination in 1175 heroin users and risk factors associated with lack of vaccine response. *Addiction, 97,* 985-992.

Rhodes, S.D., Grimley, D.M. Hergenrather, K.C. (2003). Integrating behavioral theory to understand hepatitis B vaccination among men who have sex with men. *American Journal of Health Behavior,* 27, 291-300.

Rogers, N., Lubman, D.I. (2005). An accelerated hepatitis B vaccination schedule for young drug users. *Australian and New Zealand Journal of Public Health,* 29, 305–307.

Rosenstock, I.M. (1965). Why people use health services. *Milbank Quarterly,* 44, 94-127.

Rosenstock, I.M. (1974). Historical origins of the health belief model. *Health Education Monographs,* 2, 1-8.

Seal, K.H., Kral, A.H., Lorvick, J., McNees, A., Gee, L., Edlin, B.R. (2003). A randomized controlled trial of monetary incentives vs. outreach to enhance adherence to the hepatitis B vaccine series among injection drug users. *Drug and Alcohol Dependence,* 71, 127-131.

Sheeran, P. (2002). Intention-behavior relations: A conceptual and empirical review. In: Stroebe, W. & Hewstone, M. (Eds.), *European Review of Social Psychology,* 12, 1-36.

Sheeran, P., Abraham, C. (1996). The health belief model. In M. Conner and P. Norman (Eds.), *Predicting health behavior.* (pp. 23-61). Buckingham: Open University Press.

Sheeran, P., Abraham, C. (2003). Mediator of moderators: Temporal stability of intention and the intention-behavior relation. *Personality and Social Psychology Bulletin,* 12, 1-30. Chichester, UK: Wiley.

Van Houdt, R., Sonder, G.J.B., Dukers, N.H.T.M., Bovee, L.P.M.J., Van den Hoek, A., Coutinho, R.A., Bruisten, S.M. Impact of a targeted hepatitis B vaccination program in Amsterdam, The Netherlands. *Vaccine,* 25, 2698-2705.

Van Steenbergen, J.E. (2002). Results of an enhanced-outreach programme of hepatitis B vaccination in the Netherlands (1998-2000) among men who have sex with men, hard drug users, sex workers and heterosexual persons with multiple partners. *Journal of Hepatology,* 37, 507-13.

Watters, J.K., Biernacki, P. (1989). Targeted sampling: Options for the study of hidden populations. *Social Problems,* 36, 416-430.

World Health Organization (2000). Hepatitis B Fact sheet N°204. World Health Organization. Retrieved February 15, 2006, from http://www.who.int.

Wright, N.M.J., Campbell, T.L., Tompkins, C.N.E. (2002). Comparison of conventional and accelerated hepatitis B schedules for homeless drug users. *Communicable diseases and public health,* 5, 324-326.

chapter 5

The reach of a free hepatitis B vaccination program: results of a Dutch study among drug users

Abstract

Objectives. To explore the reach of an ongoing hepatitis B vaccination program in terms of awareness, vaccination uptake and compliance among drug users, and investigate reasons for non-participation.

Methods. Ethnographic mapping and targeted sampling were used to recruit 309 drug users in three regions in the Netherlands. Results are based on univariate statistics (Chi-square and t-tests) and multivariate logistic regression analysis.

Results. Of the sample, 63% reported to be aware of the free vaccine, and 44% reported to be vaccinated. DUs who visited drug consumption rooms were more likely to be aware of the program. Vaccination uptake was negatively associated with age of onset of drug use, and positively with being personally informed about the free vaccination by staff of addiction care agencies. A history of STD infection, and having sexual intercourse with casual partners were negatively associated with compliance with the hepatitis B vaccination schedule (receiving three vaccinations).

Conclusions. Our results suggest that especially marginalized DUs have been reached by the program. Personal communication about the free vaccination by addiction care staff seems beneficial for vaccination uptake. Attention should be paid towards those at risk for hepatitis B infection through sex contacts, since they are less likely to be fully vaccinated. These findings are important in order to increase the success of future vaccination programs.

5.1 Introduction

Hepatitis B is a major public health problem among drug users (DUs). Prevalence rates of previous infection of over 40% were reported in six different European countries among injecting DUs in the years 2004-2005 (Vincente & Wiessing, 2007). Immunization of this risk group is very important. In the Netherlands, after a successful pilot program (Van Steenbergen, 2002) a nationwide vaccination program started in 2002 to expand the number of people with immunity against hepatitis B virus among DUs (Waldhober & Heijnen, 2003).

Within the program, Community Health Services have been collaborating with drug assistance agencies, needle exchange sites, methadone programs, homeless shelters, and prisons (enhanced outreach). Participants are tested for markers of current or past infection with the hepatitis B virus when receiving the first dose of the 3-dose hepatitis B vaccination. Those susceptible for hepatitis B virus are encouraged to adhere to the 6-month vaccination schedule; and are given an incentive (pocket radio) after finishing the program.

To examine if the target group is adequately reached by the hepatitis B vaccination program, we will investigate the proportions as well as characteristics of DUs who are aware of the free hepatitis B vaccination, of DUs who are vaccinated within the program, and of those who comply with the vaccination schedule. In addition, reasons for refusing the vaccine and not obtaining full vaccination are assessed.

5.2 Materials and Methods

5.2.1 Procedure

Interviews were conducted between February and December 2005 in three intervention regions in the Netherlands: Rotterdam, Utrecht and South Limburg. Our recruitment procedure was based on ethnographic mapping and targeted sampling (Watters & Biernacki, 1989). This included conducting interviews with key figures and observations to map all geographic locations where DUs gathered (for example street locations, drug assistance agencies, methadone outlets, and homeless shelters). The interviewers visited the recruitment locations several times at different hours to recruit DUs (comparable to the method of time-location sampling; Muhib et al., 2001). They were informed about the nature of the questions to be expected, the amount of time the interview would take, and the fact that the study was anonymous. After completing the interview, respondents received a reimbursement of 5 euro. Eligible DUs to be included in our study were current chronic users of heroin, base coke/crack, amphetamine and methadone. A total of 309 DUs were interviewed (response rate: 83%).

5.2.2 Measures

Demographics, sexual risk behavior, drug use and the use of facilities were assessed (Table 5.1). Awareness of the program was measured by asking participants whether and how they knew hepatitis B vaccination was free of charge for them. They were also asked about their hepatitis B vaccination status, the vaccination location, and hepatitis B virus infection.

5.2.3 Statistical analyses

Associations between demographics, sexual behavior, drug use, the use of addiction care facilities, and the outcome variables (awareness of the possibility to obtain free hepatitis B vaccination, vaccination uptake, and compliance with the vaccination schedule) were analyzed using univariate statistics (χ^2-test and Student's t-test). Variables associated at $\alpha = 0.1$ level were included in multivariate hierarchic logistic regression analyses. Region was controlled for in these regression analyses.

5.3 Results

5.3.1 Awareness of the possibility to obtain free hepatitis B vaccination

Approximately two third of DUs (62.8%, n=194) were aware of the free hepatitis B vaccination. Of those, 58% was informed by staff of addiction care, 16% by staff of Community Health Services, 12% by a flyer, 9% had seen a poster, and 10% was informed by friends (multiple answers possible).

Table 5.1 shows that region, homelessness, age of onset of drug use, and visiting night shelters and/or drug consumption rooms in the past 6 months were associated with awareness. In addition to these results, DUs who had more frequently visited night shelters or drug consumption rooms in the past 6 months were more likely to be aware of the program (p=0.02; p=0.003). Visiting drug consumption rooms in the past 6 months was the only variable that remained significantly associated with awareness in a multivariate regression analysis (OR=1.86, CI: 1.04, 3.33).

TABLE 5.1. **PROPORTIONS AND MEAN SCORES (SD) OF CHARACTERISTICS FOR THOSE AWARE OR UNAWARE OF THE POSSIBILITY TO OBTAIN FREE HEPATITIS B VACCINATION**

Characteristics		Total	Aware	Un-aware	Characteristics		Total	Aware	Un-aware
		n (%)	Proportions/ mean (SD)				n (%)	Proportions/ mean (SD	
Demographic variables					Sexual behavior				
Rotterdam (ref) Utrecht * Limburg *		103 (33) 105 (34) 101 (33)	70 67 52	30 33 48	Intercourse with steady sex partner	Yes No	94 (31) 213 (69)	57 65	43 35
Male Female		241 (78) 68 (22)	61 68	39 32	Inconsistent condom use with steady sex partner	Yes No	85 (90) 9 (10)	59 44	41 56
Living with partner	Yes No	48 (16) 260 (84)	71 61	29 39	Intercourse with casual sex partner(s)	Yes No	83 (27) 225 (73)	59 64	41 36
Homeless *	Yes No	134 (43) 175 (57)	69 58	31 42	Inconsistent condom use with casual sex partner(s)	Yes No	42 (51) 41 (49)	55 63	45 37
Religious	Yes No	204 (66) 105 (34)	63 62	37 38	No. of casual sex partners	(t-test)	83	2.78 (2.18)	2.86 (3.50)
Low educational level (<=Primary school)	Yes No	110 (64) 199 (36)	61 64	39 36	Being paid for sex	Yes No	30 (10) 262 (90)	67 63	33 37
Dutch ethnicity	Yes No	144 (47) 164 (53)	55 70	45 31	Having paid for sex	Yes No	16 (5) 289 (95)	62 63	38 37
Age	(t-test)	309	41.75 (7.36)	41.57 (7.56)	Lifetime history of STD-infection	Yes No	115 (37) 193 (63)	61 64	39 36
Drug use					Use of facilities in the past 6 months				
Heroin (past 6 months)	Daily <Daily	153 (50) 153 (50)	65 60	35 40	Day shelter	Yes No	118 (39) 182 (61)	66 61	34 39
Base coke/crack (past 6 months)	Daily <Daily	125 (41) 181 (59)	66 60	34 40	Night shelter *	Yes No	95 (32) 206 (68)	72 59	28 41
Ever Injecting-drugs	Yes No	137 (45) 170 (55)	59 66	41 34	Drug consumption room **	Yes No	125 (41) 180 (59)	74 56	26 44
Ever shared needle	Yes No	58 (43) 78 (57)	57 60	43 40	Methadone program	Yes No	192 (63) 115 (37)	64 60	36 40
Injecting drugs (past 6 months)	Yes No	61 (20) 245 (80)	56 65	44 35	Imprisonment	Yes No	99 (32) 210 (68)	67 61	33 39
Age onset of drug use*	(t-test)	306	22.10 (7.18)	20.16 (6.25)					

*p<=0.05; ** p<0.01

5.3.2 Hepatitis B vaccination uptake

In our sample of DUs (n=309), 43.7% (n=135) reported to be vaccinated against hepatitis B (1 or more vaccinations), and 41.8% reported to be vaccinated within the program. The majority of these (78.2%) received their first injection at an outreach location (for example a methadone outlet). The prevalence of self-reported hepatitis B virus infection was 21.9%.

Univariate analyses among DUs who were aware of the program and who reported not to be infected, and to have been vaccinated within the program (n=140) showed that the vaccination rate was highest in the region of Rotterdam (74.1% vs 52.6% in Utrecht vs 65.5% in South Limburg; p=0.06). Also, women were more likely to participate than men (80.6% vs 58.7%; p=0.03), and DUs who obtained vaccination appear to have started drug use at a younger age (21.86 (SD=7.91) vs 24.14 years (SD=6.53); p=0.09). No other significant associations with vaccination uptake were found for the variables shown in Table 5.1. An additional analysis showed that a higher proportion of those informed about the free vaccine by staff members of addiction care reported vaccination as compared to DUs informed through counseling of CHS, flyers, posters or friends (71.6% vs 52.3%; p=0.02).

Age of onset of drug use (AOR=0.94, CI: 0.89, 0.99) as well as being informed about the vaccination program by staff members of addiction care (AOR=2.13, CI: 1.00, 4.53) were significant predictors of hepatitis B vaccination uptake in a multivariate analysis. Reasons for refusing the vaccination were: not thinking of obtaining a vaccination, not perceiving a risk to get infected with the hepatitis B virus, and not finding a convenient moment and/or not having time to obtain vaccination.

5.3.3 Compliance with the hepatitis B vaccination schedule

Of DUs who were vaccinated at least 6 months prior to the interview and thus had the opportunity to be fully vaccinated (n=60), 66.7% received three vaccinations or more. Univariate analyses showed that compliance rates in South Limburg were higher than in Rotterdam and Utrecht (94.1% vs 53.8 vs 58.8%; p=0.02). Compliance was positively associated with ever injecting drug use (79.2% vs 58.3%; p=0.09), and negatively with having intercourse with casual sex partners (42.1% vs 78.0%; p=0.006), as well as history of STD infection (41.7% vs 83.3%; p=0.001). A final multivariate analysis showed DUs who completed the schedule were less likely to report intercourse with casual sex partners (OR=0.15, CI: 0.04, 0.76) and history of STD infection (OR=0.14, CI: 0.04, 0.55) than those who did not obtain full vaccination. The following reasons for noncompliance were reported: missing out on a vaccination appointment because of being involved in drug use at the time of the appointment, being suspended by the drug assistance institution, or because of miscommunication regarding the offering of the third vaccination at one of the drug assistance agencies. Knowledge of the hepatitis B vaccination procedure was lacking by some participants; for example, the need to receive all three vaccinations. Being afraid of needles, laziness, and "no need" were also reported as reasons for non-compliance with the vaccination schedule.

5.4 Discussion

Our results reveal that almost two third of DUs (62.8%) have been reached by the hepatitis B vaccination program: they were aware that they could opt for free vaccination. Visiting drug consumption rooms was the most important predictor of awareness. Moreover, 41.8% of DUs in our study actually obtained vaccination within the program. DUs who started drug use at a younger age were more likely to be vaccinated, as well as those who had been informed about the free vaccine by staff members of addiction facilities compared to those informed by staff of CHS, flyers, posters or friends. By receiving three or more injections, 66.7% of DUs who obtained vaccination complied with the vaccination schedule. Sexual intercourse with casual partners in the past 6 months, and a history of STD were shown to be the most important variables associated with compliance.

Several shortcomings of our study should be addressed. First, a reimbursement for taking part in a survey may induce low-income groups and DUs craving for drugs to participate. Second, self-reported data among DUs have been discussed due to their variable degrees of accuracy (Best et al., 1999; Kuo et al., 2004; Langendam et al., 1999; Schlicting et al., 2003). However, serologic tests have limitations too. Since they are invasive they may increase refusal rates (Fishbein & Pequegnat, 2000).

In accordance with the outreaching nature of the vaccination program, our results show that those DUs who had visited drug consumption rooms were more likely to be aware of the free vaccine. The groups that have been reached by the program are probably the most marginalized groups, since those visiting drug consumption rooms are usually homeless and frequent users of cocaine and/or heroin. Homeless DUs regularly visit low-threshold facilities in which the free hepatitis B vaccination program has been implemented, and thus have a higher change to be aware of the program. The reported reasons for non-participation (such as not having enough time to be vaccinated and/or finding obtaining the vaccination to be inconvenient) support the finding that convenience is related to vaccination uptake (Campbell et al., 2007). In addition to these findings, we show that personal communication about the free vaccination by addiction care staff is associated with vaccination uptake and seems more efficient than showing posters or distributing flyers. Since most DUs were vaccinated on location (such as drug consumption rooms), immediate vaccination after the personal communication may be the crucial factor related to vaccination uptake.

The present study also shows that sexually active DUs and those with a history of STD infection (a group at risk for hepatitis B virus infection through sexual transmission, taken into account the high number of DUs who had unprotected sex as shown in table 5.1), are less likely to be fully vaccinated. This stresses the need to stimulate compliance with the full vaccination schedule.

References

Best, D., Noble, A., Finch, E., Gossop, M., Sidwell, C., Strang, J. (1999). Accuracy of perceptions of hepatitis B and C status: Cross sectional investigation of opiate addicts in treatment. *British Medical Journal*, 19, 290-291.

Campbell, J.V., Garfein, R.S., Thiede, H., Hagan, H., Ouellet, L.J., Golub, E.T., Hudson, S.M., Ompad, D.C., Weinbaum, C. (2007). Convenience is the key to hepatitis A and B vaccination uptake among young adult injection drug users. *Drug and Alcohol Dependence*, 91, S64-72.

Des Jarlais, D.C., Fisher, D.G., Newman, J.C., et al. (2001). Providing hepatitis B vaccination to injection drug users: referral to health clinics vs onsite vaccination at a syringe exchange program. *American Journal of Public Health*, 91, 1791–1792.

Fishbein, M., Pequegnat, W. (2000). Evaluating AIDS prevention interventions using behavioral and biological outcome measures. *Sexually Transmitted Diseases*, 27, 101–110.

Kuo, I., Mudrick, D.W., Strathdee, S.A., Thomas, D.L., Sherman, S.G. (2004). Poor validity of self-reported hepatitis B virus infection and vaccination status among young drug users. *Clinical Infectious Diseases*, 38, 587–590.

Langendam, M.W., Van Haastrecht, H.J., Van Ameijden, E.J. (1999). The validity of drug users'self-reports in a non-treatment setting: prevalence and predictors of incorrect reporting methadone treatment modalities. *International Journal of Epidemiology*, 28, 514-520.

Muhib, F.B., Lin, L.S., Stueve, A., Miller, R.L., Ford, W.L., Johnson, W.D., Smith, P.J. (2001). A venue-based method for sampling hard-to-reach populations. *Public Health Report*, 116, 216–22.

Quaglio, G.L., Lugoboni, F., Mezzelani, P., Des Jarlais, D.C., Lechi, A. (2006). Hepatitis vaccination among drug users. *Vaccine*, 24, 2702-09.

Schlicting, E.G., Johnson, M.E., Brems, C., Wells, R.S., Fisher, D.G., Reynolds, G. (2003). Validity of injecting drug users'self report of hepatitis A, B, and C. *Clinical Laboratory Science*, 16, 99-106.

Van Steenbergen, J.E. (2002). Results of an enhanced-outreach programme of hepatitis B vaccination in the Netherlands (1998–2000) among men who have sex with men, hard drug users, sex workers and heterosexual persons with multiple partners. *Journal of Hepatology*, 37, 507–513.

Vincente J., Wiessing, L. (2007). European Monitoring Centre for Drugs and Drug Addiction annual report 2007: positive assessment of HIV in IDUs though hepatitis C still very high. *Euro Surveillance*, 12, 3317.

Waldhober, Q., Heijnen, M-L. (2003). Landelijk bereik van HBV-vaccinatiecampagne risicogroepen. *Infectieziekten Bulletin*, 14, 249-253.

Watters, J.K., Biernacki, P. (1989). Targeted sampling: Options for the study of hidden populations. *Social Problems*, 36, 416-430.

Wright, N.M., Campbell, T.L., Tompkins, C.N. (2002). Comparison of conventional and accelerated hepatitis B immunisation schedules for homeless drug users. *Communicable Disease and Public Health*, 5, 324-326.

chapter 6

Vaccination uptake and awareness of a free hepatitis B vaccination program among female commercial sex workers

Abstract

Objectives. To explore the reach of a free hepatitis B vaccination program among female commercial sex workers within a legalized prostitution setting in the Netherlands, and investigate reasons for non-participation and non-compliance.

Methods. In this cross-sectional study, based on ethnographic mapping and targeted sampling, 259 commercial sex workers were interviewed at their work in three regions in the Netherlands. The semi-structured interviews contained questions on socio-demographics, sexual risk behavior, sex work, awareness of the opportunity to obtain free hepatitis B vaccination, vaccination uptake, and compliance with the full vaccination schedule.

Results. Of our sample, 79% reported to be aware of the opportunity to obtain hepatitis B vaccination, and 63% reported to be vaccinated against hepatitis B (received at least one vaccination). A personal approach by health professionals was associated with vaccination uptake, when specific socio-demographic variables, sexual behavior and sex work related covariates were controlled for in the analysis. Window prostitution and the duration of working in the region were associated with awareness of the opportunity to obtain free hepatitis B vaccination.

Conclusions. The results of this study suggest that outreach activities (i.e. personal approach) within this program are beneficial. Transient commercial sex workers are more difficult to reach within the current vaccination program. The results can be used to increase the success of future health programs among this specific risk group.

6.1 Introduction

Hepatitis B, an infectious disease of the liver caused by the hepatitis B virus, is a major public health problem worldwide. Over 350 million people are currently chronically infected with hepatitis B. The virus is directly transmitted through unsafe sex and blood contact, and is 50 to 100 times more contagious than HIV (WHO, 2000). A safe and effective vaccine against hepatitis B has been available since 1982 (CDC, 1982) and consists of three injections.

In the Netherlands, a low endemic country with 2.1% persons in the general population showing markers of previous infection (anti-HBc-positive) (Van Marrewijk et al., 1999), the Health Council of the Netherlands advised the Dutch Ministry of Health to vaccinate risk groups for hepatitis B. This resulted in a two-year pilot program which started in 1998, followed by an ongoing nationwide vaccination program which started in 2002, targeted at specific risk groups: drug users (DUs), commercial sex workers (CSWs), men who have sex with men (MSM), and heterosexuals with multiple sex partners. The aim of the program is to expand the number of persons among these behavioral risk groups with immunity against hepatitis B through vaccination by Community Health Services (Waldhober et al., 2003). These public services are responsible for environmental health, communicable disease control, epidemiology, health education and related tasks. Since the start of the program in November 2002 through September 2007, nationwide, a total of 78,263 persons from four (combined) risk groups (DUs, CSWs, MSM, and heterosexuals with multiple sex partners) obtained at least one vaccination. Of these persons, 16% are DU, 12% are CSW (male and female), 25% are MSM, 46% are heterosexual with multiple sex partners, and 1% is known to have multiple sex partners (Heijnen et al., 2007).

Within the Dutch vaccination program, the hepatitis B vaccination is offered free of charge. Participants were tested for markers of current or past infection with the virus when receiving their first dose of the hepatitis B vaccination. When found to be chronically infected (positive for anti-HBc and HBsAg), participants were referred to their healthcare providers for complete serological hepatitis B virus screening and counseling, with treatment if possible. Those who were susceptible for hepatitis B were urged to get their second and third dose after 1 and 6 months, respectively, in order to comply with the hepatitis B vaccination schedule to obtain long-lasting protection (at least 15-20 years, probably lifelong). For those who had obtained natural immunity (anti-HBc positive, HBsAg negative), no further vaccination was required (Waldhober et al., 2003).

In order to reach CSWs, staff of the Community Health Services periodically visited various prostitution locations (i.e. the streets, windows, clubs, sex shops and brothels); this method of enrolling participants for vaccination is referred to as 'enhanced outreach'. Posters and flyers were also distributed as part of the program (Waldhober et al., 2003). Vaccines were distributed and offered at all prostitution locations possible (clubs, windows, etc.). Prostitution clubs and brothels were visited at least 3 times a year (the time interval determined by the schedule of the vaccine). The window-prostitution sites in Utrecht were visited once a month; and at the prostitution zones the vaccines were offered once a month in Utrecht, whereas in Rotterdam the zone was visited one day a week (providing hepatitis B vaccination flyers and safe-sex advice) and vaccines were offered 3 times a year. In all regions, Community Health Services collaborated with prostitution care at the prostitution zones. This enabled them to use the facilities of these organisations (e.g., a bus that provided shelter for CSWs) for the vaccination. In South Limburg, staff of prostitution care vaccinated CSWs; therefore in that region the vaccine could be offered at any given time by the staff of prostitution care at the prostitution zone. In addition the option was open for all CSWs to obtain vaccination at the local Community Health Services at regular office hours.

In order to establish an optimal program regarding the group of CSWs, it is necessary to examine whether this target group is adequately reached by the national hepatitis B vaccination program. Therefore, the present study explored the proportion and characteristics of CSWs who:

- are aware that they can opt for free hepatitis B vaccination;
- obtained vaccination within the program;
- have complied with the hepatitis B vaccination schedule.

We also investigated reasons for non-participation in the vaccination program and non-compliance with the hepatitis B vaccination schedule. This information is useful for the development of future vaccination programs aimed at protecting the sexual health of CSWs.

6.2 Materials and Methods

6.2.1 Procedure

Between September 2004 and February 2006, 259 CSWs were recruited for semi-quantitative interviews in three intervention regions in the Netherlands: Rotterdam, Utrecht and South Limburg. Our recruitment procedure was based on ethnographic mapping and targeted sampling (Watters & Biernacki, 1989). Since the year 2000, prostitution has been legalized in the Netherlands. Adults with a legal residency or valid working papers are permitted to work as a prostitute. Sex locations, such as prostitution clubs and brothels, are licensed by the local authorities (Smallenbroek & Smits, 2001). This enabled us to start our sampling method by studying documents of prostitution policy and administration of the municipalities. The next step involved conducting interviews with key figures, i.e., experts, outreach workers, as well as social workers, health services providers, local authorities, police officers, local residents, and CSWs themselves. Following this method, all geographic locations where CSWs gathered were mapped for each of our study regions. After the initial ethnographic map was made, repeated observations took place at different hours at the locations that were pointed out by the key persons. The number, the frequency and the socio-demographic features of CSWs visiting these locations were estimated. After we had gathered sufficient information on the sub-groups at each location, the number of CSWs to be recruited per location was determined.

The final number of respondents that were recruited per recruitment location is shown in Table 6.1.

TABLE 6.1 **NUMBER OF RESPONDENTS (CSWS) PER RECRUITMENT LOCATION TYPE PER REGION**

	Rotterdam	Utrecht	South Limburg	Total
Brothel/private house	26	11	23	60
Club	37	4	19	60
Escort	6	4	2	12
Prostitution zone	7	12	8	27
Window	x	68	x	68
Home	3	3	3	9
Erotic massage salon	5	0	7	12
Erotic bar	8	x	x	8
Sex shop (with CSWs)	3	x	0	3
Total	95	102	62	259

Notes: 'x' = does not exist in that region; 'o' = exists in the region but nobody was recruited to represent this particular location

Managers of the selected clubs, brothels, sex shops and erotic massage salons were informed about our study and a request was sent out to recruit CSWs at these locations. At street and window locations the interviewers could access CSWs directly without the mediation of managers. Escorts and CSWs who worked at home were recruited by the interviewers via telephone. All other CSWs were recruited personally by the interviewers. The interviewers visited the recruitment locations several times at different hours. To avoid double interviews, the characteristics of respondents were noted, and the same pair of interviewers worked together in the same region. Interviews were conducted in various languages: Dutch, English, German, French, and Spanish. As part of the informed consent-related procedure, CSWs were given information about the nature of the questions to be expected, the amount of time the interview would take, and the fact that the study was based on anonymity. They were informed that they had the opportunity not to answer any question if they chose not to. On average an interview took 45 minutes to complete. After completing the interview, respondents were given a manicure set as a gift for their participation.

6.2.2 Participants

In the present study CSWs are defined as women who engage in sexual behavior for money. They were all recruited within a legalized or tolerated setting. A total of 259 CSWs participated in the study. The response rate at the locations was 64%; in brothels the response rate was highest (90%), followed by clubs (78%), erotic massage salons (63%), erotic bars (57%), window prostitution (50%) and prostitution zones (46%). In Utrecht, a region with mainly window and street prostitution, the response was lower (48%) compared to Rotterdam (78%) and South Limburg (86%) ($\chi^2(2)=44.90$, p=0.00, two-tailed) where there is no window prostitution. The most important reason for non-participation in the present study was the lack of time to be interviewed. No significant differences were found between CSWs who did and did not participate regarding their age and ethnicity.

6.2.3 Measures

The interviews were conducted using a semi-structured questionnaire in which the following socio-demographic information was noted: highest educational level attained, the country in which they, their mother and father were born, their living situation (with which persons) in the preceding 6 months, religion[2], housing situation (in what type of accommodation), and their year of birth.

Since hepatitis B can be transmitted through unsafe sex, sexual behavior (intercourse, oral sex) with regular and casual sex partners (who did not pay for sex) in the preceding 6 months were measured, as well as condom use, and lifetime history of sexually transmitted disease (STD) infection. Subsequently, sexual behavior as well as condom use with clients in the past 6 months was assessed, including having had a torn condom during intercourse with clients[3]. Finally, the number of unique clients with whom CSWs had had sexual contact in the previous week was measured (which will be referred to in the text as 'frequency of client contacts').
Respondents were asked about which locations they currently work in. To assess the transience of CSWs they were also asked the duration of working as a prostitute, in the specific study region, and at their current workplace.

Participants were asked if they had obtained hepatitis B vaccination, the number of injections they had received, the location of vaccination onset, and when the first vaccination was received. To measure immunity, respondents were asked if they had ever been infected with the hepatitis B virus. Awareness of the vaccination program was assessed by asking participants whether they knew hepatitis B vaccination was free of charge for people with multiple sex partners (also prostitutes). Finally, CSWs were asked how they had been informed about the free hepatitis B vaccination. Respondents who had not obtained vaccination but were aware of the program were asked for the reason(s) for non-participation. Those who had obtained vaccination, but had not complied with the full vaccination schedule (3 vaccinations) were asked why not.

---

[2] *Some religions prevalent in the Netherlands are opposed to vaccinations; as such, religion may correlate with lower vaccination uptake rates.*

[3] *The variables 'torn condom during intercourse with clients' and 'duration of working as a prostitute' were included in the questionnaire at a later time point, therefore only part of the sample of CSWs have responded to this question (respectively, n=179 and n=187; not applicable for n=10).*

6.2.4 Statistical analyses

Associations between socio-demographics, sexual behavior and issues related to sex work with awareness of the opportunity to obtain free hepatitis B vaccination, vaccination uptake (0 vs 1 or more reported hepatitis B vaccinations) and compliance (1, 2 vs 3 or more reported hepatitis B vaccinations) were analyzed using univariate statistics (Chi-square test, Student's t-test, and Mann-Whitney U tests). Variables with a significance level $\alpha<0.10$ in univariate analyses were included as covariates in multivariate logistic regression analyses. Awareness of the opportunity to obtain free hepatitis B vaccination, vaccination uptake and compliance with the vaccination schedule were included as the dependent variables. To control for variability in intensity and duration of the vaccination program between the three regions, region was controlled for in the regression analyses. A p-value of 0.05 was considered statistically significant.

6.3 Results

6.3.1 Sample characteristics

Tables 6.2 to 6.4 present the sample characteristics and the differences between CSWs who were aware of the opportunity to obtain free hepatitis B vaccination and those who were not.

TABLE 6.2 **PROPORTIONS AND MEAN SCORES (SD) FOR SOCIO-DEMOGRAPHIC FACTORS FOR THOSE AWARE OR UNAWARE OF THE OPPORTUNITY TO OBTAIN FREE HEPATITIS B VACCINATION**

Characteristics	Total group	Aware	Unaware	
	n (%)	%	%	χ^2
Region				
Rotterdam	95 (37)	76	24	1.11
Utrecht	102 (39)	80	20	
South Limburg	62 (24)	82	18	
Living situation				
Alone	82 (31)	81	19	0.13
Not alone	177 (69)	79	21	
Housing situation				
Living in a house	205 (79)	79	21	0.92
Other	54 (21)	80	20	
Religious				
Yes	162 (63)	80	20	0.06
No	97 (37)	79	21	
Educational level				
Low	138 (54)	80	20	0.17
Medium and high	116 (46)	79	21	
Ethnicity				
Dutch	77 (30)	74	26	1.74
Other	182 (70)	81	19	
	n / mean (SD)	Mean (SD)	Mean (SD)	T
Age	256 / 33.88 (8.96)	34.68 (8.74)	30.89 (9.22)	-2.80*

* $p<0.01$

TABLE 6.3 **PROPORTIONS AND MEAN SCORES (SD) FOR SEXUAL RISK BEHAVIOR FACTORS FOR THOSE AWARE OR UNAWARE OF THE OPPORTUNITY TO OBTAIN FREE HEPATITIS B VACCINATION**

Characteristics	Total group	Aware	Unaware	
	n (%)	%	%	χ^2
Intercourse with a regular partner				
Yes	168 (65)	81	19	0.74
No	89 (35)	76	24	
Condom use				
Always	28 (17)	82	18	0.04
Inconsistent/never	139 (83)	81	19	
Intercourse with casual partner (s)				
Yes	61 (24)	74	26	1.40
No	193 (76)	81	19	
Condom use				
Always	31 (53)	81	19	2.26
Inconsistent/never	27 (47)	63	37	
Intercourse with clients				
Yes	234 (91)	79	21	-
No	22 (9)	86	14	
Condom use				
Always	229 (98)	79	21	-
Inconsistent/never	5 (2)	80	20	
Torn condom				
Yes	46 (26)	67	33	7.46**
No	133 (74)	86	14	
Oral sex (active) with clients				
Yes	235 (92)	79	21	-
No	21 (8)	86	14	
Condom use				
Always	189 (80)	78	22	0.52
Inconsistent/never	46 (20)	83	17	
Frequency of client contacts				
High	117 (47)	86	14	4.94*
Low	131 (53)	74	26	
STD				
Ever	90 (35)	83	17	1.38
Never	166 (65)	77	23	

* p<=0.05, ** p<0.01

TABLE 6.4 **PROPORTIONS AND MEAN SCORES (SD) FOR FACTORS RELATED TO SEX WORK FOR THOSE AWARE OR UNAWARE OF THE OPPORTUNITY TO OBTAIN FREE HEPATITIS B VACCINATION**

Characteristics	Total group	Aware	Unaware	
	n (%)	%	%	χ^2
Club				
Yes	60 (23)	80	20	0.02
No	196 (77)	79	21	
Brothel				
Yes	62 (24)	74	26	1.26
No	193 (76)	81	19	
Window				
Yes	69 (27)	88	12	4.70*
No	188 (73)	76	24	
Prostitution zone				
Yes	27 (11)	85	15	0.72
No	229 (89)	78	22	
Escort				
Yes	18 (7)	61	39	-
No	223 (93)	81	19	
Home				
Yes	13 (5)	69	31	-
No	242 (95)	80	20	
Erotic massage salon				
Yes	12 (5)	75	25	-
No	243 (95)	79	21	
Erotic bar				
Yes	11 (4)	55	45	-
No	244 (96)	80	20	
	n / Mean (SD)	Mean (SD)	Mean (SD)	T
Duration of working as a prostitute (in months)	187 / 66.88 (70.73)	75.97 (73.01)	27.39 (41.45)	-5.30**
Duration of working in the region (in months)	251 / 39.25 (55.91)	44.77 (59.44)	18.15 (32.13)	-4.34**
Duration of working at the workplace (in months)	249 / 25.30 (40.25)	28.49 (43.33)	13.21 (21.78)	-3.54*

* p<=0.05,** p<0.001

In addition to Table 6.4, our data on the transience of CSWs show that 25% of CSWs were working for less than 6 months in the current region. Furthermore, 25% of CSWs were working for less than 3 months at the current workplace. For some of the CSWs (n=187) we found that 20% began work as a prostitute less than one year ago.

6.3.2 Awareness of the opportunity to obtain free hepatitis B vaccination

Our results show that most CSWs (79.2%) were aware that they could obtain free hepatitis B vaccination. Table 6.5 shows that most CSW learned about this via staff of the Community Health Services.

TABLE 6.5 **RESPONDENTS SPECIFIED BY THE WAYS IN WHICH THEY WERE INFORMED OF THE OPPORTUNITY TO OBTAIN FREE HEPATITIS B VACCINATION (MULTIPLE ANSWERS WERE POSSIBLE)**

	Proportions (N=204)
Staff of Community Health Service	53
Friends and/or colleagues	18
Staff of prostitution care facilities	14
STD clinic	12
Flyer	8
Poster	4
Advertisement in local newspaper	2
Internet site	1

Univariate statistics showed that CSWs who were aware that they can obtain free hepatitis B vaccination were on average 4 years older than those who were not aware (Table 6.2). A higher proportion of CSWs who had a greater frequency of client contacts (>12 different clients in the past week) was aware of the hepatitis B vaccination program, compared to those who had a lower frequency of client contacts. Among CSWs who reported that a condom had been torn during intercourse with clients in the past 6 months, a lower proportion was aware of the program, as compared to those who did not report a torn condom (Table 6.3). Window prostitution was associated with an increased awareness of the vaccination program. Those who had worked for a longer period of time as a prostitute in the current region, and at the current workplace, were more likely to be aware of the opportunity to obtain free vaccination against hepatitis B, as compared to those who reported shorter durations on these variables (Table 6.4).

The variables with a p-value < 0.10 in univariate analyses were included in a multivariate logistic regression analysis to show which factors are most important in explaining awareness of the opportunity to obtain free hepatitis B vaccination. Because of a high correlation between the variables "duration of working in the current region" and "duration of working at the current workplace" (Spearman rho=0.75, p=0.0001), we have chosen to only include "duration of working in the current region" in the logistic regression analysis. The regression analysis (Table 6.6) shows that window prostitution and duration of working in the current region were the most important predictors of awareness of the opportunity to obtain free hepatitis B vaccination. Nagelkerke R-square= 0.18, p=0.0001 for the model. If we also include two variables that present only a part of our sample, i.e., the prevalence of a torn condom during intercourse with clients (n=179), and duration of working as a prostitute (n=187), Nagelkerke R-square would be 0.34, p=0.0001 for the model with n=172. This models shows that reporting a torn condom (OR: 0.37, CI: 0.15-0.91), duration of working as a prostitute (OR: 1.03, CI: 1.01-1.06), and window prostitution (OR: 5.22, CI: 1.32, 20.60) were associated with awareness when adjusted for confounding.

TABLE 6.6 **SUMMARY OF LOGISTIC REGRESSION ANALYSES FOR FACTORS PREDICTING AWARENESS OF THE OPPORTUNITY TO OBTAIN FREE HEPATITIS B VACCINATION PROGRAM (N=243), HEPATITIS B VACCINATION UPTAKE (N=157), AND COMPLIANCE WITH THE HEPATITIS B VACCINATION SCHEDULE (N=90)**

		OR	95% CI	Nagelkerke R-square
Awareness	Region (2)	0.44	0.17-1.09	
	Region (3)	1.18	0.49-2.86	
	Age	1.02	0.98-1.07	
	Frequency of client contacts	1.42	0.65-3.11	
	Window prostitution	5.11	1.53-17.04	
	Duration of working in the region (in months)	1.02	1.01-1.03	0.18
Vaccination uptake	Region (2)	1.09	0.27-4.35	
	Region (3)	4.09	1.23-13.59	
	Age	1.02	0.97-1.07	
	Religious	1.94	0.85-4.41	
	Frequency of client contacts	1.29	0.49-3.38	
	Window prostitution	1.69	0.35-8.20	
	Duration of working at the current workplace (in months)	1.01	1.00-1.03	
	Personal information by professionals	4.27	1.84-9.92	0.29
Compliance	Region (2)	0.91	0.25-3.30	
	Region (3)	0.90	0.18-4.55	
	Age	1.07	0.98-1.16	
	Intercourse with a regular partner	2.23	0.63-7.91	
	Intercourse with casual sex partner(s)	0.42	0.12-1.48	
	STD	0.49	0.16-1.52	
	Duration of working at the current workplace	1.00	0.99-1.02	0.21

6.3.3 Hepatitis B vaccination uptake

In our sample, the self-reported vaccination rate against hepatitis B (1 or more vaccinations) was 63.4%. Of the CSWs who had obtained hepatitis B vaccination (n=163), 134 persons got vaccinated within the free hepatitis B vaccination program (82.2%). The majority (64.4%) received their first injection at an outreach location, such as their workplace or prostitution care facility, 30.3% were vaccinated at the Community Health Service, and 5.3% at another location, such as an STD clinic.

Univariate analyses to explore correlates of vaccination uptake were performed within the group of CSWs that were eligible to obtain hepatitis B vaccination within the program (n=167). The selection of this eligible group include CSWs who were aware of the free hepatitis B vaccination program (n=205), minus the number of CSWs who were aware but had obtained vaccination outside the hepatitis B vaccination program (205-24=181), minus the number of CSWs who had reported to have ever been infected with the hepatitis B virus (181-13= 167).

Vaccination uptake was higher in Utrecht and South Limburg as compared to Rotterdam (80%, 81% vs 62%; $\chi^2(2)=7.18$, p=0.03, two-tailed). CSWs who obtained vaccination had a mean age of 35.40 (SD: 8.31) years as compared to a mean age of 32.09 (SD: 9.67) years among those who did not obtain vaccination (t=-2.14 (df=162), p=0.03, two-tailed). CSWs who reported to be religious were more likely to be vaccinated. Among religious CSWs, 79% had obtained vaccination as compared to 64% among the non-religious CSWs ($\chi^2(1)=4.26$, p=0.04, two-tailed). A higher proportion of CSWs who reported a torn condom during intercourse with clients had obtained vaccination (93%), as compared to those who had not reported that (73%) ($\chi^2(1)=4.66$, p=0.03, two-tailed). A higher proportion of CSWs with a high frequency of client contacts (>12) in the past week had obtained vaccination (80%) as compared to those who had a low frequency of client contacts (66%) (marginally significant: $\chi^2(1)=3.64$, p=0.06, two-tailed). CSWs who had been working behind a window were more likely to obtain vaccination (84% vs 69%; $\chi^2(1)=3.97$, p=0.045, two-tailed). Duration of working at the workplace was positively associated with vaccination uptake. Those who had been vaccinated had worked for a mean duration of 33.43 (SD: 50.49) months at the current workplace compared to a mean duration of 15.88 (SD: 21.59) months among those who had not been vaccinated against hepatitis B (t=-3.08 (df=153.42), p=0.002, two-tailed). No other significant associations emerged between hepatitis B vaccination uptake and the other variables presented in Tables 6.2, 6.3 and 6.4. CSWs who had been personally informed about the opportunity to obtain free hepatitis B vaccination by staff of Community Health Services or prostitution care facilities (thus by professionals) were more likely to obtain vaccination (83%) as compared to those who had been informed in other ways (57%), e.g. via posters, flyers or by colleagues ($\chi^2(1)=13.79$, p=0.0001, two-tailed).

A multivariate logistic regression analysis showed that receiving personal information from professionals about the vaccination program was the most important predictor of hepatitis B vaccination uptake. The other statistically significant variable is the region of work. Duration of working at the current workplace was marginally significant (Table 6). Nagelkerke R-square= 0.29, p=0.0001 for the model. If we also include the prevalence of a torn condom during intercourse with clients (OR: 3.37, CI: 0.57-19.92), a variable that can be calculated for only a part of our sample, Nagelkerke R-square would be 0.39, p model=0.0001, with n=109, indicating that the model effect size is stronger.

CSWs who did not obtain vaccination and who had reported not to be infected with hepatitis B (n=45) reported different reasons for non-participation. The most important reason was lack of time. Others reported that they did not think they would get infected with the virus, were afraid of needles, laziness, or simply no longer thought about the free hepatitis B vaccination. A few reported that they had been out of business for a while and had recently begun working in prostitution again. Finally, some reported lack of knowledge about hepatitis, the vaccine, and the vaccination procedure.

6.3.4 Compliance with the hepatitis B vaccination schedule

The compliance rates were analyzed of all CSWs who had not reported to be infected with the hepatitis B virus, who had participated in the vaccination program, and who were vaccinated at least 6 months prior to the interview (n=94). This means that all respondents within the analyses have had the opportunity to get fully vaccinated within the normal vaccination schedule. Of these CSWs, 79% received three vaccinations or more, 16% received two vaccinations, and 5% received only one vaccination.

Univariate analyses showed that CSWs who did not comply with the vaccination schedule were younger than those who did (Mann-Whitney U, z=-2.16, p=0.03, two-tailed). No other socio-demographic variables had significant differences between those who complied and those who did not. CSWs who had intercourse with casual partner(s) in the past 6 months showed lower compliance rates (57%) than CSWs who had not (86%) (χ^2 (1)=8.52, p=0.004, two-tailed). CSWs who had intercourse with a regular partner in the past 6 months showed higher completion rates (84%) as compared to CSWs who had not (69%) (marginally significant: $\chi^2(1)=2.88$, p=0.09, two-tailed). Compliance rates were lower among CSWs who reported lifetime occurrence of an STD (69%) as compared to those who did not (85%) (marginally significant:χ^2 (1)=3.00, p=0.08, two-tailed). The other sexual behavior variables were not related with compliance with the vaccination schedule. For a few variables Chi-square statistics could not be calculated because more than 20% of the cells had an expected count of less than 5. CSWs who complied with the vaccination schedule had higher scores on duration of working as a prostitute and duration of working at the current workplace (Mann-Whitney U test, respectively: z=-1.77, p=0.07 (marginally significant), and z=-1.94, p=0.05). None of the other variables in Table 6.3 showed a significant association with compliance; in addition, compliance was not associated with

receiving personal information about the free hepatitis B vaccine by staff of Community Health Services or prostitution care facilities.

Those variables that showed a p-value of <0.10 in the previous univariate statistics were included in a multivariate logistic regression analysis on compliance, in which we controlled for the region in which CSWs were recruited (Table 6.6). The analysis shows no significant results. Nagelkerke R-square= 0.21, p=0.08 for the model. Duration of working in the prostitution sector (OR: 1.00, CI: 0.99-1.01), a variable that can be calculated for only a part of our sample, also showed no significant results on a multivariate level (n=69).

CSWs who were eligible for hepatitis B vaccination (i.e., who were not immune), but did not comply with the vaccination schedule (n=20), reported missing a vaccination appointment as the most important reason. For example, they were on vacation when the second or third vaccination was offered, or they had moved to another workplace. Other reasons for non-compliance were forgetting the appointment, and laziness. A few persons reported that they did not know about a third vaccination.

6.4 Discussion

To our knowledge this is one of the first studies to examine which factors explain awareness of the opportunity to obtain free hepatitis B vaccination, hepatitis B vaccination uptake, and compliance with the vaccination schedule among female CSW. In our sample, 79% of the 259 CSWs reported they were aware of the free hepatitis B vaccination program. Window prostitution and duration of working in the current region were associated with awareness of the free hepatitis B vaccination program in a multivariate model. The self-reported hepatitis B vaccination rate (1 or more vaccinations) was 63%. Most CSWs reported they were vaccinated within the free hepatitis B vaccination program (82.2%). On a multivariate level we found that, among CSWs who were eligible for vaccination, those who were personally informed and those working in South Limburg were more likely to be vaccinated. The most important reason given for non-participation was lack of time. Univariate analysis showed that CSWs who had intercourse with casual sex partners in the past 6 months were less likely to comply with the vaccination schedule, as compared to those who did not. CSWs who complied with the vaccination schedule had been working for a longer time at their current workplace. However, these associations were not found in the multivariate analysis adjusted for region, age, having intercourse with a regular sex partner, and having reported an STD infection.

Our results should be considered in the light of the following limitations. First, all variables measured in our study, including hepatitis B vaccination uptake and compliance with the vaccination schedule, were based on self-reported data. Recall or social-desirability bias could undermine the accuracy of self-reports. Self-reported vaccination status and hepatitis B infection in other study groups (such as drug users) have been discussed because of their degree of accuracy as determined by serologic testing, as shown in previous studies (Best et al., 1999; Kuo et al., 2004; Schlicting et al., 2003). Second, the cross-sectional design of the study does not allow us to draw inferences about causality. Third, the prostitution locations visited by the interviewers had a license or were tolerated. This study is thus within the context of a legalized system. In a legalized setting, illegal prostitution (e.g. prostitution by minors and illegal immigrants) will be under pressure from the local authorities. Those working illegally will probably be harder to recruit by health professionals and interviewers, and are therefore less likely to participate in the vaccination program or in this type of study. These CSWs who work illegally could even be at higher risk for hepatitis B infection. This does not mean that the results are not partly generalizable to an illegal context; for example, transience or mobility among CSWs is not exclusively a Dutch phenomenon. Transience among CSWs is prevalent in most parts of the world, enabling our results to have a broader relevance.

The relationship between having had a torn condom during intercourse with clients and awareness of the opportunity to obtain free hepatitis B vaccination is not straightforward. Those who had reported a torn condom during intercourse with clients were less likely to have heard of the free vaccine. Our explanation is as follows: during their visits to prostitution locations, the health professionals of Community Health Services were able to combine promoting safer sex regarding STD and the hepatitis B vaccine. Thus, those who have not yet been informed about the free hepatitis B vaccination program (not aware) will not have seen a health professional for safe condom use (such as the use of a right lubricant) either. These individuals are probably more at risk for a torn condom. There was no correlation between having a torn condom and duration of working as a prostitute or frequency of client contacts (results not shown). Analyses among those who were aware of the free vaccine showed that those who reported a torn condom during intercourse with clients were more likely to be vaccinated. Individuals who perceive themselves as being vulnerable for hepatitis B infection (e.g. those who reported a torn condom) are more likely to be motivated to obtain hepatitis B vaccination (De Wit et al., 2005).

Our findings show that a personal approach by professionals is associated with a higher rate of vaccination uptake. Receiving information about the vaccination from an expert seems to be more effective than receiving this information via flyers or posters. The association between personal approach and vaccination uptake may be mediated by immediate vaccine accessibility. Within the vaccination program, the health professional not only gave personal information about the vaccine, but was able to administer the vaccination immediately thereafter. Our study shows that many first vaccinations were administered at the workplace, or at an outreach location. Of the CSWs who were vaccinated within the vaccination program, and reported to be personally informed about the vaccination program by professionals, 75% had received their first vaccination at an outreach location, such as their workplace. Vaccination on location may thus be the crucial factor in increasing vaccination uptake. Our results support the findings of Mak et al. (2003) that outreach activities for hepatitis B vaccination within this risk group are beneficial.

Compliance rates in our study group were high compared with other studies. Earlier studies have reported compliance rates with the standard (0, 1, 6 months) vaccination schedule of 44% (Van Steenbergen, 2002), 53% (Van Houdt et al., 2006), 60% (Mak et al., 2003) and 54% (Wouters et al., 2007), and with the accelerated vaccination schedule of 79% (0, 1, 2 months; Mak et al., 2003) and 59% (0, 1, 4 months; Wouters et al., 2007). National numbers of compliance among CSWs within the Dutch vaccination program (albeit not yet published in the peer-reviewed literature), found a compliance rate of 74% for the second vaccination and 50% for the third vaccination (Heijnen et al., 2007). The difference in compliance rates can be explained by differences in the aims and designs of the various studies. We used targeted sampling techniques to recruit a sample directly from the population of CSWs in the 3 study regions in order to explore the vaccination status within an existing population of CSWs at a certain point in time. Others have suggested that the high transience of CSWs is one of the reasons for the decline in compliance (Mak et al., 2003; Wouters et al., 2006). Van der Helm & Van Mens (1999) have shown that CSWs are highly transient between various countries within Europe. In addition to their findings, our results show that 25% of CSWs were working for less than 3 months at their current workplace, and for less than 6 months in the current region. We believe that many of those CSWs who do not comply with the vaccination schedule either moved to another city or stopped working as a prostitute. Those not completing their vaccine series because they stopped working as a prostitute have left the population of CSWs; however, they are still registered within the data of the Community Health Services as non-compliers. The compliance rates shown in our sample in 3 regions in the Netherlands are thus not representative of the compliance rates in the national registration system; however, it is likely to represent the compliance rates that are prevalent within the population of CSWs currently working in the study regions.

In conclusion, the method of enhanced outreach seems a very worthwhile method in terms of increasing awareness and vaccination uptake. A personal approach will benefit vaccination uptake rates. Our study showed that transience was significantly related to awareness on a multivariate level, and with vaccination uptake on a univariate level. Thus, one specific group of CSWs requires more attention; this group consists of CSWs who recently started working in a region and at their current workplace. These CSWs can best be reached by increasing the frequency of visits of health professionals at those locations where starting or highly transient CSWs are known to work; for example, more regular visits on different days and at different hours. The sooner in their career CSWs obtain vaccination, the better.

References

Best, D., Noble, A., Finch, E., Gossop, M., Sidwell, C., Strang, J. (1999). Accuracy of perceptions of hepatitis B and C status: Cross-sectional investigation of opiate addicts in treatment. *British Medical Journal,* 19, 290-291.

Centers for Diseases Control and Prevention (1982). Inactivated hepatitis B vaccine. *Morbidity and Mortality Weekly Report,* 31, 317-318.

De Wit, J.B., Vet, R., Schutten, M., Van Steenbergen, J. (2005). Social-cognitive determinants of vaccination behavior against hepatitis B: an assessment among men who have sex with men. *Preventive Medicine,* 40, 795-802.

Heijnen, M-L., Meerburg, B.G., Waldhober, Q., De Vries, M., Hahné, S. (2007). Landelijke hepatitis B-vaccinatiecampagne voor gedragsgebonden risicogroepen: resultaten en veranderingen. *Infectieziektenbulletin,* 18, 380-383.

Kuo, I., Mudrick, D.W., Strathdee, S.A., Thomas, D.L., Sherman, S.G. (2004). Poor validity of self-reported hepatitis B virus infection and vaccination status among young drug users. *Clinical Infecious Diseases,* 38, 587–590.

Mak, R., Traen, A., Claeyssens, M., Van Renterghem, L., Leroux-Roels, G., Van Damme, P. (2003). Hepatitis B vaccination for sex workers: do outreach programmes perform better? *Sexually Transmitted Infections,* 79, 157-159.

Schlicting, E.G., Johnson, M.E., Brems, C., Wells, R.S., Fisher, D.G., Reynolds, G. (2003). Validity of injecting drug users'self report of hepatitis A, B, and C. *Clinical Laboratory Science*, 16, 99-106.

Smallenbroek, A.J., Smits, E.C. (2001). *Gemeentelijk prostitutiebeleid na opheffing van het algemeen bordeelverbod. Inventarisatie van de stand van zaken.* Den Haag: SGBO Onderzoeks- en Adviesbureau van de Vereniging van Nederlandse gemeenten.

Van der Helm, Th., Van Mens, L. (1999). *Mobility in prostitution in The Netherlands 1998-1999. An inventory done under the auspices of EUROPAP-TAMPEP 1998-1999.* Amsterdam: Municipal Health Service Amsterdam.

Van Houdt, R., Sonder, G.J., Dukers, N.H., Bovee, L.P., Van den Hoek, A., Coutinho, R. A., Bruisten, S.M. (2006). Impact of a targeted hepatitis B vaccination program in Amsterdam, The Netherlands. *Vaccine,* 25, 2698-2705.

Van Marrewijk, C.M., Veldhuijzen, I.K., Conyn-van Spaendonck, M.A.E., Kooy, H., Van den Hof, S., Dorigo-Zetsma, J.W. (1999). *Prevalence of hepatitis B viral markers in the Dutch population: a population-based serosurveillance study (Pienter project)*. Bilthoven: RIVM.

Van Steenbergen, J.E. (2002). Results of an enhanced-outreach programme of hepatitis B vaccination in the Netherlands (1998-2000) among men who have sex with men, hard drug users, sex workers and heterosexual persons with multiple partners. *Journal of Hepatology*, 37, 507-513.

Waldhober Q., Heijnen M-L. (2003). Landelijk bereik van HBV-vaccinatiecampagne risicogroepen. *Infectieziekten Bulletin*, 14, 249-253.

Watters, J.K., Biernacki, P. (1989). Targeted sampling: Options for the study of hidden populations. *Social Problems*, 36, 416-430.

World Health Organization (2000). Hepatitis B Fact sheet N°204. World Health Organization. Available: www.who.int. Accessed February 15, 2006.

Wouters, K., Leuridan, E., Van Herck, K., Van Ardenne, N., Roelofs, I., Mak, R., Prévost, C., Guérin, P., Denis, B., Van Damme, P. (2007). Compliance and Immunogenicity of two hepatitis B vaccination schedules in sex workers in Belgium. *Vaccine*, 25, 1893-1900.

chapter 7

The reach of a free hepatitis B vaccination program among men who have sex with men

Abstract

Background. Homosexual contact is a major risk factor for acute hepatitis B infection. This study explores the percentage and characteristics of men who have sex with men (MSM) who have been reached by a hepatitis B vaccination program, and investigates reasons for vaccine refusal and non-compliance with the vaccination schedule.
Methods. In a cross-sectional study, 320 MSM were recruited through ethnographic mapping and targeted sampling to be interviewed on location.
Results. Awareness of the opportunity to obtain free hepatitis B vaccination was reported by 74% of MSM, and 50% reported to be vaccinated against hepatitis B (received at least 1 injection). A personal approach by health professionals and having sex with casual partners were positively associated with vaccination uptake. Being bisexual was negatively, and visiting gay bars/discos was positively associated with awareness of the opportunity to obtain free hepatitis B vaccination. The most important reason for vaccine refusal was a low perceived risk of getting infected with the virus.
Conclusions. This study shows that personal approach is beneficial for vaccination uptake among MSM. In order to increase the percentage of MSM that obtain vaccination, the personal approach should be prolonged and focus on perceived risk. Moreover, extra efforts may be needed to sufficiently reach bisexual men. Communication at anonymous meeting places including gay chat sites on the internet and cruising areas could help increase the level of awareness of the hepatitis B vaccination program and thus the chance that these men obtain vaccination.

7.1 Introduction

Homosexual contact is a major risk factor for acute hepatitis B infection (Kane, 1995; Koedijk et al., 2007). To enlarge the immunity against hepatitis B among men who have sex with men (MSM), a nationwide vaccination program was started in the Netherlands in 2002. The vaccination program was coordinated by the Netherlands Association for Community Health Services and was implemented by local Community Health Services.

In order to reach MSM, the Community Health Services periodically visited various venues where MSM meet, such as cruising areas, gay bars, discos, parties, and saunas. This method of collecting participants for vaccination is referred to as 'enhanced outreach'. Distributing posters and flyers at these locations to inform MSM about the free hepatitis B vaccination was also part of the program (Waldhober & Heijnen, 2003). The Community Health Services work with voluntary peers (STD prevention workers) who are trained to reach the target group. These peers give education on safe sex and inform the men about the free hepatitis B vaccine on site. The free vaccination could be obtained on appointment at regular office hours at the local Community Health Service.

Within the targeted vaccination program, the hepatitis B vaccine was offered free of charge according to the 6-month schedule: i.e. at 0, 1, and 6 months. Participants were tested for markers of current or past infection with the virus when receiving their first dose of the hepatitis B vaccination. When found to be chronically infected (positive for anti-HBc and HBsAg), participants were transferred to their healthcare provider for complete serological hepatitis B virus screening and counseling, with treatment if possible. Those who were susceptible for hepatitis B were urged to get their second and third dose after 1 and 6 months, respectively, in order to comply with the hepatitis B vaccination schedule to obtain long-lasting protection (at least 15-20 years, probably life-long). For those who had obtained natural immunity (anti-HBc positive, HBsAg negative), no further vaccination is required.

The present study explores the proportions and characteristics of MSM who: 1) are aware that they can opt for free hepatitis B vaccination, 2) have been vaccinated within the program, and 3) complied with the hepatitis B vaccination schedule. Also investigated are reasons for vaccine refusal and non-compliance with the hepatitis B vaccination schedule. Our findings show whether or not the target group is adequately reached by a targeted vaccination program. Furthermore, the study shows what lessons can be learned if hepatitis B vaccination is nationwide provided free of charge for MSM. These lessons may be of use in order to increase the success of future health campaigns among this specific risk group.

7.2 Materials and Methods

Between August 2004 and May 2006, 320 MSM were recruited for semi-quantitative interviews in three intervention regions in the Netherlands. Our recruitment procedure was based on ethnographic mapping and targeted sampling (Watters & Biernacki, 1989). Following this method, for each of the study regions, interviews with key persons (e.g. local authorities, people from within the gay community and health professionals) were held to map all geographic locations where MSM gathered. These locations include cruising areas, gay bars, discos, parties, saunas, cinemas, and sports associations. After the initial ethnographic map was made, repeated observations took place at different hours at all the locations. The number, frequency, and socio-demographic features of MSM visiting these locations were estimated. Based on the ethnographic map of each region, 320 MSM were recruited by the interviewers at the locations described above at several moments and at different hours.

As part of the informed consent-related procedure, MSM were given information about the nature of the questions to be expected, the amount of time the interview would take, and how anonymity is warranted in the study. They were informed that they had the possibility not to answer any question if they chose not to. Interviews took about 30 minutes to complete. After completing the interview, respondents were given an incentive (a CD holder) for their participation.

In the present study MSM are defined as men who actually have sex with men, and men who want to have sex with men (the latter are included for preventive purposes: i.e. young men who do not yet have sex but want to have sex with men, are assumed to be at risk for infection with the hepatitis B virus in the future). In total, 320 MSM took part in the study (response rate: 68%). No significant differences were found between those who did and those who did not participate regarding age and ethnicity. The most important reason given for non-participation was not being in the mood to be interviewed.

The interviews were performed using a semi-structured questionnaire, in which the following demographic information was noted: living situation and main activity in the preceding 6 months, religion, highest educational level, the country in which they, their mother and father were born, and year of birth. Interviewees were asked if they were sexually attracted to men or women, with answers ranging from only men to only women (5 categories). 'Sexual identity' was measured by asking participants if they described themselves as being gay, more gay than straight, bisexual, more straight than gay, or straight. Sexual behavior with regular (intercourse) and casual sex partners (intercourse and receptive oral sex) in the preceding 6 months was assessed, as was condom use, and life-time history of STD infection. Respondents were asked which locations they had been visiting in the past 6 months, and if they had currently visited gay sites on the internet. Awareness of the vaccination program was assessed by asking respondents whether they knew hepatitis B vaccination was free of charge for MSM. They were asked how they had heard about the free hepatitis B vaccination. The questionnaire also contained questions about hepatitis B vaccination, the number of injections, the location of vaccination onset, and how long ago the first vaccination was received. To measure immunity, respondents were asked if they had ever been infected with the hepatitis B virus. MSM who had not obtained vaccination but were aware of the program were asked for the reason(s) for

vaccine refusal. Similarly, MSM who had obtained vaccination but did not complete the vaccination schedule were asked for the reasons for noncompliance. Associations between socio-demographics, sexual behavior and visited locations with awareness of the possibility to obtain free hepatitis B vaccination, vaccination uptake and compliance were analyzed using univariate statistics (Chi-square test, Student's t-test, and Mann-Whitney U tests). Multivariate logistic regression analyses were performed with variables that showed a p-value below 0.10 on a univariate level. Awareness of the free hepatitis B vaccination, vaccination uptake and compliance with the vaccination schedule were included as the dependent variables in separate regression analyses. Because differences may exist in the intensity and the duration of the vaccination program between the three regions, region was controlled for in the analyses. A p-value ≤0.05 was considered statistically significant.

7.3 Results

7.3.1 Sample characteristics

The demographic characteristics of the total group of MSM, and of those who were aware of the free vaccine as compared to those who were not are described in Table 7.1.

TABLE 7.1. PROPORTIONS AND MEAN SCORES (SD) FOR SOCIO-DEMOGRAPHIC FACTORS FOR THE TOTAL SAMPLE, AND THOSE AWARE/UNAWARE OF THE POSSIBILITY TO OBTAIN FREE HEPATITIS B VACCINATION

Characteristics	Total	Aware	Unaware	
	n (%)	%	%	χ^2
Region				
Rotterdam	103 (32)	70	30	2.63
Utrecht	108 (34)	79	21	
South Limburg	109 (34)	74	26	
Living situation				
Alone	154 (48)	76	24	0.56
Not alone	166 (52)	72	28	
Main activity				
Working	235 (74)	74	26	0.06
Not working	84 (26)	75	25	
Religious				
Yes	129 (40)	73	26	0.16
No	191 (60)	75	25	
Educational level				
Low	38 (12)	66	34	1.47
Medium and high	280 (88)	75	25	
Ethnicity				
Dutch	256 (80)	74	26	0.04
Other	63 (20)	73	27	
	n / mean (SD)	mean (SD)	mean (SD)	T
Age	317 / 35.54 (11.84)	34.51 (12.64)	38.43 (12.64)	2.62*

* p<0.01

Table 7.2 shows the degree to which the MSM in our sample report sexual risk behavior.

TABLE 7.2 **PROPORTIONS AND MEAN SCORES (SD) FOR SEXUAL RISK BEHAVIOR FACTORS FOR THE TOTAL SAMPLE AND THOSE AWARE/UNAWARE OF THE POSSIBILITY TO OBTAIN FREE HEPATITIS B VACCINATION**

Characteristics	Total	Aware	Unaware	
	N (%)	%	%	χ^2
Sexual attraction				
Only to men/more to men	293/320 (92)	77	23	
Both to men and women/more to women	27/320 (8)	44	56	13.47 **
Sexual identity				
Gay, More gay than straight	277/309 (90)	78	22	
Bisexual, more straight than gay	32/309 (10)	47	53	14.25 **
Regular sex partner				
Yes	135 (42)	77	23	1.14
No	184 (58)	72	28	
Casual sex partner(s)				
Yes	213 (67)	75	25	0.37
No	107 (33)	72	28	
Receptive intercourse with casual sex partners				
Yes	71 (33)	86	14	6.64*
No	142 (67)	70	30	
Condom use				
Always	50 (70)	91	9	-
Inconsistent/never	21 (30)	84	16	
Insertive intercourse with casual sex partners				
Yes	103 (48)	78	22	
No	110 (52)	73	27	0.70
Condom use				
Always	84 (81)	80	20	-
Inconsistent/never	20 (19)	76	24	
Receptive oral sex with casual sex partners				
Yes	168 (79)	78	22	
No	45 (21)	64	26	3.48
Condom use				
Always	10 (6)	78	22	-
Inconsistent/never	157 (94)	80	20	
Sex with women				
Yes	30 (10)	53	47	7.55 *
No	284 (90)	76	24	
STD				
Ever	154 (49)	77	23	1.38
Never	165 (52)	71	29	
	N / mean (SD)	mean (SD)	mean (SD)	T
No. of casual sex partners	208 / 8.95 (12.83)	9.08 (12.75)	8.58 (13.18)	-2.43

Note. Of the variables measuring condom use, no χ^2 could be calculated as the conditions of this test could not be fulfilled (more than 20% of the cells has an expected count less than 5).
* p<0.01, ** p<0.001

Table 7.3 shows the locations MSM had visited during the past 6 months, i.e. gay bars/ discos and cruising areas.

TABLE 7.3 **PROPORTIONS AND MEAN SCORES (SD) OF VENUES THAT HAVE BEEN VISITED FOR THE TOTAL SAMPLE, AND THOSE AWARE/UNAWARE OF THE POSSIBILITY TO OBTAIN FREE HEPATITIS B VACCINATION**

Characteristics	Total	Aware	Unaware	
	N (%)	%	%	χ^2
Gay bar/disco				16.56 ****
Yes	241 (75)	80	20	
No	78 (25)	56	44	
Gay party				4.41 **
Yes	172 (55)	79	21	
No	144 (45)	68	32	
Cruising area				10.83 ***
Yes	77 (24)	60	40	
No	243 (76)	79	21	
Gay sauna				1.11
Yes	80 (25)	79	21	
No	239 (75)	73	27	
Sex cinema				2.79 *
Yes	25 (8)	60	40	
No	295 (92)	75	25	
Gay association				1.46
Yes	78 (25)	80	20	
No	241 (75)	73	27	
Gay sites on the internet				2.54
Yes	237 (74)	76	24	
No	83 (26)	68	32	

Note. *p<0.10, ** p<=0.05, *** p<0.01, ****p<0.001

7.3.2 Awareness of the possibility to obtain free hepatitis B vaccination

Our results show that most MSM (74.1%) were aware that they could opt for free hepatitis B vaccination. Most were informed about the opportunity to obtain free vaccination by flyers (32%), followed by getting information from STD prevention workers of the Community Health Services (31%), friends (23%), posters (19%), an advertisement in a magazine (18%), an STD-clinic (13%) or an internet site (10%)[4].

[4] *Multiple answers possible*

MSM who were aware of the possibility to obtain free hepatitis B vaccination were younger than MSM who were not aware. The other variables that are shown in Table 7.1 were not statistically significant associated with awareness of the free vaccination. Table 7.2 shows that bisexual MSM were less likely to be aware of the possibility to obtain free hepatitis B vaccination. This association was shown by the variables 'sexual identity' 'sexual attraction' and 'having sex with female partners' in the past 6 months. Among MSM who had sex with casual partners, positive associations emerged between awareness and having had receptive intercourse or receptive oral sex with these partners (marginally significant). Finally, Table 7.3 shows that awareness of the possibility to obtain free hepatitis B vaccination was positively associated with visiting gay bars/discos, and gay parties; a negative association is shown for visiting cruising areas and sex cinemas (marginally significant).

The variables that were associated with awareness of the possibility to obtain free hepatitis B vaccination in univariate analyses on α=0.10 level were included in a multivariate logistic regression analysis. Because the variables 'sexual attraction', 'sexual identity' and 'having sex with women' all measure 'homosexuality' or 'bisexuality', only 'sexual attraction' was included in the multivariate model to avoid multicollinearity. For the same reason, visiting gay parties was excluded from the analysis; in our sample visiting gay parties overlaps with visiting gay bars/discos (89%). Visiting sex cinemas was also excluded since 80% of MSM who visit sex cinemas also visit cruising areas. Finally, despite the fact that they are marginally significant on a univariate level, the variables that measure receptive intercourse and receptive oral sex with casual sex partners were excluded because these variables represent only the selective group of MSM that actually has sex with casual partners. Table 7.4 shows the variables that were included in the multivariate logistic regression analysis. 'Visiting gay bars and discos' and 'sexual attraction' were predictors of awareness of the opportunity to obtain free hepatitis B vaccination.

TABLE 7.4 **SUMMARY OF HIERARCHICAL LOGISTIC REGRESSION ANALYSES FOR FACTORS PREDICTING AWARENESS OF THE POSSIBILITY TO OBTAIN FREE HEPATITIS B VACCINATION PROGRAM (N=316) AND FOR FACTORS PREDICTING HEPATITIS B VACCINATION UPTAKE (N=148)**

			OR	95% CI	Nagekerke R-square
Awareness	Step 1	Region (2)	1.77	0.95-3.30	
		Region (3)	1.38	0.76-2.52	0.02
	Step 2	Region (2)	1.70	0.91-3.20	
		Region (3)	1.18	0.63-2.19	
		Age	0.97	0.95-0.99	0.05
	Step 3	Region (2)	1.52	0.80-2.90	
		Region (3)	1.23	0.65-2.31	
		Age	0.97	0.95-0.99	
		Sexual attraction	3.59	1.56-8.25	0.09
	Step 4	Region (2)	1.53	0.79-2.97	
		Region (3)	1.30	0.66-2.58	
		Age	0.99	0.96-1.01	
		Sexual attraction	2.59	1.09-6.18	
		Gay bar/disco	2.39	1.32-4.35	
		Cruising area	0.60	0.32-1.13	0.14
Vaccination uptake	Step 1	Region (2)	3.70	1.57-8.71	
		Region (3)	4.64	1.96-10.98	0.13
	Step 2	Region (2)	3.98	1.65-9.59	
		Region (3)	5.38	2.20-13.18	
		Casual sex partners	2.57	1.22-5.43	0.18
	Step 3	Region (2)	4.29	1.74-10.59	
		Region (3)	5.53	2.22-13.80	
		Casual sex partners	2.65	1.24-5.68	
		Informed by staff of the CHS	2.53	1.15-5.54	0.22

7.3.3 Hepatitis B vaccination uptake

Of the total sample of MSM (including those who are unaware of the vaccination campaign and those who have been infected with the virus, n=320), the self-reported hepatitis B vaccination rate (1 or more vaccinations) was 50%, 3% did not know if they were vaccinated against hepatitis A or B, and 47% reported not to be vaccinated against hepatitis B. The prevalence of self-reported hepatitis B was 8.2%.

Of MSM who had obtained vaccination (n=159), 55% reported to be vaccinated as part of the free hepatitis B vaccination program. Of those (n=87), the majority (74%) received their first injection at the Community Health Service, 8% at an STD clinic, and 18% at an outreach location, e.g. a gay sauna. Of those who were not vaccinated as part of the free program (n=72), 39% was vaccinated because of their work in health care.

Univariate analyses were performed within the group of MSM who were aware that they could opt for free hepatitis B vaccination and who were eligible for vaccination within the vaccination program (n=148). We excluded those reporting hepatitis B virus infection or vaccination outside the program from the analyses. In Rotterdam the vaccination rate was lower (30%) than in Utrecht (61%) and South Limburg (66%); χ^2=14.58, p=0.001. The other socio-demographic variables shown in Table 7.1 were not significantly associated with vaccination uptake. MSM who had sex with casual partners were more likely to be vaccinated: 60% of MSM with casual sex partners in the past 6 months had obtained vaccination, compared with 41% among those without casual sex partners (χ^2=4.65, p=0.03). Of MSM who had insertive intercourse with casual sex partners, 76% reported to be vaccinated compared with 49% of MSM who had sex with casual partners but who had not performed insertive intercourse. Analyses including the other behavioral variables shown in Tables 7.2 and 7.3 showed no significant differences. An extra analysis showed that the proportion of those vaccinated was higher among MSM who had been personally informed about the opportunity to obtain free hepatitis B vaccination by STD prevention workers of the Community Health Service as compared to those who were informed via flyers, posters, friends (67% vs. 47%, χ^2=5.04, p=0.03).

The recruitment region, having casual sex partners, and receiving personal information about the program from STD-prevention workers were significantly associated with hepatitis B vaccination uptake in a multivariate logistic regression analysis. Whether MSM had insertive intercourse with casual sex partners was excluded from this analysis, since this variable is measured only within the specific group of MSM who actually have sex with casual partners.

MSM who were eligible for vaccination but did not obtain vaccination but reported several reasons for vaccine refusal, mainly: not perceiving a risk for getting infected with the virus, not having time to obtain vaccination, laziness, and not thinking about the hepatitis B vaccine.

7.3.4 Compliance with the hepatitis B vaccination schedule

Of MSM who had participated in the vaccination program, and who had the opportunity to be fully vaccinated (n=61), thus excluding those who reported infection with the hepatitis B virus and those who received the first vaccination less than 6 months prior to the interview, 84% received three vaccinations or more, 15% received two vaccinations, and 2% received only one vaccination. Because of the high number of MSM who finished the vaccination program in our sample, we were unable to calculate univariate statistics (such as Chi-square) to explore differences between MSM who complied with the vaccination procedure and those who did not. The condition that a maximum of 20% of the expected cell frequencies is between 1 and 5 was not fulfilled (De Vocht, 2006). Also, since none of the associations showed a p-value below 0.10 on a univariate level, no multivariate logistic regression analysis was conducted. Although those who complied with the vaccination schedule were approximately 5 years older than those who did not comply, age and the number of casual sex partners were not significantly associated with compliance (data not shown). MSM who started the vaccination procedure, but did not comply with the vaccination schedule reported lack of knowledge about the procedure and delaying to call for a new appointment as the main reasons for non-compliance.

7.4 Discussion

Our results show that 74% of MSM were aware that they could opt for free hepatitis B vaccination. MSM who had visited gay bars and discos were more likely to have heard about the free vaccination. Also, bisexual MSM were less likely to be aware of this opportunity than homosexual MSM. Half of the MSM (50%) reported to be vaccinated against hepatitis B (1 or more injections). Almost half of these MSM (45%) reported to be vaccinated outside the vaccination program, for example because of their work in health care. Among MSM who reported to be aware of the vaccination program and were not immune, those who had sex with casual sex partners, and those who were personally informed about the free vaccination program by STD prevention workers of Community Health Services, were more likely to obtain vaccination. MSM recruited in the Rotterdam area were less likely to be vaccinated against hepatitis B than those in the other two regions. The most important reason for vaccine refusal was that MSM did not perceive a risk to become infected with the virus. Of MSM who had participated in the vaccination program, and who received the first vaccination at least 6 months prior to the interview (n=61), 84% received three vaccinations or more.

Before discussing these results, we have to consider several limitations of this study. First, since our sample is based on recruitment on locations, our findings can not be generalized to the entire population of MSM. The meaning of our findings should probably be restricted to MSM who visit these locations. MSM who do not visit these locations are probably less likely to be reached by the vaccination program. Second, all variables measured in our study were based on self-report. Recall or social-desirability bias may undermine the accuracy of self-reports. Self-reported vaccination status and hepatitis

B infection in other study groups, such as drug users, have been discussed because of their variable degrees of accuracy as determined by serologic testing (Best et al., 1999; Kuo et al., 2004; Schlicting et al., 2003). Rhodes et al. (2001) who also measured hepatitis B vaccination through self-report found a somewhat lower hepatitis B vaccination rate of 42% among an internet sample of MSM from the USA as compared with our results (50%). Whether this difference is due to the impact of the Dutch vaccination program or differences in community characteristics is not clear. Fourth, only 61 respondents were part of the analyses on compliance with the vaccination schedule; one reason for this low number is that almost 50% of the respondents who were vaccinated reported to be vaccinated outside the vaccination program, and were thus excluded from the analyses; this is far more than we had expected beforehand. Because of the high completion rate (84%), combined with the small sample size, the conditions of Chi-square tests could not be fulfilled; therefore, we were unable to investigate which factors were associated with compliance.

Compliance (84%) was relatively high within our sample of MSM when compared to other studies among MSM. Others reported compliance rates of 74% and 69% for the standard schedule (0, 1, 6 months) (Van Steenbergen, 2002; Van Houdt, 2007). These differences can be explained by the differences in the study designs. Our compliance rate regards a population of MSM visiting our study locations and was based on self-report, whereas Van Steenbergen (2002) and Van Houdt (2007) measured the actual compliance of all MSM starting a hepatitis B vaccination through the registration system of the vaccination program.

Our results showed that perceiving no or a very low risk of getting infected with the virus was the most important reason for refusing the free hepatitis B vaccine. Our finding corroborates results of De Wit et al. (2005) who showed perceived risk of infection with the hepatitis B virus to be a crucial factor related to vaccination uptake among MSM as well. This suggests that communication about the hepatitis B vaccination should address perceived risk of infection. In addition, the communication about the free vaccination should be personal, since the personal approach in informing MSM about the free vaccine which was shown to be beneficial for vaccination uptake when compared to less outreaching activities such as distributing flyers or hanging up posters. Personal conversation can be tailored to the individual in question, whereas poster and flyers are usually developed to inform a more general public of MSM. Future vaccination programs targeted at MSM should thus focus on this outreach approach and not solely rely on only the distribution of flyers and posters.

In general, gay bars and discos are relatively easy locations for STD prevention workers to visit to reach the target population. This could explain why MSM who visited these venues were more likely to have heard about the free vaccine. To enlarge the reach of a targeted vaccination program, attention should also be paid to the locations that are more difficult for STD prevention workers to recruit participants, such as cruising areas. Cruising areas and internet sites are also venues where specific groups within MSM, such as bisexual MSM could be recruited for the program. In the Rotterdam area vaccination uptake was lower, possibly because of its wider geographic locations, which makes the locations less accessible for STD prevention workers.

Since homosexual contact is considered a risk factor for hepatitis B, it is important to vaccinate the members of this community. The present study shows that a large proportion of MSM actually obtained hepatitis B vaccination (50%). Also, a high percentage (74%) of MSM was aware of the opportunity to obtain free hepatitis B vaccination. To increase the reach of the hepatitis B vaccination program, we recommend Community Health Services to also focus on less accessible locations where important groups, such as bisexuals, can be found, in order to enlarge the reach of this program. Furthermore, personal communication was found to be beneficial for vaccination uptake and we recommend these STD prevention workers to address perceived risk of infection with the hepatitis B virus, since this is the major reason for refusing the vaccine.

Key points

The reach of a hepatitis B vaccination program (in terms of awareness, vaccination uptake and compliance) was explored in a population of men who have sex with men (MSM).
The implications of our findings are considered valuable for a broader context: all targeted vaccination programs addressing hepatitis B vaccination among MSM.
Personal approach by trained peers is an important tool to increase vaccination uptake when compared to providing flyers, or hanging up posters.
Attention for bisexual MSM. Locations where bisexual MSM gather, such as public parks, saunas, sex cinemas should be visited regularly.
Perceived risk is a major reason for refusing the vaccination among MSM.

References

Best, D., Noble, A., Finch, E., Gossop, M., Sidwell, C., Strang, J. (1999). Accuracy of perceptions of hepatitis B and C status: Cross sectional investigation of opiate addicts in treatment. *British Medical Journal*, 19, 290-91.

De Vocht, A. (2006). *Basishandboek SPSS 14 voor windows*. Utrecht: Bijleveld Press.

De Wit, J.B., Vet, R., Schutten, M., Van Steenbergen, J.E. (2005). Social-cognitive determinants of vaccination behavior against hepatitis B: an assessment among men who have sex with men. *Preventive Medicine*, 40, 795-802.

Kane, M. (1995). Epidemiology of hepatitis B infection in North America. *Vaccine*, 3, 16S-17S.

Koedijk, F.D.H., Op de Coul, E.L.M., Boot, H.J., Van de Laar, M.J.W. (2007). Hepatitis B surveillance in the Netherlands, 2002-2005: acute infection is mainly via sexual contact while chronic infection is via vertical transmission through mothers from endemic regions. *Nederlands Tijdschrift Geneeskdunde*, 151, 2389-2394.

Kuo, I., Mudrick, D.W., Strathdee, S.A., Thomas, D.L., Sherman, S.G. (2004). Poor validity of self-reported hepatitis B virus infection and vaccination status among young drug users. *Clinical Infectious Diseases*, 38, 587–90.

Rhodes, S.D., DiClemente, R.J., Yee, L.J., Hergenrather, K.C. (2001). Correlates of hepatitis B vaccination in a high-risk population: An internet sample. *The American Journal of Medicine*, 110, 628-632.

Schlicting, E.G., Johnson, M.E., Brems, C., Wells, R.S., Fisher, D.G., Reynolds, G. (2003). Validity of injecting drug users'self report of hepatitis A, B, and C. *Clinical Laboratory Science*, 16, 99-106.

Van Houdt, R., Sonder, G.J.B., Dukers, N.H.T.M., Bovee, L.P.M.J., Van den Hoek, A., Coutinho, R.A., Bruisten, S.M. Impact of a targeted hepatitis B vaccination program in Amsterdam, The Netherlands. *Vaccine*, 25, 2698-2705.

Van Steenbergen, J.E. (2002). Results of an enhanced-outreach programme of hepatitis B vaccination in the Netherlands (1998-2000) among men who have sex with men, hard drug users, sex workers and heterosexual persons with multiple partners. *Journal of Hepatology*, 37, 4, 507-13.

Waldhober, Q., Heijnen, M-L. (2003). Landelijk bereik van HBV-vaccinatiecampagne risicogroepen. *Infectieziekten Bulletin*, 14, 249-53.

Watters, J.K., Biernacki, P. (1989). Targeted sampling: Options for the study of hidden populations. *Social Problems*, 36, 416-30.

chapter 8

Intention to obtain hepatitis B vaccination among drug users, commercial sex workers and men who have sex with men

Abstract

Background. This study explores which demographic, behavioral and social-cognitive factors correlate with intention to obtain hepatitis B vaccination among drug users (DUs), commercial sex workers (CSWs), and men who have sex with men (MSM).
Methods. A cross-sectional study was conducted in which DUs, CSWs and MSM were interviewed on site (shelters, clubs, gay bars, etc.). Recruitment was based on ethnographic mapping and targeted sampling in three regions in the Netherlands. The semi-structured questionnaire contained items tapping social-cognitive factors potentially related to vaccination intention derived from the Health Belief Model and the Theory of Planned Behavior. Of those who participated in a larger study, a total of 118 DUs, 87 CSWs, and 135 MSM were eligible for inclusion in the present study which focused on the unvaccinated members of these groups.
Results. Multivariate analyses show that attitude towards vaccination was the most important predictor of intention to obtain hepatitis B vaccination among all three high-risk groups. In addition, CSWs who perceived little control over getting vaccinated against hepatitis B had a weaker intention to obtain vaccination. Perceived susceptibility was an important predictor of intention among MSM. Age was positively associated with intention among DUs, and negatively associated with intention among CSWs and MSM.
Discussion. DUs, CSWs, and MSM had a relatively positive intention towards hepatitis B vaccination. To further increase intention to obtain hepatitis B vaccination, future vaccination programs should specifically address perceived susceptibility among MSM, perceived behavioral control among CSWs, and attitude towards vaccination among all three risk groups (DUs, CSWs and MSM). Specific attention should be paid to motivating younger CSWs and MSM.

8.1 Introduction

Although a safe and effective vaccine against infection with the hepatitis B virus has been available since 1982 (Centers for Diseases Control and Prevention, 1982), hepatitis B remains a major public health problem today. Over 350 million people worldwide are chronically infected with the hepatitis B virus (WHO, 2000). The virus can be directly transmitted through unsafe sex and blood contact, and is 50 to 100 times more contagious than HIV (WHO, 2000).

In the Netherlands, after successful implementation of a pilot program (1998-2000) (Van Steenbergen, 2002; Baars et al., in press 'a'), an ongoing nationwide vaccination program started in 2002, targeted at high-risk groups: i.e. drug users (DUs), heterosexuals with multiple sex partners, commercial sex workers (CSWs), and men who have sex with men (MSM). The aim of the vaccination program is to increase protection against the hepatitis B virus and to reduce transmission by offering free hepatitis B vaccination and screening for the virus markers. The strategy for targeting the members of these communities involves enhanced outreach activities: staff of Community Health Services periodically visits various locations, such as day shelters, street prostitution sites, and gay bars in order to reach the target groups. In addition, posters and flyers are distributed as part of the program (Waldhober et al., 2003). Baars et al. showed that within three regions in the Netherlands, 63% of DUs, 79% of CSWs and 74% of MSM were aware that they could opt for this free hepatitis B vaccine (Baars et al., in press 'b'; Baars et al., unpublished data). However, not all the members of these three communities actually got vaccinated. The present study focuses on those who did not.

Preventive behavior and health behavior changes can be predicted through a set of proximal determinants. These predictors include awareness of the threat of a disease, the evaluation of a given preventive behavior (in a utilitarian and more social sense), and the ability to perform a given behavior. Two important theoretical models, namely the Health Belief Model (HBM; Rosenstock, 1965; Rosenstock, 1974) and the Theory of Planned Behavior (TPB; Ajzen, 1991) have provided useful theoretical frameworks to predict a range of health behaviors, such as cervical screening, smoking cessation and contraceptive use (see for example Conner & Sparks, 2005; Abraham & Sheeran, 2005).

The HBM specifically focuses on health behavior and assumes that the performance of preventive behaviors depends on an individual's judgment of his or her personal susceptibility to a specific disease and the perceived severity of the consequences of this disease. Furthermore, beliefs about the benefits and barriers of performing this behavior determine whether or not the behavior is carried out (Rosenstock, 1965; Rosenstock, 1974).

The TPB is a more general model predicting behavior and presumes that behavior is determined by the individual's intention to perform the behavior and the individual's perceptions of their ability to perform the behavior (perceived behavioral control). The strength of an individual's intention is determined by three factors, namely a person's evaluation of performing the behavior (attitude towards the behavior), the extent to which important others would like them to perform it (subjective norm), and their perceived behavioral control (Ajzen, 1991). Cialdini, Reno & Kallgren (1990) introduced the term 'descriptive norm' as the perceptions of what significant others do. Fishbein (1993) suggested that both subjective norms and descriptive norms are indicators of the same underlying concept, i.e. social pressure.

Constructs of the HBM and the TPB have been applied in previous studies to explain motivation to obtain hepatitis B vaccination. Other studies have shown that, among DUs, attitude towards hepatitis B vaccination was associated with intended vaccination uptake (Baars et al., in press 'a'), and among MSM attitude, subjective norm, as well as perceived susceptibility were associated with intention (Schutten et al., 2002). To our knowledge, this is the first study to investigate correlates of female CSWs' intention to get vaccinated against hepatitis B.

The aim of the present study is to show which demographic, behavioral and social-cognitive factors are associated with intention to obtain hepatitis B vaccination among the members of three high-risk communities: DUs, CSWs and MSM. The social-cognitive factors measured in this study are derived from the HBM and TPB. Our aim is not to test the predictive value of these two theoretical models, but to find specific leads for improving campaigns promoting hepatitis B vaccination among these communities. Knowledge of the factors that underlie vaccination uptake is needed to accurately target and design future vaccination campaigns.

8.2 Methods

8.2.1 Procedure

The present study was part of a broader project in which awareness of the hepatitis B vaccination program and hepatitis B vaccination uptake was investigated among DUs, CSWs and MSM in the Netherlands (Baars et al., in press 'b'; Baars et al., unpublished data). Recruitment procedures were based on ethnographic mapping and targeted sampling (Watters & Biernacki, 1989) on locations where members of the target groups can be found, such as drug consumption rooms, brothels, and gay parties. A sample of DUs, CSWs and MSM who visited these locations was invited to participate in our study. Response rates at these locations were: 83% (n=309) for DUs, 64% (n=259) for CSWs and 66% (n=320) for MSM.

The participants were informed of the nature of the questions to be expected, the amount of time the interview would take, and were assured that the study was anonymous. They were also informed that they had the possibility not to answer any question if they chose not to, and could discontinue participation at any point. During the interview respondents (including those who reported not to be aware of the program) were informed about

the opportunity to obtain free hepatitis B vaccination. All participants received a small incentive for taking part in the study (DUs were given 5 euros; CSWs received a manicure set; and MSM were offered a CD holder).

8.2.2 Participants

The participants in our study are defined as follows: DUs are described as current chronic users of heroin, (base) cocaine, amphetamine or methadone; CSWs are women who engage in sexual behavior for money; and MSM include men who actually have sex with men, as well as men who would want to have sex with men.

Of the 309 DUs, 259 CSWs and 320 MSM who had participated in the larger study, 50% (n=155), 37% (n=96) and 47% (n=150), respectively, reported that they had not (yet) been vaccinated against hepatitis B (Baars et al, in press 'b'; Baars et al., unpublished data). These unvaccinated respondents are the focus of the present study. Those respondents who reported to be immune because of prior infection with the hepatitis B virus were excluded from the analyses (n= 60). Also, one DU was excluded because data on social-cognitive variables were missing. The sample for the present study consists of 118 DUs, 87 CSW, and 135 MSM.

8.2.3 Measures

Interviews were semi-structured and standardized questions were asked. Fixed answer categories were presented with most of the questions. The questionnaire contained assessments of demographic variables, risk behaviors (sexual behaviors and drug use), variables measuring awareness of the possibility to obtain hepatitis B vaccination, vaccination uptake and hepatitis B virus infection, as well as social-cognitive constructs potentially related to intention to obtain vaccination, derived from the HBM and TPB.

Demographic and behavioral characteristics

A range of demographic information was collected, including the recruitment region, gender, living situation (e.g. with or without partner), religion, educational level, country in which the participants and their mother and father were born, and year of birth. In order to examine hepatitis B related risk behaviors, participants were asked if they currently had a steady sexual partner, as well as whether they had casual sex partners (sexual contacts not paid for) in the preceding 6 months. We also assessed if participants had ever injected drugs, as well as life-time history of Sexually Transmitted Diseases (STD; specified as chlamydia, syphilis, gonorrhea, genital herpes, genital warts, pubic lice, or other STD infections). Finally, participants were asked whether they had obtained vaccination against hepatitis B.

Social-cognitive constructs

Awareness of the vaccination program was assessed by asking participants whether they knew hepatitis B vaccination was available for them free of charge.
Intention towards obtaining hepatitis B vaccination was measured by asking respondents: "Do you think you will obtain vaccination against hepatitis B within the next 6 months?" (1=certainly not, to 7=certainly yes).
Perceived severity of being infected with hepatitis B was measured by asking the respondent "How serious would you find it to be infected with the hepatitis B virus?" (1=not serious, to 7=very serious).
Perceived susceptibility of being infected with hepatitis B was assessed with the item "What do you think is the probability of you becoming infected with the hepatitis B virus within the next 6 months?" (1=very low, to 7= very high).
Perceived benefits of obtaining hepatitis B vaccination were measured with 4 items that were answered on a 5-point scale ranging from 1=strongly disagree to 5=strongly agree; for example 'Getting vaccinated against hepatitis B would be a good way to protect my health.'; and 'Getting vaccinated against hepatitis B would be a good way to protect the health of my sex partner(s).' These 4 items were combined into one scale called 'health benefits' with alpha 0.59 for DUs, 0.62 for CSWs, and 0.63 for MSM[1].
Perceived barriers were measured with 3 items on a 5-point scale ranging from 1=strongly disagree to 5=strongly agree: 'I don't have the time to get vaccinated against hepatitis B'; 'I know where to go to get the vaccine against hepatitis B' (reverse coded); 'I would have trouble getting to some place that could vaccinate me against hepatitis B'. These barriers are analyzed separately, since they could not be combined in a sufficiently reliable scale in any of the groups.
Attitude towards obtaining hepatitis B vaccination was assessed using three semantic differential items that could be answered on a 7-point scale: "What do you think about getting vaccinated against hepatitis B within the next 6 months?" (unimportant - important, bad - good, unwise - wise). Cronbach's alpha for the three items was 0.79 for DUs, 0.73 for CSWs, and 0.80 for MSM[5].
Subjective norm towards obtaining hepatitis B vaccination was measured with three items considering the perceived opinions of the (potential) steady partner, family and friends. For instance: 'My friends think it is important for me to obtain vaccination against hepatitis B (1=strongly disagree, 5=strongly agree). Participants who did not have a partner, family or friends were coded as neutral. Cronbach's alpha for the three items was 0.64 for DUs, 0.71 for CSWs, and 0.78 for MSM[1].
Descriptive norm towards obtaining hepatitis B vaccination was assessed by asking respondents: 'Do you know any people that are close to you, who have been vaccinated against hepatitis B?' Respondents could answer yes or no to this question.
Perceived behavioral control was assessed in two manners. Among MSM the construct was measured on the basis of three general items, for example 'It's easy for me to obtain hepatitis B vaccination' (1=strongly disagree, 5=strongly agree), with Cronbach's alpha of 0.67. For DUs and CSWs (groups that are generally vaccinated on location by the nurses of the Community Health Service) a more specified measurement of perceived behavioral control was developed on the basis of three items: 'How easy or difficult is it for you to obtain

[5] *To obtain a single measure of health benefits, attitude towards vaccination and subjective norm, scores on the items were averaged.*

hepatitis B vaccination if you are vaccinated at addiction care facilities' among DUs and 'How easy or difficult is it for you to obtain hepatitis B vaccination if you are vaccinated at your workplace' among CSWs; 'How easy or difficult is it for you to obtain vaccination at an open office hour at the Community Health Service'; and 'How easy or difficult is it for you to obtain vaccination on appointment at the Community Health Service' (1=very difficult, 7=very easy). The first item was analyzed separately; and in the text of the present article it is referred to as 'perceived behavioral control over vaccination on site'. The latter two items were included in a scale called 'Vaccination at the Community Health Service'. Correlation between these items was 0.69, $p<0.0001$ for DUs, and 0.71, $p<0.0001$ for CSWs.

The operationalisation of most of the constructs was based on previous studies that have addressed hepatitis B vaccination uptake. Intention, perceived severity, perceived susceptibility, attitude and perceived behavioral control were derived from Schutten et al. (2002) and Baars et al. (in press 'a'), and the benefits and barriers stem from Rhodes et al. (2003).

8.2.4 Statistical analyses

First, mean scores and proportions of demographic characteristics, hepatitis B risk behaviors and social-cognitive variables were calculated for the three groups separately. For each group, associations between demographics, behavioral variables and social-cognitive variables with intention to obtain free hepatitis B vaccination were analyzed with Pearson's correlation and One-way ANOVA. Finally, variables related at the $\alpha=0.1$ level in univariate analysis were introduced into the initial linear regression. In this model, demographic and behavioral variables were entered in the first step, and social-cognitive variables were entered in the second step. The variables were retrained in the final model only if they were associated at the $\alpha=0.05$ level, which is the level that is considered statistically significant in the regression analyses of the present study.

8.3 Results

8.3.1 Demographic characteristics and hepatitis B risk behavior

The demographic characteristics as well as risk behaviors for hepatitis B virus infection of the participating DUs, CSWs, and MSM are reported in Table 8.1. Sexual risk behaviors include having a steady, casual sex partner(s), and history of STD infection. History of intravenous drug use is presented as a risk for infection with the hepatitis B virus through blood contact.

TABLE 8.1 **DEMOGRAPHICS AND HEPATITIS B RISK BEHAVIORS OF DUS (N=118), CSWS (N=87) AND MSM (N=135)**

	DU	CSW	MSM
Demographic characteristics	n (%)	n (%)	n (%)
Region			
Rotterdam	29 (25)	45 (52)	60 (44)
Utrecht	52 (44)	30 (34)	36 (27)
(East-)South Limburg	37 (31)	12 (14)	39 (29)
Gender			
Male	101 (86)	0	135 (100)
Female	17 (14)	87 (100)	0
Living situation			
Alone	87 (74)	29 (33)	58 (43)
With others	31 (26)	58 (67)	77 (57)
Religious			
Yes	80 (68)	48 (55)	57 (43)
No	38 (32)	39 (45)	76 (57)
Educational level			
Low	92 (79)	46 (54)	24 (18)
Medium/high	24 (21)	39 (46)	111 (82)
Ethnicity			
Dutch	48 (41)	29 (33)	107 (79)
Other	70 (59)	58 (67)	28 (21)
Age: mean (SD)	41.80 (7.25)	31.64 (9.61)	35.99 (12.23)
Hepatitis B risk behaviors			
Steady partner			
Yes	30 (26)	55 (63)	59 (44)
No	86 (74)	32 (37)	76 (56)
Casual sex partner(s)			
Yes	33 (28)	24 (28)	87 (64)
No	84 (72)	62 (72)	48 (36)
STD			
Ever	41 (35)	30 (35)	53 (39)
Never	77 (65)	57 (65)	82 (61)
Intravenous drug use			
Ever	37 (32)	3 (3)	0
Never	80 (68)	84 (97)	135 (100)

Note: The totals vary according to missing values for some variables

8.3.2 Social-cognitive variables

Table 8.2 shows mean scores of social-cognitive variables among the three communities. In the present sample of unvaccinated individuals, 44% of DUs, 52% of CSWs, and 55% of MSM reported to be aware of the possibility to obtain free hepatitis B vaccination. The mean scores show that intention to obtain hepatitis B vaccination was moderately positive among all three communities.

TABLE 8.2 **MEAN SCORES (SD), RANGE, AND PROPORTIONS ON SOCIAL-COGNITIVE VARIABLES IN DUS (N=118), CSWS (N=87) AND MSM (N=135)**

	DU		CSW		MSM	
	n (%) or mean (SD)	Range	n (%) or mean (SD)	Range	n (%) or mean (SD)	Range
Awareness	52 (44%)	-	45 (52%)	-	75 (55%)	-
Intention	3.28 (1.49)	1-5	3.53 (1.42)	1-5	2.96 (1.31)	1-5
Perceived susceptibility	2.36 (1.82)	1-7	2.74 (1.92)	1-7	2.11 (1.24)	1-7
Perceived severity	6.46 (1.39)	1-7	6.57 (1.09)	1-7	6.50 (0.83)	1-7
Health benefits	4.27 (0.85)	1-5	4.36 (0.83)	2-5	4.05 (0.85)	2-5
Barrier: no time	1.49 (1.14)	1-5	1.64 (1.29)	1-5	1.49 (1.02)	1-5
Barrier: know where to go...	3.81 (1.73)	1-5	4.13 (1.49)	1-5	4.13 (1.46)	1-5
Barrier: location	1.66 (1.40)	1-5	1.80 (1.36)	1-5	1.42 (1.06)	1-5
Attitude	5.82 (1.51)	1-7	6.32 (1.18)	3-7	5.47 (1.45)	3-7
Subjective norm	3.65 (0.87)	1-5	3.72 (1.05)	1-5	3.44 (0.86)	1-5
Descriptive norm	37 (32%)	-	36 (41%)	-	44 (33%)	-
PBC (general)	-	-	-	-	4.65 (0.62)	1-5
PBC vaccination on site	5.62 (1.91)	1-7	6.08 (1.71)	1-7	-	-
PBC vaccination at CHS	5.47 (1.68)	1-7	5.05 (1.99)	1-7	-	-

Note 1: PBC: perceived behavioral control; CHS: Community Health Service
Note 2: The totals vary according to missing values for some variables

8.3.3 Variables associated with intention to obtain hepatitis B vaccination

Drug Users (DUs)

Univariate statistics showed that DUs' intention to obtain hepatitis B vaccination was associated with study region F (2, 117) = 2.43, p=0.09; marginally significant. Furthermore, intended hepatitis B vaccination uptake was negatively associated with Dutch ethnicity F (1, 117) = 6.235, p=0.014, having a steady sex partner F (1, 115) = 3.40, p=0.068; marginally significant, and positively associated with age (r=0.26, p=0.005). This indicates that DUs with a non-Dutch ethnic background, DUs who did not have a steady sex partner, and older individuals had a stronger intention to obtain vaccination.

Social-cognitive factors that were associated with intention include: perceived susceptibility to hepatitis B virus infection (r=0.17, p=0.076), health benefits (r=0.21, p=0.026), attitude towards vaccination (r=0.65, p=0.0001), subjective norm (r=0.39, p=0.0001), and perceived behavioral control over vaccination at the Community Health Service (r=0.29, p=0.002). The other social-cognitive factors were not significantly associated (at the α=0.10 level) with DUs' intention to obtain hepatitis B vaccination.

Table 8.3 shows that age and attitude towards vaccination were significant predictors of intended hepatitis B vaccination uptake in a multivariate regression model. The other variables that were univariately associated with intended vaccination uptake were introduced into the initial linear regression model but were removed from the final model since they were not significantly associated with intended hepatitis B vaccination uptake.

TABLE 8.3 **REGRESSION ANALYSIS ON INTENTION TO OBTAIN HEPATITIS B VACCINATION AMONG DUS (PAIRWISE DELETION, N=113)**

Step	Variable	ß-value	SE B	ß-value	P-value
1	Age	0.05	0.02	0.26	0.006
2	Age	0.04	0.01	0.20	0.005
	Attitude	0.62	0.07	0.63	0.0001

Note. R^2 = 0.07 for step 1; R^2=0.46 for step 2, p=0.000

Commercial sex workers (CSWs)

Univariate analyses of the demographic and behavioral factors measured in this study, showed that age was associated with CSWs' intention to obtain hepatitis B vaccination (r= -0.32, p=0.003).

Univariate analyses of social-cognitive factors showed that perceived severity to hepatitis B virus infection (r=0.28, p=0.009), perceived health benefits of vaccination (r=0.34, p=0.001), attitude towards vaccination (r=0.55, p=0.0001) and subjective norm (r=0.28, p=0.008) were positively associated with intended vaccination uptake. Those who agreed with the barrier 'I would have trouble getting to some place that could vaccinate me against hepatitis B' had a weaker intention to obtain hepatitis B vaccination (r= -0.25, p=0.018). Finally, the analyses showed that perceived control over vaccination on site was marginally correlated, and perceived control over vaccination at the Community Health Service was significantly correlated with intention to obtain vaccination (r=0.21, p=0.06 and r=0.45, p=0.0001, respectively). No significant correlations (at the α=0.10 level) were found for the other social-cognitive variables shown in Table 8.2.

The multivariate regression model (Table 8.4) shows that age, attitude towards vaccination, and perceived control over vaccination at the Community Health Service are predictors of CSWs' intended hepatitis B vaccination uptake. This implies that younger CSWs, those who evaluated the advantages and disadvantages of vaccination as positive, and those who find it easy to obtain vaccination at the Community Health Service have a stronger intention to obtain vaccination against hepatitis B.

TABLE 8.4 **REGRESSION ANALYSIS ON INTENTION TO OBTAIN HEPATITIS B VACCINATION AMONG CSWS (PAIRWISE DELETION, N=79)**

Step	Variable	ß-value	SE B	ß-value	P-value
1	Age	-0.05	0.02	-0.32	0.004
2	Age	-0.03	0.01	-0.22	0.012
	Attitude	0.51	0.11	0.43	0.0001
	PBC at CHS	0.25	0.06	0.35	0.0001

Note. R^2 = 0.10 for step 1; R^2=0.46 for step 2, p=0.000

Men who have sex with men (MSM)

Univariate analyses of demographic and behavioral factors on intention showed that MSM with a Dutch ethnic background had a weaker intention to obtain vaccination F (1, 134) = 2.80, p=0.097; marginally significant. Furthermore, age was negatively associated with intended vaccination uptake among MSM (r= -0.26, p=0.003). The other variables shown in Table 8.1 were not statistically associated with intention (at the α=0.10 level).

Intention to obtain hepatitis B vaccination was higher among MSM who were aware of the possibility to obtain free hepatitis B vaccination F (1, 134) = 3.67, p=0.058; marginally significant. Furthermore, intention to obtain vaccination was positively correlated with perceived susceptibility (r=0.37, p=0.0001), the 'health benefits' scale (r=0.35, p=0.001), the barrier 'I don't have time to get vaccinated against hepatitis B' (r=0.18, p=0.038), attitude towards vaccination (r=0.65, p=0.0001), subjective norm (r=0.38, p=0.0001), and descriptive norm F (1, 134) = 4.51, p=0.035.

Table 8.5 shows that attitude towards obtaining hepatitis B vaccination is the most important predictor of intended hepatitis B vaccination uptake in the next 6 months among MSM. Age and perceived susceptibility of infection with the hepatitis B virus are also predictors of intention to obtain vaccination. This indicates that MSM who evaluated hepatitis B vaccination as positive, who were younger, and/or who perceived a higher chance of infection with the virus had a stronger intention to get vaccinated against hepatitis B.

TABLE 8.5 **MULTIVARIATE MODEL OF INTENTION TO OBTAIN HEPATITIS B VACCINATION AMONG MSM (PAIRWISE DELETION, N=132)**

Step	Variable	B-value	SE B	ß-value	P-value
1	Age	-0.03	0.01	-0.26	0.003
2	Age	-0.02	0.01	-0.21	0.002
	Perceived susceptibility	0.21	0.07	0.20	0.004
	Attitude	0.50	0.07	0.55	0.0001

Note. R^2 = 0.07 for step 1; R^2=0.48, p=0.000

8.4 Discussion

Although DUs, CSWs and MSM are considered at high risk for infection with the hepatitis B virus (Centers for Diseases Control and Prevention, 2008), there has been relatively little research on the factors that motivate these risk groups to obtain hepatitis B vaccination. The present study shows that, in general, most DUs, CSWs and MSM intend to obtain hepatitis B vaccination. Attitude was an important predictor of intended vaccination uptake among all three risk groups. This indicates that those who evaluate hepatitis B vaccination as important, good and wise have a stronger intention to obtain vaccination. Among DUs, CSWs and MSM, age was an important predictor as well. Whereas older DUs have a stronger intention to obtain vaccination against hepatitis B, it is the younger CSWs and MSM who are more likely to obtain hepatitis B vaccination. MSM who perceived a higher susceptibility to become infected with the hepatitis B virus were more motivated to obtain vaccination. Among CSWs, besides attitude and age, perceived control over vaccination at the Community Health Service was also an important predictor of intention to obtain vaccination. The variables explained, respectively, 46%, 46% and 48% of the variance in intention to obtain hepatitis B vaccination of DUs, CSWs and MSM.

Before discussing our findings in relation to the results of others and evaluating the practical implications, it is important to consider the limitations of the present study. An important limitation is the cross-sectional design of the study, which does not allow us to draw inferences about causality. For example, MSM who lack time to obtain vaccination could be less motivated to obtain vaccination because of that; in contrast, individuals who are highly motivated to get vaccinated may have this high on their priority list and do not find lack of time a barrier to obtain vaccination. Nevertheless, associations with intention to obtain hepatitis B vaccination show us which variables are important to further examine in order to increase vaccination uptake.

Another limitation is related to the sampling method used in the present study. Our results can not be generalized to the total community of DUs, CSWs and MSM because the sample includes only those members of the communities who visit certain locations. These locations may attract relatively marginalized drug users, such as daily users and homeless. Also, gay parties and gay bars may interest more 'active' MSM. Similarly, cruising areas and/or anonymous meeting places tend to be relatively overrepresented by bisexual men compared with the other locations visited by MSM. These marginalized drug users and 'active' MSM are probably at most risk for infection with the hepatitis B virus. In the Netherlands prostitution has been legalized since the year 2000 (Smallenbroek & Smits, 2001). The recruitment locations for CSWs in our study (such as bars and clubs) had a licence or were tolerated by the local authorities. This means that those working illegally or underaged (i.e. probably at even higher risk for infection) had a lower chance of being enrolled in our study. The current findings among CSWs should thus be considered in the context of a legal prostitution system.

Furthermore, all variables measured in our study (including hepatitis B vaccination uptake and infection with the hepatitis B virus) were based on self-report. The limitations of self-reports are well documented (Johnston et al., 2004; Schwarz & Oyserman, 2001; Stone et al., 1999). For example, recall or social-desirability bias may undermine the accuracy of self-reports. On the other hand, because (more objective) biochemical tests are often invasive this can increase refusal rates of participation in a study (Fishbein & Pequegnat, 2000).

Finally, we stress that the present study focused on *intention* to obtain hepatitis B vaccination and not on actual hepatitis B vaccination. Although the relation between intention and behavior is not always strong, intention is considered to be one of the most important predictors of actual behavior (Ajzen, 1991; Godin & Kok, 1996; Milne et al., 2000).

Comparison of the present findings with previous studies shows that our results among DUs and MSM largely overlap those of Baars et al. (in press 'a') and Schutten et al. (2002) that were conducted within the Dutch pilot program. Once again, among DUs attitude is shown to be the most important predictor of intention to get vaccinated. Among MSM, both attitude and perceived susceptibility were associated with intention to obtain hepatitis B vaccination on a multivariate level, as was shown by Schutten et al. (2002). However, within the present study, subjective norm was only univariately associated with intended vaccination uptake among MSM, while Schutten et al. (2002) showed that the association between subjective norm and intention was also established in a multivariate analysis.

The first practical implication that can be derived from our findings is comparable to that of De Wit et al. (2005) who suggested that, within health education interventions, influencing perceived susceptibility is important to increase hepatitis B vaccination uptake among MSM.

The second implication is that future vaccination programs among CSWs and MSM should focus more on younger individuals. Baars et al. (in press 'b') showed that younger CSWs were less likely to be reached by the free hepatitis B vaccination program. The results of the present study among unvaccinated CSWs show that younger CSWs are more motivated to obtain hepatitis B vaccination as compared to older CSWs. Among MSM, younger individuals are also more likely to have a stronger intention to obtain vaccination. Vaccination at a younger age can generally be regarded as more beneficial for vaccination programs targeted at these communities, particularly when obtained before individuals are at risk (i.e. starting CSWs, and MSM who have just had their 'coming out').

Attitude appears to be an important predictor of intention to obtain hepatitis B vaccination among all groups. Attitudes are based on various beliefs about the pro's and con's of a given behavior. As a third recommendation we suggest that vaccination programs targeted at these risk groups should consist of health education strategies that address these beliefs, and should thus provide relevant information or persuasive techniques in order to change attitudes towards hepatitis B vaccination.

Finally, vaccination programs should be as convenient as possible for CSWs, since the present study shows that perceived behavioral control (the belief that it is difficult or easy to actually obtain vaccination) is an important predictor of intention to obtain vaccination among CSWs. CSWs find it more difficult to obtain vaccination at the local Community Health Service than on their workplace. Moreover, the data show that CSWs who think it is easy to obtain vaccination at the local Community Health Service have a stronger intention to be vaccinated than CSWs who regard it difficult to obtain vaccination at the local Community Health Service.

In conclusion, although the strategy to address risk groups in order to increase hepatitis B vaccination may, in part, be the same for DUs, CSWs and MSM in addressing attitudes, we also found indications that it needs to differ between groups. Among CSWs perceived behavioral control should be addressed, and among MSM campaigns should focus on perceived susceptibility. Future vaccination programs targeted at these risk groups should consider including these different approaches in their intervention.

References

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes,* 50, 179-211.

Baars, J., Boon, B., De Wit, J., Schutten, M., Van Steenbergen, J., Garretsen, H., Van de Mheen, D. (in press a). Drug users' participation in a free hepatitis B vaccination program: demographic, behavioral and social-cognitive determinants. *Substance Use & Misuse*.

Baars, J.E., Boon, B., Garretsen, H.F., Van de Mheen, D. (in press b). Vaccination uptake and awareness of a free hepatitis B vaccination program among female commercial sex workers. *Women's Health Issues*.

Cialdini, R.B., Reno, R.R., Kallgren, C.A. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of Personality and Social Psychology*, 58, 1015-1026.

Centers for Diseases Control and Prevention (1982). Inactivated hepatitis B vaccine. *Morbidity and Mortality Weekly Report,* 31, 317-318.

Centers for Diseases Control and Prevention (2008). Available: http://www.cdc.gov. Accessed: July 21, 2008.

Connor, M., Sparks, P. (2005). The theory of planned behavior and health behavior. In M. Conner and P. Norman (Eds.), *Predicting health behavior*. Second Edition. (pp. 170-222). Buckingham: Open University Press.

De Wit, J.B., Vet, R., Schutten, M., Van Steenbergen, J. (2005). Social-cognitive determinants of vaccination behavior against hepatitis B: an assessment among men who have sex with men. *Preventive Medicine* 40(6):795-802.

Fishbein, M. (1993). Introduction. In D.J Terry, C. Gallois and M. McCamish (eds) *The Theory of Reasoned Action: Its Application to AIDS-preventive Behaviour.* Oxford: Perganon, xv-xxv.

Fishbein, M., Pequegnat, W. (2000). Evaluating AIDS prevention interventions using behavioral and biological outcome measures. *Sexually Transmitted Diseases*, 27, 101–110.

Godin, G., Kok, G. (1996). The theory of planned behaviour: a review of its applications to health-related behaviours. *American Journal of Health Promotion*, 11, 87-98.

Johnston, M., French, D.P., Bonetti, D. Johnston, D.W. (2004). Assessment and measurement in health psychology. In: Sutton, S., Baum, A. and Johnston, M. (eds.). *The Sage Handbook of Health Psychology*. (p 288-323). London: Sage.

Milne, S., Sheeran, P., Orbell, S. (2000). Prediction and intervention in health-related behaviour: A meta-analytic review of Protection-Motivation Theory. *Journal of Applied Social Psychology*, 30, 106-143.

Rhodes, S.D., Grimley, D.M., Hergenrather, K.C. (2003). Integrating behavioral theory to understand hepatitis B vaccination among men who have sex with men. *American Journal of Health Behavior,* 27, 291-300.

Rosenstock, I.M. (1965). Why people use health services. *Milbank Quarterly* 44:94-127.

Rosenstock, I.M. (1974). Historical origins of the health belief model. *Health Education Monographs* 2:1-8.

Schutten, M., De Wit, J.B.F., Van Steenbergen, J.E. (2002). Why do gay men want to be vaccinated against hepatitis B? An assessment of psychosocial determinants of vaccination intention. *International Journal of STD & AIDS*, 13, 86-90.

Schwarz, N., Oyserman, D. (2001). Asking questions about behavior: Cognition, communication and questionnaire construction. *American Journal of Evaluation*, 22, 127-160.

Abraham, C., Sheeran, P. (2005). The theory of planned behavior and health behavior. In M. Conner and P. Norman (Eds.), *Predicting health behavior*. Second Edition. (pp. 28-80). Buckingham: Open University Press.

Smallenbroek, A.J., Smits, E.C. (2001). *Gemeentelijk prostitutiebeleid na opheffing van het algemeen bordeelverbod. Inventarisatie van de stand van zaken.* Den Haag: SGBO Onderzoeks- en Adviesbureau van de Vereniging van Nederlandse gemeenten.

Stone, A.A., Turkkan, J.S., Bachrach, C.A., Jobe, J.B., Kurtzman, H.S., Cain, V.S. (Eds). (1999). *The science of self-report: Implications for research and practice.* Mahwah, NJ: Erlbaum.

Van Steenbergen, J.E. (2002). Results of an enhanced-outreach programme of hepatitis B vaccination in the Netherlands (1998-2000) among men who have sex with men, hard drug users, sex workers and heterosexual persons with multiple partners. *Journal of Hepatology,* 37, 4, 507-13.

Waldhober, Q., Heijnen, M-L. (2003). Landelijk bereik van HBV-vaccinatiecampagne risicogroepen. *Infectieziekten Bulletin* 2003, 14, 249-253.

Watters, J.K., Biernacki, P. (1989). Targeted sampling: Options for the study of hidden populations. *Social Problems*, 36, 416-430.

World Health Organization (2000). Hepatitis B Fact sheet N°204. World Health Organization. Available: http://www.who.int. Accessed: May 16, 2008.

chapter 9

Discussion

This research project was designed to explore the reach of a free hepatitis B vaccination program. The methods consist of a review of international peer-reviewed literature, a prospective study among 207 eligible drug users (DUs), and three cross-sectional studies in which 309 DUs, 259 commercial sex workers (CSWs) and 320 men who have sex with men (MSM) were recruited. The objective was to explore the proportions and characteristics of DUs, CSWs and MSM: i) who were aware of the opportunity to obtain free hepatitis B vaccination and those who were unaware, ii) who actually obtained vaccination and those who did not, and iii) who completed the full vaccination schedule and those who did not. Furthermore, social-cognitive correlates of vaccination behavior were investigated.

This final chapter provides a discussion on the main study results. The first section (section 9.1) summarizes the key findings. In section 9.2 the main limitations of the studies in this thesis are addressed and section 9.3 provides a discussion on the main findings. Recommendations for further research and for practice are given in section 9.4. This thesis ends with some final remarks presented in section 9.5.

9.1 Summary of study results

The literature overview (Chapter 3) showed how many and which studies explored the correlates of vaccination behavior among DUs, CSWs and MSM. The review revealed that most studies did not report on any correlates of awareness of the hepatitis B vaccine. About half of the studies were conducted as part of an intervention in which participants

were screened for hepatitis B and then vaccinated. Some studies explored correlates of vaccination uptake and compliance among DUs and MSM, and only one study examined compliance among CSWs. All these studies found diverse correlations with vaccination behavior. For example, age was reported many times as a predictor of vaccination uptake and of compliance. However, some studies reported positive associations whereas others found negative associations. When interpreting the results it is important to consider the methodology used and target groups of each study. Some studies reported similar results, for example, that convenience to obtain vaccination appears to play a role in vaccination behavior among DUs. For example recruitment at a location where immediate vaccination is provided and recruitment at a center that is most convenient (e.g. less waiting time) is beneficial for vaccination uptake. Little is known about the vaccination behavior among CSWs. Among MSM social-cognitive variables such as perceived severity, perceived susceptibility and barriers are associated with vaccination uptake.

In Chapter 4, intention as well as vaccination uptake among DUs was investigated in a prospective study within the context of the pilot program. Among 207 eligible DUs, 45% (n=93) obtained actual vaccination, of which 54% (n=50) complied with the vaccination schedule. Perceived behavioral control was the only predictor of vaccination uptake, and injecting drug use was a predictor of compliance with the vaccination schedule. Perceived behavioral control reflects the belief as to whether or not it is difficult for DUs to obtain free hepatitis B vaccination. This result confirms the idea that vaccination against hepatitis B should be made as convenient as possible for DUs in order to increase vaccination uptake.

Chapters 5, 6 and 7 showed that 63% of DUs, 74% of CSWs and 79% of MSM were aware of the possibility to obtain free hepatitis B vaccination within the present vaccination program. Furthermore, our results showed that particular groups are less likely to be aware of the possibility to obtain free hepatitis B vaccination. These groups are DUs who do not visit drug consumption rooms, CSWs who do not work behind windows and those who work for a shorter period in the study region, and MSM who reported to be bisexual and who do not visit gay bars/discos.

Of the total samples, 44% of DUs, 63% of CSWs, and 50% of MSM had obtained hepatitis B vaccination. Being personally informed about the vaccination program was an important predictor of vaccination uptake among all three groups. Among DUs this applied if the information was provided by staff members of addiction care, and among CSWs and MSM if a personal approach was offered by prevention workers for sexually transmitted diseases (STD) of the Community Health Service. Among CSWs these prevention workers were professionals, and among MSM these included peers who were trained to provide information about hepatitis B and other STD. Other variables associated with vaccination uptake were age of onset of drug use among DUs, and having sex with casual partners among MSM. Recruitment region was associated with vaccination uptake among CSWs and MSM. Important reasons for non-participation in the vaccination program among

DUs were 'not thinking about the vaccine' and 'not perceiving a risk to get infected with the virus'; and among CSWs and among MSM 'lack of time' and 'not perceiving a risk to infected with the virus'.

Compliance rates of 67% among DUs, 79% among CSWs and 84% among MSM were shown. Among DUs, a history of STD and having sex with casual partners were negatively associated with compliance with the hepatitis B vaccination schedule (receiving three vaccinations). Among CSWs and MSM there were no associations (in multivariate analyses) with vaccine completion; this is probably due to the smaller sample sizes since most CSWs and MSM were fully vaccinated and many MSM were vaccinated outside the free vaccination program. Reasons for not receiving three vaccinations were missing out on a vaccination appointment because of occupation with other activities among DUs and CSWs and lack of information about the vaccine procedure among the three risk groups.

Finally, in Chapter 8 the social-cognitive predictors of intention to obtain hepatitis B vaccination are described among DUs, CSWs and MSM who had not yet been vaccinated. Whereas older DUs were more likely to be motivated to obtain vaccination against hepatitis B, the younger CSWs and MSM had a stronger intention to obtain the hepatitis B vaccination. Overall, attitude towards obtaining hepatitis B vaccination is an important predictor of intended hepatitis B vaccination uptake. Furthermore, CSWs who believe it is less difficult to obtain vaccination at the office of the Community Health Service and those who perceive more health benefits were more likely to intend to obtain hepatitis B vaccination. MSM who perceived a higher susceptibility to get infected with the hepatitis B virus were also more likely to be motivated for hepatitis B vaccination uptake.

9.2 Study limitations

Before discussing the results of the studies presented in this thesis, the study limitations are described below. In the previous chapters most of the study limitations of the specific studies have been discussed in detail. Two main limitations related to our study design will be addressed in this general discussion.

9.2.1 Self-reported data

The first limitation is related to the studies in which vaccination uptake and infection with the hepatitis B virus were based on self-reports. The limitations of self-reports are well reported (Johnston et al., 2004; Schwarz & Oyserman, 2001; Stone et al., 1999). Among DUs self-reported data have been discussed because of their variable degrees of accuracy, as shown in earlier studies (Best et al., 1999; Kuo et al., 2004; Langendam et al., 1999; Schlicting et al., 2003). Despite the limitations of self-reports we have chosen this method for a number of reasons.

In the study exploring the ongoing vaccination program, anonymity was one of the key aspects of entering the study. We aimed to keep non-response as low as possible in order to minimize any selection bias. This was important because our aim was to recruit a representative sample of the risk groups under study, including those persons not willing to be vaccinated within the vaccination program for any reason at all.

An alternative to self-reported hepatitis B vaccination rates would have been to link our survey to the vaccination program using the first letters of the surname and date of birth, as was done in our study of the pilot program. In that study, however, the self-report questionnaires were provided by health professionals who were familiar with most of the DUs. In our cross-sectional studies, asking people for their full date of birth might deter some potential participants; for example, especially CSWs are afraid of confrontation with, e.g., the tax departments. Therefore, in our studies exploring the current ongoing vaccination program we chose not to link our survey with the vaccination program.

Another possibility to collect data on hepatitis B vaccination and immunity would have been to collect blood or saliva samples, and to test for markers of previous infection and vaccination. However, although self-reports are not always considered accurate, the alternative serologic tests also have their limitations. In addition to the extra costs and infrastructure needed for the implementation of our study, asking for blood samples might also discourage some of the target group. For example, Fishbein & Pequegnat (2000) argued that because some biological and biochemical tests are invasive, their use may increase refusal rates. This might also be a reason not to accept the hepatitis B vaccination, i.e. the respondents are 'scared of needles'. In addition, in DUs with a history of injecting drugs it may be difficult to draw blood from their veins, making it unpleasant for them to participate in our study.

A second limitation concerning biochemical tests was mentioned by Campbell et al. (2007). Because anti-bodies wane over time, serologic testing results may not correlate well with true vaccine history and true immunity. Studies have indicated that in 17-50% of vaccinated persons, hepatitis B virus markers of previous vaccinations are difficult to detect 10-15 years later (Mast et al., 2006). This does not mean that these persons are no longer protected against hepatitis B virus infection, since a high proportion will retain immunologic memory (Banatvala & Van Damme, 2003; Bauer & Jilg, 2006). In addition, tests based on saliva samples (considered as the 'least invasive' test) showed a sensitivity ranging from 75-86% and a specificity of >99% (Fisker et al., 2002; Hope et al., 2007). Sensitivity refers to the ability of a diagnostic test to identify the true positives (or persons that are actually infected), whereas specificity refers to the ability of the test to identify the true negatives (or persons that are not infected). Given the aim of our study, together with the low sensitivity of saliva samples and the invasiveness of blood samples, we therefore chose to rely on the best option available, which was self-reported data.

9.2.2 Recruitment of the respondents

The second limitation of the studies in this thesis involves aspects of our recruitment procedure. In Chapter 2 (which presents the recruitment strategies) we report that, at a few locations, managers denied recruitment in their institution or club. For example, in Utrecht we were not able to recruit DUs attending the methadone program; we were planning to recruit respondents during the special evening hours at the methadone outlet for people who work. Because of this missed opportunity to recruit these respondents, the marginalized individuals recruited on the street could be slightly overrepresented in our study among DUs in Utrecht.

In South Limburg, due to a tense atmosphere among CSWs related to the tax service, some managers of sex clubs did not allow us interview at their location; if the same managers had also obstructed health professionals, an overestimation of the awareness and possibly vaccination uptake could exist due to (possible) selection bias in South Limburg. However, this does not seem to be the case, since comparison of the clubs who participated and those who did not showed no major differences: they were visited similarly by health professionals of the Community Health Service.

As mentioned above, we aimed for a response rate as high as possible since our general objective is to show the reach of the vaccination program, which also includes those who were not willing to get vaccinated. The response rates of participation in our study among the risk groups were 83% for DUs, 64% for CSWs and 66% among MSM, indicating that 17%-36% of members of the target groups for our study had been missed. However, the characteristics (age and ethnicity) of those who refused to participate in the study did not differ from those who participated in our study.

Another limitation of our study design is that the results on the correlates of hepatitis B vaccination behavior are not generalizable to the total communities of DUs, CSWs and MSM. However, they are generalizable within the settings of marginalised DUs who visit drug care facilities and/or spend time on the street, CSWs who are engaged in legal or tolerated prostitution, and active MSM who visit leisure locations for MSM. Since we investigated the uptake of the vaccine in only three regions in the Netherlands these rates may not be representative for the nationwide populations. This limitation also holds for the prospective study (Chapter 4) in which the baseline questionnaires were distributed in addiction care facilities (such as methadone outlets) in three regions in the Netherlands.

9.3 Discussion of our findings

This section discusses and interprets the key findings of our studies.

9.3.1 Awareness of the free hepatitis B vaccination program

The first research question in this thesis was: 'What are the proportions of those who are aware and those who are unaware of the possibility to obtain free hepatitis B vaccination; and what are their characteristics?' Our results show that most members of the target groups are aware that they can opt for free hepatitis B vaccination. Among DUs, 63% is aware of the opportunity to obtain free hepatitis B vaccination versus 79% among CSWs and 74% among MSM.

The awareness among our DUs is high compared to the 54% of DUs that had heard about hepatitis B vaccination as reported by Carey et al. (2005). Our finding that DUs who visited drug consumption rooms were more likely to be aware of the vaccination program than those who did not visit these facilities corroborates the findings of others who reported that those in drug treatment (Kuo et al., 2004), and those with sustainable contact with the needle exchange services (McGregor et al., 2003; Carey et al., 2005) are more likely to obtain vaccination. In general we can state that the individuals who are regularly in contact with staff of addiction care are more likely to have heard of the vaccine and/or have been offered the vaccine. DUs who visit drug consumption rooms are more likely to be homeless and are likely to be daily users. This suggests that the most marginalized DUs have been reached by the vaccination program.

CSWs who work for a shorter period in the region were less likely to be aware of the free hepatitis B vaccine. This implies that mobility indeed plays a role in vaccination behavior among CSWs, as also suggested by Mak et al. (2003) and Wouters et al. (2006). CSWs that are transient, thus temporarily working in the region, are less likely to be 'caught' by health professionals who promote hepatitis B vaccination. Furthermore, our results indicate that CSWs who work behind windows are probably most 'visible' for health professionals, since they are most likely to be aware of the possibility to obtain hepatitis B vaccination.

MSM who had not visited gay bars and discos and those who reported to be bisexual were less likely to be reached by the free hepatitis B vaccination program. This is in agreement with Rhodes et al. (2002) who found that bisexual men were less likely to be vaccinated than homosexual men. Bisexual men less often visit typical 'gay' locations (gay bars and discos) in which the Dutch vaccination program is broadly implemented, and are thus less likely to be aware of the vaccination program, resulting in a lower participation rate within the vaccination program.

9.3.2 Hepatitis B vaccination uptake

The second question in this thesis was: 'What are the proportions of those who actually obtained vaccination and those who did not; and what are their characteristics?' We showed that 44% of DUs, 63% of CSWs and 50% of MSM reported hepatitis B vaccination uptake. Within the prospective study of the pilot program, 45% of eligible DUs had obtained vaccination. Hospers et al. (2006), investigating MSM in the Netherlands, also found a self-reported hepatitis B vaccination rate similar to that which we found among MSM in three Dutch regions. This suggests that our proportions of vaccination uptake are representative for a broader population of MSM.

Being personally informed about the vaccination program was an important predictor of vaccination uptake among all groups. Among DUs our results also indicate that face-to-face contact by people they are familiar with (such as staff of addiction care) is beneficial for vaccination uptake. Not only are they trusted by DUs, but can help DUs remember their vaccination appointments if they see them on a regular basis. Subsequently, we showed that vaccination uptake was associated with age of onset of drug use. Those who started using drugs at a younger age were more likely to be vaccinated. Because this variable has not previously been studied in relation to vaccination uptake by other researchers, no comparative data are available. Among intravenous DUs, the number of years injecting has been studied and was found to be positively associated with vaccination uptake (Hope et al., 2007); however, others found no association between these variables (Lum et al., 2003; McGregor et al., 2003).

Among CSWs, being informed about the free vaccine by professionals from the Community Health Services or prostitution care was beneficial for vaccination uptake. A factor possibly affecting this association is that vaccines were offered by these health professionals on location. In fact, most CSWs (75%) reported that they had received their first vaccination on or nearby their workplace. This suggests that convenience and direct offering are beneficial for vaccination uptake among the group of CSWs. This is supported by the reasons given for not obtaining hepatitis B vaccination (the main reason was "lack of time"), and our findings regarding the motivation of CSWs to be vaccinated (see section 9.3.4 on social-cognitive variables related to vaccination behavior).

The Community Health Services in the three study regions worked with peers that were trained to educate risk groups on safe sex and to promote hepatitis B vaccination among MSM. Among MSM, the personal contact with these STD prevention workers had a positive effect on vaccination uptake as compared to other communication techniques such as promotion through flyers or posters. De Wit et al. (2008) also showed that a personal touch is beneficial in motivating participants; they argue that information concerning health risks can best be communicated to MSM in a narrative manner (e.g. a personal account of a member of the target audience's peer group) rather than by statistical facts and figures. Furthermore, our results among MSM showed that having sex with casual partners was positively associated with vaccination uptake. This indicates that those at risk through sexual contact with casual sex partners are reached by the vaccination program. It also shows (combined with the reported reason for vaccine refusal

'not perceiving a risk to infected with the virus'), that those who do not obtain hepatitis B vaccination are less likely to have casual sex partners and find themselves less likely to be susceptible to get infected with the hepatitis B virus.
CSWs and MSM who were recruited in Rotterdam had a relatively low vaccination rate as compared to those who were recruited in the other two regions. Probably the wider geographic locations in this region make the locations less accessible for STD-prevention workers.

Our findings on intention to obtain hepatitis B vaccination show that older DUs were more likely to be motivated to get vaccinated against hepatitis B. The opposite seems true for CSWs and MSM; the younger CSW and MSM were more likely to intend to obtain hepatitis B vaccination. Older DUs, MSM and CSWs are more experienced than the younger members of these communities. Older DUs may reflect on their risk behavior in different ways than older MSM and older CSWs.

9.3.3 Compliance with the vaccination schedule

The third aim of this thesis was to explore the proportions of those who complied with the hepatitis B vaccination schedule and those who did not, and to reveal their characteristics. Within the study of the current vaccination program, we showed that 67% of DUs, 79% of CSWs and 84% of MSM who started the vaccination procedure completed the three-dose vaccine schedule. Our prospective study found that 54% of vaccinated DUs complied with the vaccination schedule. In the Netherlands, compliance rates of 50% among CSWs, and 74% among MSM were previously reported in the national vaccination program (Heijnen et al., 2007). The compliance rates of the target groups within the cross-sectional studies are higher than those reported in the national program and the pilot program that were based on follow-up. These dissimilarities can probably be explained by differences in the aims of the studies and the study designs. Whereas the cross-sectional studies reflect the populations at a certain point in time, the registration system of the prospective studies also include those participants that have, for example, moved or migrated and should in fact be registered as lost to follow-up.

DUs who did not comply with the vaccination schedule were more likely to have reported a history of STD infection, and sexual intercourse with casual partners. This suggests that those who are most at risk through sexual contact are less likely to be fully vaccinated. The reported effects on compliance of providing monetary incentives and accelerated vaccine schedules (Seal et al., 2003; Christensen et al., 2004) could be particularly relevant for these sexually active groups.

In our prospective study, a negative relation was found between recent injecting drug use and receiving full vaccination. This seems to contradict our findings in the cross-sectional study that indicated (on univariate analysis) that the opposite is true. However, the latter study concerns DUs who *ever* injected drugs, whereas the prospective study deals with those who *recently* injected drugs.

Among CSWs and MSM we found no associations with vaccine completion. Among CSWs mobility or transience is suggested to be a barrier for compliance (Mak et al., 2003 and Wouters et al., 2006). Highly mobile groups are believed to complete the vaccine less often. Although our results show a similar trend, we were unable to confirm this suggestion regarding compliance (probably due to the small numbers in our study who did not comply with the vaccination schedule). This is also true for MSM, since most MSM were fully vaccinated and many MSM were vaccinated outside the free vaccination program.

Our review of the literature shows that, among MSM, compliance had been studied by Dufour et al. (1999) and Sethi et al. (2006). The first authors found for example that vaccine completion among MSM was negatively associated with income and educational level, and positively with number of casual sex partners, and history of STD infection. The latter authors showed that those who were enrolled early in the study had a greater chance to be fully vaccinated. This could indicate that the most motivated MSM were vaccinated first and had a higher completion rate. It could also indicate that the nurses providing the vaccine were more motivated at the beginning of the study to have everybody completely vaccinated. However, our study data can neither confirm nor reject these hypotheses.

9.3.4 Social-cognitive determinants of vaccination behavior

The final objective of this work was to establish which social-cognitive factors play a role in hepatitis B vaccination behavior. On the basis of two cognitive models, i.e. the Health Belief Model (HBM; Rosenstock, 1965; Rosenstock, 1974) and the Theory of Planned Behavior (TPB; Ajzen, 1991), we explored which social-cognitive factors are associated with actual vaccination behavior among DUs (Chapter 4), and with the intention of DUs, CSWs and MSM to obtain vaccination (Chapter 8). Our aim was not to test the predictive value of the theoretical models, but to find specific leads for improving campaigns in promoting hepatitis B vaccination uptake. Overall, attitude towards obtaining hepatitis B vaccination (which is part of the TPB), was the most important social-cognitive predictor of intention to obtain hepatitis B vaccination. CSWs who perceived more control over vaccination uptake were more likely to intend to obtain hepatitis B vaccination. MSM who perceived a higher susceptibility to get infected with the hepatitis B virus had a stronger intention to get vaccinated against hepatitis B. We showed that our integrated models explain 49%, 53% and 51% of the variance in intention to obtain hepatitis B vaccination among DUs, CSWs and MSM, respectively.

Our results of the prospective study among DUs (Chapter 4) suggest that convenience is an important factor related to vaccination behavior. This is reflected by the social-cognitive variable 'perceived behavioral control' which is the only predictor of vaccination uptake. The belief of some DUs that they are 'not capable' of obtaining free hepatitis B vaccination should be translated into 'making it as easy as possible' to obtain vaccination. Thus, offering the vaccine on an accessible location, and in a direct manner (direct offering), will promote vaccination uptake because it is then more convenient for DUs to obtain vaccination.

Among MSM we showed that perceived susceptibility was associated with intention to obtain vaccination (Chapter 8). This was also considered by De Wit et al. (2005) to be the most important social-cognitive variable in explaining vaccination uptake. Our findings in Chapter 8 confirm an important reason given for vaccine refusal, namely: 'not perceiving a risk to get infected with the virus' (Chapter 7), which we have discussed in section 9.3.2.

Communication about the free vaccine with individuals and groups should address the factors empirically shown to determine intention. As revealed in Chapter 8, in our study these factors include attitude towards obtaining hepatitis B vaccination among all behavioral risk groups, perceived susceptibility among MSM, and perceived behavioral control among CSWs. On the other hand, our prospective study among DUs (Chapter 4), as well as the study of De Wit et al. (2005) among MSM, showed that attitude towards hepatitis B vaccination and intention to obtain vaccination were not predictors of vaccination uptake; this questions the relevance of using these concepts in health education programs to stimulate vaccination uptake. However, if the environment facilitates vaccination uptake (such as vaccination on site), and the person is able to perform this behavior, then the person's motivation to obtain vaccination will eventually determine whether or not that behavior will be performed. An explanation for not finding a relationship between attitude and vaccination uptake in the study by De Wit et al. (2005), and in our prospective study (Chapter 4), could be related to the study designs. In Chapter 4 (similar to De Wit et al., 2005) we measured attitude before the respondents were exposed to any information about the free vaccine. Thus, their attitude could have been changed by the information (flyers or personal information) they received after finishing the questionnaire and before the actual vaccination uptake. Also, various barriers may have been experienced, even though DUs have a positive attitude and intention towards obtaining vaccination. This is referred to as the 'intention-behavior gap' (Orbell & Sheeran, 1998; Gollwitzer, 1999); good intentions do not always result in actual behavior. Fishbein (2000) argues that translating intention into action requires certain skills and overcoming potential barriers.

9.4 Recommendations

The Health Council of the Netherlands is currently preparing a recommendation concerning universal hepatitis B vaccination; this was advocated by the World Health Organization many years ago (WHO, 1992). However, if universal vaccination would be implemented (for example, by vaccinating newborns), a targeted vaccination approach for behavioral risk groups will still be necessary for several years until the newborns have reached adolescent age and the immunization of risk groups has reached a sufficient level. Therefore, the recommendations emerging from the work in this thesis are important for both current and future vaccination programs among behavioral risk groups. Recommendations for additional research are described below.

9.4.1 Recommendations for further research

In the previous section we argued that different barriers may play a role in the ability of DUs to obtain vaccination. These barriers may include finding a place to sleep, and craving for drugs; such activities are urgent and time consuming, leaving little room for planning to obtain a hepatitis B vaccination. Although we investigated a number of other barriers (Chapter 8) these were not associated with the intention of DUs to obtain vaccination. If these barriers are in fact moderators of the relationship between intention and behavior, then this might explain why these barriers are not associated with intention. The relationship between intention and behavior could be different for DUs with many perceived barriers compared to those with low perceived barriers. The actual vaccination behavior of DUs should be explored further by investigating the benefits and barriers to obtaining vaccination (two constructs of the HBM).

We have argued that most DUs live in an environment in which the primary necessities of life may play a more important role than obtaining a hepatitis B vaccination. Although DUs have a positive attitude and intention towards obtaining vaccination, different barriers may play a role in their ability to actually obtain vaccination. Perceived behavioral control was found to be an important predictor of vaccination uptake. DUs who thought it was difficult to obtain hepatitis B vaccination had a lower chance of obtaining vaccination. This implies that it should be made easier for DUs to be vaccinated against hepatitis B; obtaining vaccination should be as convenient as possible, as also reported by others (Des Jarlais et al., 2001; Campbell et al., 2007). On the other hand, self-initiative may also play a role among DUs. In the Netherlands, harm-reduction programs have been successfully developed and in some regions special trajectories for DUs are in place. For DUs who are 'in care' this usually means that many activities are arranged for them (e.g. finances, appointments with the dentist, screening of the lungs, etc.). Although this is reasonable (in many cases care is necessary), such an arrangement does not necessarily stimulate self-responsibility or self-initiative. It would be interesting to investigate the levels of independence or self-support among DUs. For example, to explore whether self-initiative and adherence to the use of health services among DUs are in fact attainable goals, taking into account their addiction problems.

DUs who are at risk for hepatitis B infection because of their sexual behavior with casual sex partners and history of STD were less likely to be fully vaccinated. Although sustainable levels of anti-bodies can develop in less than three vaccinations (CDC, 2002), it remains a health concern for DUs and for those they have sex with. In our study, although less than one third (27%, n=83) had intercourse with casual partners, half of them reported unsafe sex. The magnitude of this problem with regard to the transmission of infection should be explored further.

Hepatitis B vaccination uptake in CSWs not working in a legalized setting should be furthered investigated. In the Netherlands, the prostitution sector has been legalized. This means that CSWs who have obtained a work permit and residence permit are allowed

to work as a prostitute. CSWs working legally in the Netherlands will be easier to reach than those working illegally. Because CSWs working illegally possibly are at greater risk for infection, the possibilities for vaccination against hepatitis B in this group should be explored further. Since transience or mobility of CSWs occurs internationally (Van der Helm & Van Mens, 1999), the transience we found to be associated with hepatitis B vaccination uptake could be of extra importance for those who are working illegally and who are moving from one country to the other. Their transience can create missed opportunities to obtain vaccination.

Our findings show that, among MSM, perceived risk of infection with the hepatitis B virus is associated with hepatitis B vaccination behavior. Not perceiving a risk was an important reason for vaccine refusal and was negatively associated with intention to obtain vaccination. We also found that MSM who did not report vaccination were less likely to have sex with casual partners and are, thus, probably at less risk for infection compared with other MSM. It would be interesting to explore those groups that do not regard themselves as being at risk. Preliminary results (not reported in this thesis) show that those not perceiving a risk for infection include MSM who are at the 'pre-stage' of their sexual career and have not yet had sex, as well as the group of MSM who did not have sex frequently. However, informal talks with some interviewees revealed that, although some men report not to have had sex with their regular partner or with any casual sex partners in the previous 6 months, this does not mean that they do not have sex at all. For example, some had sex with multiple sex partners whilst on vacation over the years. Therefore, information bias could result from questions asked about casual sex partners within a relatively short period. Future research among those reporting few sex partners should cover a study period longer than 6 months. For the present research, however, because we focused on the whole group of MSM we chose the previous 6 months as a reference period; among groups who frequently have casual sex partners a longer period of measurement may also produce information bias, i.e. the well-documented recall bias.

Furthermore, we need to investigate what messages will stimulate the motivation to obtain vaccination among those MSM who are at less risk for infection compared to other MSM. Among those MSM who are at the 'pre-stage' of their sexual career the importance of early protection could be emphasised. For men who report few sexual contacts, the effect of information such as 'being a member of a community in which the virus is more prevalent increases the chance of becoming infected' could be investigated. Information could also more clearly indicate that safe sex to prevent infection with hepatitis B is not the same as safe sex to prevent infection with HIV. This was also reported by Rhodes et al. (2002) in their qualitative study. Many men seem to be unaware that the hepatitis B virus is more infectious than HIV; the impact of this message should be explored further. For example, in a randomized controlled trial, the effect of fear appeals could be investigated. Witte & Allen (2002) showed that strong fear appeals combined with efficient messages can produce behavioral change. Fear appears to be a great motivator, as long as individuals believe they are able to protect themselves; thus, combined with offering a safe and effective hepatitis B vaccination, such protection is within reach.

The registration system of the hepatitis B vaccination program of the Community Health Services is an important source of information for compliance rates and characteristics of those who do and do not complete the vaccine series. These characteristics include their sexual orientation, whether they have been paid for sex (CSWs yes/no), if they have used drugs (ID yes/no), age, gender, country of birth, and region. The total number of participants in the first 5 years of the program exceeds 80,000 persons. These data have not yet been reported in the peer-reviewed literature and it would be interesting to explore these data in more depth.

9.4.2 Recommendations for practice

The data presented in this thesis may have implications for the current vaccination approach, because they shed light on the 'unreached' groups and their reasons for non-participation and non-compliance. Combined with our knowledge on the social-cognitive predictors of hepatitis B vaccination behaviour, our results can: i) help health professionals working on the current vaccination program focus on specific risk groups, or develop new intervention techniques, and ii) direct the implementation of future vaccination programs targeted at these groups. Knowledge of the variables that underlie vaccination behavior is needed to accurately target future vaccination approaches. The three risk groups under study here may, in part, need different approaches in order to increase their rates of vaccination against hepatitis B.

Recommendations based on our findings to promote awareness, vaccination uptake and compliance with the vaccination schedule are described below.

Recommendations to increase awareness

To enlarge the reach of the free hepatitis B vaccination program, the network of addiction care facilities and shelters should be optimally used. Our results showed that DUs who had visited drug consumption rooms and night shelters were more likely to have heard about the free vaccine than those not visiting these facilities. This suggests that, in those facilities, the vaccination program is well implemented. Additional attention should be paid to other facilities (such as day shelters and methadone outlets) in order to reduce missed opportunities to prevent infection.

Extra attention should be paid to starting and young CSWs; this means being alert to the new women in the business. The sooner CSWs get vaccinated, the greater the chance the vaccination will prevent hepatitis B infection and the greater the benefit for them. To reach these starting CSWs the outreach work should be continued and, if possible (depending on cost-effectiveness, etc.), the visits should be intensified to reach as many women as possible. Offering the vaccine on location over a variety of time points (e.g. late afternoon,

or at night) and on different days will probably increase the chance of meeting new CSWs. Not every CSW works the same number of hours, and 'early' and 'late' shifts can take place at the various locations.

Attention should also be paid to bisexual MSM. One way to reach bisexual MSM is to intensify visits to their meeting places; these include public parks, saunas, sex cinemas. Extended use of the internet should also be explored. In July 2005 a first step was taken with the establishment of the 'Homohep' website on which MSM can make appointments (online) to be vaccinated (Heijnen et al., 2006). This website was expanded in September 2008 by the website 'b-a-man.nl' ("be a man and take responsibility"), which is part of a new campaign focusing on young MSM.

Recommendations to increase vaccination uptake

In our prospective study we found that perceived behavioral control was a predictor of vaccination uptake. The belief of some DUs that they are not capable of obtaining free hepatitis B vaccination is linked to their convenience in obtaining the vaccine at an accessible location, in a direct manner. Thus direct provision of the vaccination should be further facilitated to increase vaccination uptake.

Our finding that a personal approach by staff of addiction care services is beneficial for vaccination uptake shows the need to maintain and possibly expand the cooperation of Community Health Services with these low-threshold facilities. The staff of these facilities can encourage these high-risk groups to accept the vaccine and help them to remember their vaccination appointments. The personal contact between staff of addiction care and DUs should be stimulated and maintained with regard to vaccination uptake.

Also among CSWs, the personal approach is associated with vaccination uptake. The effort of health professionals promoting the vaccine and direct offering of the vaccine at the workplace could be intensified in order to increase vaccination uptake. Indeed, our results showed that CSWs find it more difficult to obtain vaccination at the Community Health Service than at their place of work.

We found that a torn condom during intercourse with clients was associated with a higher vaccination uptake (Chapter 6). Those CSWs who have experienced a torn condom are probably more aware of the health risks, and of the benefits of vaccination, which could stimulate their decision to obtain vaccination. In our sample, a quarter of CSWs reported torn condoms during intercourse with clients. CSWs should be informed on the possibility of condom failure and that a vaccine helps to protect against the hepatitis B virus.

Since 'lack of time' was reported as a reason for not obtaining vaccination among CSWs and MSM, it should be stressed that the vaccine is also available outside office hours (if appropriate) and at several locations.

A personal approach from trained peers seems an important tool to increase vaccination uptake among MSM; this method of vaccination promotion should be stimulated. In personal conversation these peers can tailor the messages for the target population, they can answer questions, and can also respond to any thoughts that might prohibit MSM from taking appropriate action.

Interventions among MSM should focus on the perceived risk of infection with the hepatitis B virus, since not perceiving a risk was an important reason given for vaccine refusal (Chapter 7) and was a predictor of intention (Chapter 8). In the previous section we made some recommendations for further research on the type of message that can be used in communication on perceived risk. Once an effective and persuasive type of communication has been developed, it could be implemented in the present and/or future vaccination programs.

To enlarge the intention of DUs, CSWs and MSM to obtain vaccination, the vaccination program should address their attitude towards hepatitis B vaccination. Attitude towards vaccination was associated with intended hepatitis B vaccination uptake among DUs, CSWs, and MSM. New and positive information about hepatitis B and the vaccine can stimulate new positive attitudes towards vaccination and influence the motivation to get vaccinated.

Recommendations to increase compliance

The reported reasons for non-compliance show that it is important to provide more explicit information about the vaccination schedule and procedure to DUs, CSWs and MSM. Although it is not clear whether the participants in our study had merely forgotten about the vaccination procedure or whether the communication of those who offered vaccination had failed, it nevertheless shows that it is necessary to explain the importance of full vaccination to the participants and emphasize the place and date of the follow-ups. Is should also be explained that the vaccination schedule is flexible (within certain limits), and that if an appointment is missed it is advisable and beneficial to make a new one.

Since many of the CSWs are transient (25% had been working less than 3 months at the current workplace; Chapter 6) it is important to stress that the vaccine series can be completed free of charge in every region in the Netherlands. CSWs should also be encouraged to inform the Community Health Service of their new place of work, so that the local Community Health Service can remind them of their vaccination appointments. The same strategy used to address awareness of the vaccination program among CSWs can also be used to improve the compliance with the vaccination schedule. This means that the distribution of the vaccination at the place of work of CSWs could be intensified. In some sex clubs the Community Health Services offer vaccination three times a year. However, our observations (during the ethnographic mapping and data collection period) showed that CSWs can work on different days, and for window prostitution the switching 'early'

and 'late' shifts makes it easier to miss a vaccination appointment. Offering the vaccine on location during various time points and on different days may enlarge the chance of meeting the CSWs again. However, this approach is time consuming and the cost-effectiveness needs to be taken into account.

9.5 Final remarks

In conclusion, the enhanced outreach approach seems to be a rewarding technique in terms of awareness and hepatitis B vaccination uptake. Our findings suggest that, in spite of the diversity of the three high-risk groups under study, a personal approach among all three risk groups is the most rewarding strategy to further increase the reach of the hepatitis B vaccination program.

References

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes,* 50, 179-211.

Altice, F.L., Bruce, R.D., Walton, M.R., Buitrago, M.I. (2005). Adherence to hepatitis B virus vaccination at syringe exchange sites. *Journal of Urban Health,* 82, 151-161.

Banatvala, J.E., Van Damme, P. (2003). Hepatitis B vaccine - do we need boosters? *Journal of Viral Hepatitis,* 10, 1– 6.

Bauer, T., Jilg, W. (2006). Hepatitis B surface antigen-specific T and B cell memory in individuals who had lost protective antibodies after hepatitis B vaccination. *Vaccine*, 24, 572-577.

Best, D., Noble, A., Finch, E., Gossop, M., Sidwell, C., Strang, J. (1999). Accuracy of perceptions of hepatitis B and C status: Cross sectional investigation of opiate addicts in treatment. *British Medical Journal,* 19, 290-291.

Campbell, J.V., Garfein, R.S., Thiede, H., Hagan, H., Ouellet, L.J., Golub, E.T., Hudson, S.M., Ompad, D.C., Weinbaum, C. (2007). Convenience is the key to hepatitis A and B vaccination uptake among young adult injection drug users. *Drug and Alcohol Dependence*, 91, S64-72.

Carey, J., Perlman, D., Friedmann, P., Kaplan, W., Nugent, A., Deutscher, M., Masson, C., Des Jarlais, D. (2005). Knowledge of hepatitis among active drug injectors at a syringe exchange program. *Journal of Substance Abuse Treatment,* 29, 47-53.

Centers for Disease Control and Prevention. (2002). Hepatitis B vaccination among high-risk adolescents and adults – San Diego, California, 1998-2001. *Morbidity and Mortality Weekly Report*, 51, 618-621.

Christensen, P.B., Fisker, N., Krarup, H.B., Liebert, E., Jaroslavtsev, N., Christensen, K., Georgsen, J. (2004). Hepatitis B vaccination in prison with a 3-week schedule is more efficient than the standard 6-month schedule. *Vaccine,* 44, 3897-3901.

De Wit, J., Das, E., Vet, R. (2008). What works best: objective statistics or a personal testimonial? Comparing the persuasive effects of narrative versus statistical evidence to increase risk perception. *Health Psychology*, 27, 110-115.

De Wit, J.B., Vet, R., Schutten, M., Van Steenbergen, J. (2005). Social-cognitive determinants of vaccination behavior against hepatitis B: an assessment among men who have sex with men. *Preventive Medicine,* 40, 795-802.

Des Jarlais, D.C., Fisher, D.G., Newman, J.C., Trubatch, B.N., Yancovitz, M., Paone, D., Perlman, D. (2001). Providing hepatitis B vaccination to injection drug users: referral to health clinics vs on-site vaccination at a syringe exchange program. *American Journal of Public Health,* 91, 1791-1792.

Dufour, A., Remis, R.S., Alary, M., Otis, J., Mâsse, B., Turmel, B., Vincelette, J., Lavoie, R., LeClerc, R., Parent, R. (1999). Factors associated with hepatitis B vaccination among men having sexual relations with men in Montreal, Quebec, Canada. Omega Study Group. *Sexually Transmitted Diseases,* 26, 317–324.

Fishbein, M. (2000). The role of theory in HIV-prevention. *AIDS Care*, 12, 273-278.

Fishbein, M., Pequegnat, W. (2000). Evaluating AIDS prevention interventions using behavioral and biological outcome measures. *Sexually Transmitted Diseases*, 27, 101-110.

Fisker, N., Georgsen, J., Stolborg, T., Khalil, M.R., Christensen, P.B. (2002). Low Hepatitis B Prevalence Among Pre-School Children in Denmark: Saliva Anti-HBc Screening in Day Care Centres. *Journal of Medical Virology*, 68, 500-504.

Heijnen, M-L., Meerburg, B.G., Waldhober, Q., De Vries, M., Hahné, S. (2007). Landelijke hepatitis B-vaccinatiecampagne voor gedragsgebonden risicogroepen: resultaten en veranderingen. *Infectieziektenbulletin,* 18, 380-383.

Heijnen, M., Vet, R., Nijman, A., Siedenburg, E., Waldhober, Q. (2006). Homohep.nl: homomannen werven voor gratis hepatitis B vaccinatie via internet. *SoaAids Magazine online*, 3, 1. Available: http://www.soaaidsmagazine.nl. Accessed: May 16, 2008.

Hope, V.D., Ncube, F., Hickman, M., Judd, A., Parry, J.V. (2007). Hepatitis B vaccine uptake among injecting drug users in England 1998 to 2004: is the prison vaccination programme driving recent improvements? *Journal of Viral Hepatitis,* 14, 653-660.

Hospers, H.J., Dorfler, T.T. & Zuilhof, W. (2006). *Schorer Monitor 2006*. Amsterdam: Schorer.

Gollwitzer, P.M. (1999). Implementation intentions. Strong effects of simple plans. *American Psychologist,* 54, 493-503.

Johnston, M., French, D.P., Bonetti, D. and Johnston, D.W. (2004). Assessment and measurement in health psychology. In: Sutton, S., Baum, A. and Johnston, M. (eds.). *The Sage Handbook of Health Psychology*, p 288-323. London: Sage.

Kuo, I., Mudrick, D.W., Strathdee, S.A., Thomas, D.L., Sherman, S.G. (2004). Poor validity of self-reported hepatitis B virus infection and vaccination status among young drug users. *Clinical Infectious Diseases*, 38, 587-590.

Langendam, M.W., Van Haastrecht, H.J., Van Ameijden, E.J. (1999). The validity of drug users'self-reports in a non-treatment setting: prevalence and predictors of incorrect reporting methadone treatment modalities. *International Journal of Epidemiology*, 28, 514-520.

Lum, P.J., Ochoa, K.C., Hahn, J.A., Page Shafer, K., Evans, J.L., Moss, A.R. (2003). Hepatitis B virus immunization among young injection drug users in San Francisco, California: the UFO Study. *American Journal of Public Health,* 93, 919-923.

Mak, R., Traen, A., Claeyssens, M., Van Renterghem, L., Leroux-Roels, G., Van Damme, P. (2003). Hepatitis B vaccination for sex workers: do outreach programmes perform better? *Sexually Transmitted Infections,* 79, 157-159.

Mast, E.E., Weinbaum, C.M., Fiore, A.E., et al. (2006). A comprehensive immunization strategy to eliminate transmission of hepatitis B virus infection in the United States: Recommendations of the Advisory Committee on Immunization Practices (ACIP), Part 2: Immunization of adults. *Morbidity and Mortality Weekly Report Recommendations and Reports*, 55, 1-33.

McGregor, J., Marks, P.J., Hayward, A., Bell, Y., Slack, R.C.B. (2003). Factors influencing hepatitis B vaccine uptake in injecting drug users. *Journal of Public Health,* 25, 165-170.

Ompad, D.C., Galea, S., Wu, Y., Fuller, C.M., Latka, M., Koblin, B., Vlahov, D. (2004) Acceptance and completion of hepatitis B vaccination among drug users in New York City. *Communicable Disease and Public Health,* 7, 294-300.

Orbell, S., Sheeran, P. (1998). 'Inclined abstainers': a problem for predicting health-related behaviour. *British Journal of Social Psychology,* 37, 151-165.

Rhodes, S.D., DiClemente, R.J. (2003). Psychosocial predictors of Hepatitis B vaccination among young African-American gay men in the Deep South. *Sexually Transmitted Disease,* 30, 449-454.

Rhodes, S.D., Grimley, D.M., Hergenrather, K.C. (2003). Integrating behavioral theory to understand hepatitis B vaccination among men who have sex with men. *American Journal of Health Behavior,* 27, 291-300.

Rhodes, S.D., Hergenrather, K.C. (2002). Exploring hepatitis B vaccination acceptance among young men who have sex with men: Facilitators and Barriers. *Preventive Medicine,* 35, 128-134.

Rhodes, S.D., Hergenrather, K.C., Yee, L.J. (2002). Increasing hepatitis B vaccination among young African American men who have sex with men: Simple answers and difficult solutions. *AIDS Patient Care and STDs*, 16, 519-525.

Rosenstock, I.M. (1965). Why people use health services. *Milbank Quarterly,* 44, 94-127.

Rosenstock, I.M. (1974). Historical origins of the health belief model. *Health Education Monographs,* 2, 1-8.

Rudy, E.T., Detels, R., Douglas, W., Greenland, S. (2003). Factors affecting hepatitis vaccination refusal at a sexually transmitted disease clinic among men who have sex with men. *Sexually Transmitted Diseases,* 30, 411-418.

Schwarz, N., Oyserman, D. (2001). Asking questions about behavior: Cognition, communication and questionnaire construction. *American Journal of Evaluation*, 22, 127-160.

Schlicting, E.G., Johnson, M.E., Brems, C., Wells, R.S., Fisher, D.G., Reynolds, G. (2003). Validity of injecting drug users'self report of hepatitis A, B, and C. *Clinical Laboratory Science*, 16, 99-106.

Seal, K.H., Kral, A.H., Lorvick, J., McNees, A., Gee, L., Edlin, B.R. (2003). A randomized controlled trial of monetary incentives vs. outreach to enhance adherence to the hepatitis B vaccine series among injection drug users. *Drug and Alcohol Dependence*, 71, 127-131.

Sethi, G., Holden, B.M., Greene, L., Gaffney, J., Ward, H. (2006). Hepatitis B vaccination for male sex workers: the experience of a specialist GUM service. *Sexually Transmitted Infections*, 82, 84-85.

Stone, A.A., Turkkan, J.S., Bachrach, C.A., Jobe, J.B., Kurtzman, H.S., Cain, V.S. (Eds). (1999). *The science of self-report: Implications for research and practice.* Mahwah, NJ: Erlbaum.

Van der Helm, Th., Van Mens, L. (1999). *Mobility in prostitution in The Netherlands 1998-1999. An inventory done under the auspices of EUROPAP-TAMPEP 1998-1999.* Amsterdam: Municipal Health Service Amsterdam.

WHO Expanded Programme on Immunisation, Global Advisory Group. (1992). *Weekly Epidemiological Record*, 3, 11-16.

Witte, K., Allen, M. (2000). A Meta-Analysis of Fear Appeals: Implications for Effective Public Health Campaigns. *Health Education & Behavior*, 27, 591-615.

Wouters, K., Leuridan, E., Van Herck, K., Van Ardenne, N., Roelofs, I., Mak, R., Prévost, C., Guérin, P., Denis, B., Van Damme, P. (2007). Compliance and Immunogenicity of two hepatitis B vaccination schedules in sex workers in Belgium. *Vaccine*, 7, 1893-1900.

SUMMARY

Hepatitis B is a disease of the liver caused by the hepatitis B virus. This virus is transmitted through blood-blood and sexual contact. Certain high-risk groups, such as drug users (DUs), commercial sex workers (CSWs) and men who have sex with men (MSM), are targeted for free hepatitis B vaccination in the Netherlands. A two-year pilot program was introduced in the Netherlands in 1998 in which free vaccination was offered on site in certain 'outreach regions'. After this pilot program, in 2002 a nationwide vaccination program was started. In this latter program, the vaccine was also promoted at various locations such as prostitution zones, gay bars and at addiction care facilities, as well as being offered on site at various other locations.

In this thesis we explored the reach of the hepatitis B vaccination program among Dus, CSWs and MSM. Specifically, the research questions are: 1) What are the proportions of those who are aware and those who are unaware of the possibility to obtain free hepatitis B vaccination; and what are their characteristics? 2) What are the proportions of those who actually obtained vaccination and those who did not; and what are their characteristics? 3) What are the proportions of those who complied with the hepatitis B vaccination schedule and those who did not; and what are their characteristics? 4) Finally, we investigated what social-cognitive factors are associated with hepatitis B vaccination behavior. These social-cognitive concepts were derived from the Health Belief Model and the Theory of Planned Behavior, two theories that have frequently and successfully been used to explain health behavior. The results of the studies in this thesis can contribute to improve the current or future campaigns directed at promoting vaccination.

This thesis is largely based on data that we collected at several locations that are visited by the risk groups in three geographical regions in the Netherlands. First of all, the locations such as the street, day and night shelters, prostitution clubs, gay bars and 'cruising areas' were mapped for each risk group in each region. At these locations, a total of 309 DUs, 259 CSWs and 320 MSM were interviewed about topics such as demographic characteristics, risk behavior for hepatitis B infection, awareness of the free vaccine, vaccination behavior, and social-cognitive factors that could explain their vaccination behavior.

Chapter 2 presents details of the methods used in these cross-sectional studies. Also described is a prospective study (conducted within the pilot program) which investigated social-cognitive variables of vaccination uptake among DUs in the so-called 'outreach regions'.

Chapter 3 first shows an overview of the present international peer-reviewed literature on correlates of hepatitis B vaccination among DUs, CSWs and MSM. This review shows that most studies were conducted as part of a vaccination program, and as such did not report on any correlates of awareness of the hepatitis B vaccine. The correlation of age with

vaccination uptake and with compliance was most frequently investigated; however, the results of the studies are ambiguous. It is important to consider differences in the study designs and target groups when interpreting such results. Some of the studies showed a similar trend, namely that convenience to obtain vaccination seems to play a role among DUs (i.e. direct offering is easier for them). Among MSM, social-cognitive variables, such as perceived severity of infection with the hepatitis B virus, perceived susceptibility and barriers, are associated with vaccination uptake. Although little is known about vaccination behavior among CSWs, it has been suggested that transience is an important factor related to vaccination uptake among this group.

Chapter 4 reports on the question which demographic, social-cognitive and risk-related factors predict vaccination behavior among DUs. This was investigated in a prospective study among 207 DUs that were eligible for vaccination within the pilot program. Our results show that the intention to obtain vaccination was associated with attitude towards the hepatitis B vaccine. However, vaccination uptake was predicted by their 'perceived behavioral control', i.e. the belief as to whether or not they are capable of performing this behavior. Finally, we showed a negative association between completing the vaccine schedule and current injecting drug use.

Chapters 5, 6 and 7 describe which part of the risk groups were reached by the vaccination program. Most members of the risk groups were aware that they could opt for free hepatitis B vaccination. Among DUs, 63% was aware of the opportunity to obtain free hepatitis B vaccination. Among CSWs and MSM awareness was 74% and 79%, respectively. Among DUs, visiting drug consumption rooms was most predictive of awareness of the free vaccine. Among CSWs, our results showed that those who work behind windows and those working for a longer duration in the region (i.e. less transient) were more likely to be aware of the possibility for vaccination. MSM visiting gay bars and discos, and those whose sexual orientation was 'gay', were also more likely to be aware of the vaccination program than those who did not visit these locations or who were bisexual.

Among DUs, 44% was vaccinated against hepatitis B. Among CSWs and MSM the proportions that had obtained vaccination were higher, i.e. 63% and 50%, respectively. Being personally informed about the vaccination program was an important predictor of vaccination uptake among all groups. Among DUs this applied if the information was provided by staff members of addiction care, and among CSWs and MSM when the personal approach was made by health counsellors of the Community Health Service. Furthermore, vaccination uptake among DUs was negatively associated with age of onset of drug use. Among CSWs and MSM, the recruitment region was associated with vaccination uptake. In addition, having sex with casual partners was positively associated with vaccination uptake among MSM. Reasons for non-participation in the vaccination program were 'not thinking about the vaccine' among DUs, 'not perceiving a risk to get infected with the virus' among all risk groups, and 'lack of time' among CSWs and MSM.

Most of those initiating the vaccine series actually completed it; compliance rates were 67% among DUs, 79% among CSWs, and 84% among MSM. Among DUs, having sexual intercourse with casual partners and a history of STD infection were negatively associated with compliance with the hepatitis B vaccination schedule. The group that does not complete the vaccine schedule is therefore more likely to be at higher risk for infection through risky sexual activities. Among CSWs and MSM we found no associations with vaccine completion, probably due to the smaller numbers in these groups since most CSWs and MSM were fully vaccinated and about half of the MSM was vaccinated outside the free vaccination program.

Chapter 8 presents a study on the social-cognitive predictors of intention to obtain hepatitis B vaccination among DUs, CSWs and MSM. Those who were not yet vaccinated reported on their intention towards obtaining vaccination, their attitude, subjective norms, descriptive norms, perceived behavioral control, benefits, and barriers to hepatitis B vaccination. They also reported on their perceived susceptibility towards infection with the hepatitis B virus, and how serious they would find it to be infected with the virus. Overall, attitude towards obtaining hepatitis B vaccination is an important predictor of intended hepatitis B vaccination uptake. Furthermore, in DUs, age is positively associated with the intention to get vaccinated, but negatively associated with the intention of CSWs and MSM. Specifically, among CSWs we showed that those who believe it is more difficult to obtain vaccination at the office of the Community Health Service had a weaker intention to obtain hepatitis B vaccination. Among MSM, perceived susceptibility to get infected with the hepatitis B virus plays an important role in intention to obtain vaccination.

Finally, in Chapter 9 of this thesis the results are summarized and discussed. In addition, implications for further research and practice are presented. From our findings, we can conclude that the 'outreach' activities, in particular the personal approach, are beneficial for vaccination uptake among these three high-risk groups.

SAMENVATTING

Hepatitis B is een ziekte aan de lever die veroorzaakt wordt door het via bloed-bloed en seksueel contact overdraagbare hepatitis B virus. Bepaalde risicogroepen zoals druggebruikers, prostituees en mannen die seks hebben met mannen (MSM) komen in Nederland in aanmerking voor een gratis hepatitis B vaccinatie. Van 1998 tot 2000 heeft een proefcampagne plaatsgevonden in een aantal regio's in Nederland, waarbij gratis hepatitis B vaccinatie op locatie werd aangeboden in zogenaamde 'outreach' regio's. Na deze proefcampagne is in 2002 de landelijke gratis hepatitis B vaccinatiecampagne van start gegaan. Ook in deze vaccinatiecampagne wordt hepatitis B op 'outreach'-locaties zoals op tippelzones, in homocafés en bij verslavingszorginstellingen gepromoot en op sommige locaties ter plekke aangeboden aan de bovengenoemde doelgroepen.

In dit proefschrift is onderzocht wat het bereik is van de hepatitis B vaccinatiecampagne onder druggebruikers, prostituees en MSM. Dat wil zeggen: 1) Welk percentage van de doelgroepen is wel en welk percentage is niet bekend met de vaccinatiecampagne, en over welke kenmerken beschikken deze personen? 2) Welk percentage van de doelgroepen is wel en welk percentage is niet gevaccineerd tegen hepatitis B, en over welke kenmerken beschikken deze personen? 3) Welk percentage van de doelgroepen maakt de vaccinatiereeks wel en welk percentage maakt de reeks niet af en over welke kenmerken beschikken deze personen? 4) Ten slotte is onder deze doelgroepen onderzocht wat de sociaal-cognitieve factoren zijn die een rol spelen bij hun keuze om zich te laten vaccineren tegen hepatitis B. Deze sociaal-cognitieve factoren zijn afgeleid van het Health Belief Model en de Theory of Planned Behavior, twee theorieën die vaak en naar tevredenheid gebruikt zijn om gezondheidsgedrag te verklaren. De resultaten van de studies in dit proefschrift kunnen bijdragen om de huidige en toekomstige vaccinatiecampagnes te optimaliseren.

Dit proefschrift is grotendeels gebaseerd op gegevens die wij verzameld hebben op zogenaamde 'vindplaatsen' in drie regio's in Nederland. Allereerst zijn de 'vindplaatsen' zoals de straat, locaties van dag- of nachtopvang, prostitutie clubs, homo-cafés en cruising-gebieden per doelgroep voor elke regio in kaart gebracht. Op deze vindplaatsen zijn vervolgens 309 druggebruikers, 259 prostituees en 320 MSM op locatie geïnterviewd over onder andere demografische kenmerken, risicogedrag, bekendheid met de campagne, vaccinatiegedrag en sociaal-cognitieve factoren die dit vaccinatiegedrag kunnen verklaren. Hoofdstuk 2 geeft een verdere beschrijving van de methoden van deze cross-sectionele studies. Daarnaast wordt in hoofdstuk 2 de onderzoeksopzet van de longitudinale studie onder druggebruikers beschreven die gedurende de proefcampagne in drie 'outreach' regio's is uitgevoerd.

Hoofdstuk 3 laat een overzicht zien van recente studies naar factoren die samenhangen met hepatitis B vaccinatie. Hieruit komt naar voren dat veel studies zijn opgezet binnen

een vaccinatieprogramma en deze studies onderzoeken zodoende niet de bekendheid met de vaccinatiecampagne in een bepaalde populatie. De samenhang van leeftijd met de vaccinatiegraad en compliance is het vaakst onderzocht, maar de resultaten zijn niet eenduidig. Daarnaast zijn er vanuit verschillende studies aanwijzingen dat het druggebruikers zo gemakkelijk mogelijk gemaakt moet worden om zich te laten vaccineren (bijvoorbeeld het direct aanbieden van vaccinatie is voor hen gemakkelijker). Verder blijken sociaal-cognitieve factoren als 'waargenomen risico van infectie met het hepatitis B virus', 'waargenomen ernst van infectie' en barrières van vaccinatie onder MSM gerelateerd te zijn aan vaccinatiegedrag. Over het vaccinatiegedrag van prostituees is nog maar weinig bekend. Er zijn wel signalen die erop wijzen dat mobiliteit een belangrijke rol speelt in hun vaccinatiegedrag, maar dit is nog niet aangetoond.

Hoofdstuk 4 is gericht op de vraag welke demografische en sociaal-cognitieve factoren, en welke risicogedrag gerelateerde factoren het vaccinatiegedrag van druggebruikers verklaren. Dit is onderzocht in een prospectieve studie onder 207 druggebruikers die in aanmerking kwamen om gevaccineerd te worden tijden het proefproject. Onze resultaten laten zien dat hun intentie om zich te laten vaccineren samenhangt met hun attitude ten opzichte van hepatitis B vaccinatie. Echter, of zij zich wel of niet laten vaccineren hangt af van hun waargenomen gedragscontrole, dus in hoeverre zij zichzelf van tevoren in staat achten om zich te laten vaccineren. Daarnaast bestaat er een negatief verband tussen het afmaken van de vaccinatiereeks en het recent injecteren van drugs.

De hoofdstukken 5, 6 en 7 geven weer welk deel van de doelgroepen is bereikt door de landelijke vaccinatiecampagne. Het grootste deel van de doelgroepen is ervan op de hoogte dat zij in aanmerking komen voor gratis hepatitis B vaccinatie. Onder druggebruikers is 63% bekend met de campagne. Bij prostituees en MSM is de bekendheid iets hoger: respectievelijk 74% versus 79%. Druggebruikers die gebruiksruimten hadden bezocht hebben de grootste kans om bekend te zijn met de vaccinatiecampagne. Onder prostituees zijn dit de vrouwen die achter ramen werkten en zij die voor een langere periode in de onderzoeksregio werkten en dus minder mobiel zijn. MSM die homocafés en homodisco's bezoeken en zij die aangaven homoseksueel te zijn hadden eveneens meer kans om bekend te zijn met de campagne dan MSM die deze homohorecagelegenheden niet bezochten of aangaven biseksueel te zijn.

Onder druggebruikers was 44% gevaccineerd tegen hepatitis B. Onder prostituees en MSM was de vaccinatiegraad iets hoger, namelijk 64% en 50%. Onder alle doelgroepen bestaat een positief verband tussen het bekend worden met de gratis vaccinatie via persoonlijk contact en de vaccinatiegraad. Voor druggebruikers bestaat dit verband wanneer medewerkers van de verslavingszorg hen informeren over het vaccin. Onder prostituees en MSM heeft een persoonlijke benadering door voorlichters van de GGD een positief gevolg voor vaccinatiegraad in vergelijking met het slechts verspreiden van bijvoorbeeld posters en/of flyers. Verder blijkt dat druggebruikers die jonger waren toen zij voor het eerst regelmatig drugs gebruikten een grotere kans hebben om gevaccineerd te zijn dan zij die ouder waren. Er bestaat een positief verband tussen het laten vaccineren en het hebben van een of meer losse sekspartners onder MSM. Onder MSM en prostituees bleek ook de regio geassocieerd met de vaccinatiegraad. Redenen die worden genoemd voor het niet deelnemen aan de vaccinatiecampagne zijn: 'niet aan vaccinatie denken' onder druggebruikers, 'geen risico ervaren om besmet te raken' onder alle doelgroepen, en 'gebrek aan tijd' onder prostituees en MSM.

Het merendeel van de personen die zich laten vaccineren maakt de 3-delige vaccinatiereeks daadwerkelijk af. De compliance is 67% onder druggebruikers, 79% bij prostituees en 84% bij MSM. Van de groep druggebruikers die de vaccinatiereeks niet afmaakt heeft een hoger percentage een of meer losse sekspartners en een hoger percentage rapporteerde ooit een SOA te hebben opgelopen, vergeleken met de groep die de vaccinatiereeks wel afmaakt. De groep die de vaccinatiereeks niet afmaakt, vertoont in dit opzicht dus meer risicovol gedrag. Onder prostituees en MSM vonden we geen verschillen tussen groepen die de vaccinatiereeks afmaken en zij die dit niet doen. Dit heeft waarschijnlijk te maken met de kleine steekproef omvang: de meeste prostituees en MSM waren namelijk volledig gevaccineerd.

In hoofdstuk 8 werd gekeken welke factoren de vaccinatie-intentie van druggebruikers, prostituees en MSM verklaren. Het onderzoek is uitgevoerd onder druggebruikers, prostituees en MSM die niet gevaccineerd waren tegen hepatitis B. Zij rapporteerden hun intentie, attitude, subjectieve norm, descriptieve norm, waargenomen gedragscontrole, voordelen, en nadelen ten aanzien van vaccinatie tegen hepatitis B. Ook vertelden zij in hoeverre zij zich kwetsbaar achten voor de kans op infectie met het hepatitis B virus en hoe ernstig zij het zouden vinden wanneer zij geïnfecteerd zouden raken. De resultaten laten zien dat onder alle drie de doelgroepen attitude een belangrijke voorspeller is van intentie om zich te laten vaccineren. Daarnaast hangt leeftijd bij druggebruikers positief en bij prostituees en MSM negatief samen met hun intentie om zich te laten vaccineren. Specifiek voor prostituees geldt dat diegenen die het moeilijk vonden om zich op de GGD te laten vaccineren een lagere intentie hebben om zich te laten vaccineren. Onder MSM speelt risicoperceptie een belangrijke rol in de intentie om zich te laten vaccineren.

Ten slotte worden hoofdstuk 9 van dit proefschrift de belangrijkste resultaten kort samengevat en bediscussieerd. Daarnaast worden de implicaties besproken voor verder onderzoek en beleid. Geconcludeerd kan worden dat de 'outreach'-activiteiten in de vorm van de persoonlijke aanpak een belangrijke bijdrage leveren aan de vaccinatiegraad onder deze risicogroepen.

DANKWOORD

“Om de wereld te leren kennen is een wereldreis niet nodig. Er zijn vele onbekende werelden dicht in de buurt.” Zo luidt één van de stellingen behorend bij mijn promotie. Na een onderzoek van ruim 5 jaar heb ik veel geleerd. Behalve de onderzoeksvaardigheden die ik heb opgedaan, heb ik ook het gevoel dat ik de wereld wat beter heb leren kennen. De dataverzameling bood een unieke kans om eens verder te kijken dan mijn eigen wereldje. Ik heb zelf een aardig deel van de bijna 900 interviews afgenomen en heb vele bijzondere mensen ontmoet op plekken die je wellicht overslaat, zoals homo-ontmoetingsplaatsen, prostitutiezones en gebruiksruimten. Ik ben erg blij met deze ervaring en het feit dat alle resultaten nu in boekvorm zijn verschenen.

Er zijn zoveel mensen die mij op welke wijze dan ook geholpen hebben om dit proefschrift tot stand te laten komen. Laat ik beginnen bij mijn (co)promotoren!

Dike, volgens mij is dit het eerste in de hopelijk nog lange reeks van proefschriften waar jij promotor van bent. Ik heb veel van je geleerd. Hoe jij het voor elkaar krijgt om al dat werk te verzetten en er ook nog eens voor je promovenda te zijn. Jouw nuchtere aanpak bevalt mij wel.
Brigitte: je bent een fantastisch mens en een warm persoon. Wat ben jij een doorzetter. Je hebt me zo goed geholpen. Echt fijn dat jij ondanks jouw overstap mijn stukken van commentaar bleef voorzien.
Henk, fijn dat je jouw ervaring in wilde zetten voor mijn promotietraject. Het gaf mij een prettig gevoel wanneer jij zei dat iets prima in orde was.

Daarnaast niet te vergeten alle respondenten die hebben deelgenomen aan het onderzoek. Het is niet niets om tijdens je werkzaamheden of vrije tijd meer dan een half uur lang geïnterviewd te worden over hepatitis B gerelateerde zaken. Stel je eens voor, je staat lekker te dansen op de dansvloer of te sjansen met een mooie jongeman en dan komt er een dame naar je toe om te vragen of je geïnterviewd wilt worden! Toch fantastisch als je dan “Ja“ zegt!

Verder zijn er nog velen die ik graag zou willen bedanken:
De interviewers die vol enthousiasme hebben geinterviewd op de meest aparte plekken en tijden. Jullie worden zeker niet vergeten!

Miranda en Dike, dank voor de kans die jullie mij hebben gegeven om dit onderzoek uit te voeren. Het IVO is voor mij een hele goede leerschool geweest en dat is het nog steeds.

Marie-Louise Heijnen en Quita Waldhober van GGD Nederland voor de samenwerking en de opdracht die jullie bij het IVO hebben uitgezet en de vervolgopdracht waar ik op dit moment aan mag werken.

ZonMw voor de financiële bijdrage, waardoor dit onderzoek mogelijk was.

De deelnemende GGD'en en sleutelcontactpersonen van diverse instellingen en organisaties voor hun informatie.

De managers van clubs of andere gelegenheden voor hun medewerking.

Stanley, Marcel en Milan van 'straatkunst'-galerie VIA Kunst voor de afbeelding op de cover. De spuit staat symbool voor de hepatitis B vaccinatie gevuld met de kleuren van de drie doelgroepen, namelijk: 'rood' voor prostituees, 'roze' voor homomannen en 'bruin' met 'wit' voor druggebruikers.

De co-auteurs die ik nog niet genoemd heb voor hun bijdrage, in het bijzonder John de Wit. Fijn dat jij zelfs vanuit Australië reageerde op mijn stukken. Regina, die mij het eerste jaar begeleid heeft, dank ik ook van harte voor haar commentaar op hoofdstuk 8 en haar input voor de vragenlijst.

Dan de meiden op de kamer. Eerst Aafje en Marjolijn, toen Marloes, en elkaar afwisselend Esther, Gerdien en Soenita erbij. Ook Serina heeft de laatste fase van mijn proefschrift nog meegemaakt. Ja, ja, voor degenen die het nog niet weten het IVO bestond tot voor kort voor 90% uit vrouwen. Een kippenhok zou ik het niet willen noemen, zeker niet gezien het prachtige pand met het mooie uitzicht op de Heemraadssingel, maar behalve dat er hard gewerkt werd, was het erg gezellig bij ons op de kamer. Hoewel ik de laatste tijd wel het gevoel had dat er mijnerzijds minder tijd werd vrijgemaakt voor een leuk gesprekje. Jullie moesten soms hard om mij lachen als ik diep in mijn materie zat en als een verdwaasde reageerde wanneer jullie mij wat vroegen: ...5 seconden later... "Huh wat?"

Nadine en Marloes fijn dat jullie mijn paranimfen willen zijn. Nadine bedankt voor je warme vriendschap en dat je voor me klaar stond tijdens het onderzoek. Ik zal onze reis naar Heerlen nooit vergeten. Marloes, ik heb het als erg prettig ervaren om samen met jou een promotietraject te doorlopen. Dank voor het lezen van mijn proefschrift en de adviezen die je mij gegeven hebt. Jammer dat onze wegen binnenkort gaan scheiden, maar één ding weet ik zeker: dat jij een mooie carrière tegemoet zult gaan.

Petula, dank voor je vrienschap die al vanuit de kleutertijd stamt en voor het feit dat je mijn teksten hebt bekeken. Toch handig zo'n leuke lerares Engels als vriendin!

De hele kudde. Bijzonder dat onze vriendschap die ontstaan is tijdens onze studie sociologie na zoveel jaren nog steeds volop bloeit. En grappig om te zien waar wij allemaal zijn beland. Suus, dank voor het lezen van de samenvatting.

Mijn lieve vader die altijd voor mij klaarstaat. Zo ook tijdens dit onderzoek. Bijvoorbeeld op donkere parkeerplaatsen om een oogje in het zeil te houden omdat wij interviewers niet op elkaar konden letten. De geïnterviewden kwamen trouwens maar wat graag bij hem een kopje koffie drinken.

Mijn opa van alweer 91 jaar die wel 5 verschillende kranten per dag leest en die zorgde dat ik d.m.v. krantenartikelen goed op de hoogte werd gehouden over alle ontwikkelingen rond hepatitis, prostituees, homomannen en druggebruikers. Als u in uw tijd de mogelijkheden had gehad, dan was u zeker weten ook gepromoveerd!

Mijn moeder en schoonmoeder die met alle liefde gezorgd hebben voor Jari. Mijn beide oma's en mijn schoonvader die altijd hun interesse hebben getoond. Opa Jan, ik weet zeker dat u nu ook erg trots was geweest.

Mijn lieve Robert die altijd positief in het leven staat en mij niet alleen aangespoord heeft om te promoveren, maar ook nog eens de zorg voor Jari op zich heeft genomen als ik weer met mijn proefschrift bezig was.

Lieve Jari, ook jij hebt een deel van het onderzoek meegemaakt ... al was het dan misschien niet helemaal bewust, namelijk in mijn buik. Niet alle foetussen maken het mee dat ze in een buik mee mogen swingen in de homobar.

Iedereen heel erg bedankt!

Getekend, Jessica

CURRICULUM VITAE

Jessica Baars was born on November 16, 1977 in Rotterdam. After completing her secondary school (VWO) at the Caland Lyceum in Rotterdam in 1997, she continued her studies at Erasmus University Rotterdam. There she obtained a Master's degree in Sociology in 2002, followed by a Master's degree Epidemiology at the Netherlands Institute for Health Sciences in 2006. In 2003 she started her PhD studies at IVO (Scientific Bureau for Research on Lifestyle, Addiction and related Social Developments) whilst employed by Erasmus University Rotterdam. Since April, 2008 she has been working as a researcher at the head office of IVO in Rotterdam.

IVO
Heemraadssingel 194
3021 DM Rotterdam
T 010 425 33 66
F 010 276 39 88
Secretariaat@ivo.nl
www.ivo.nl