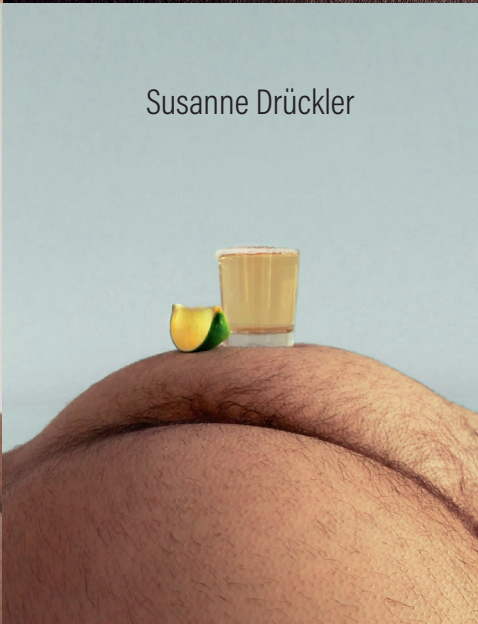


Sex & drugs among men
who have sex with men, sex workers and
transgender and gender diverse people



Susanne Drückler



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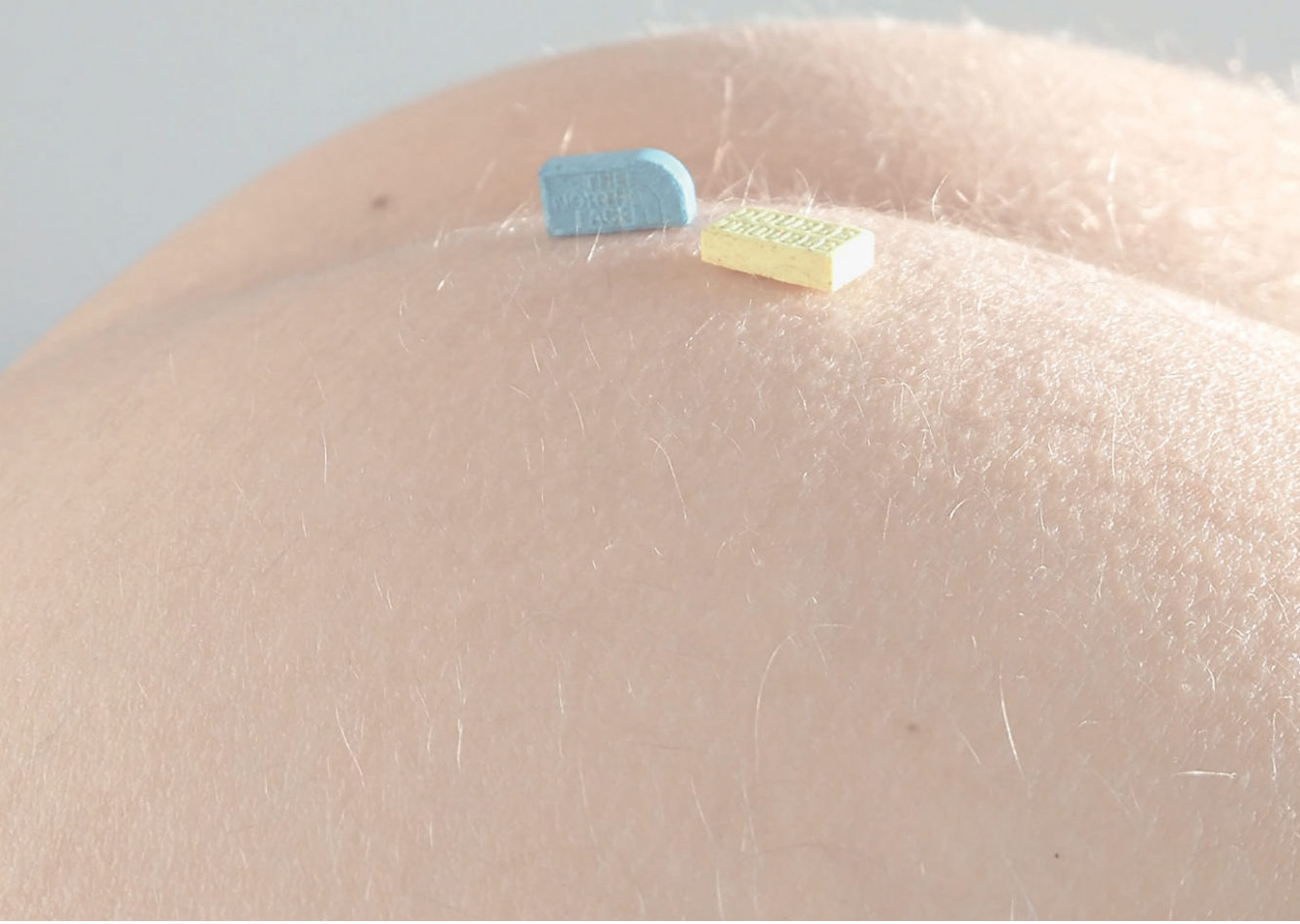
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Chapter 1

General introduction



1.1 SEXUAL HEALTH

The diversity of human sexual behaviour has been studied over decades. The sexual trichotomy model states that sexual orientation, sexual identity and sexual behaviour are interconnected [1]. Sexual orientation refers to a person's sexual and emotional attraction to another person [2]. Sexual identity describes how a person thinks of oneself to whom one is sexually attracted to [1]. However, sexual behaviour does not necessarily have to correspond with sexual orientation nor sexual identity [3]. In addition to sexual orientation, sexual identity and sexual behaviour, there is also gender identity which refers to a person's internal sense of being male, female or an alternative gender [2]. Along with the sexual trichotomy model, sexual health is especially important. Let's consider the WHO definition, "*sexual health is a state of physical, emotional, mental and social well-being in relation to sexuality; it is not merely the absence of disease, dysfunction or infirmity. Sexual health requires a positive and respectful approach to sexuality and sexual relationships, as well as the possibility of having pleasurable and safe sexual experiences, free of coercion, discrimination and violence. For sexual health to be attained and maintained, the sexual rights of all persons must be respected, protected and fulfilled*" [4].

In short, sexual health is more than just the presence or absence of sexually transmitted infections (STIs) or human immunodeficiency virus (HIV). In the studies of this thesis, we do not cover the full spectrum of this definition of sexual health, but focus on the understanding of sexual behaviour as well as on health care needs among men who have sex with men (MSM), sex workers (SW) and transgender and gender diverse people (TGDP) with different gender identities. We studied the emerging trend of sexualised substance use and also looked at the association with non-consensual sexual behaviour in order to start with a broader perspective of the sexual health scale than only looking at STI and HIV incidence or prevalence.

1.2 SEXUALISED SUBSTANCE USE

Recreational drug use is more prevalent among MSM compared to non-MSM populations [5-7]. A newer phenomenon among MSM which has risen is sexualised substance use; any use of drugs during sex which provides increased thrilling pleasure and loosens inhibitions [8-10]. The gay community initiated using the word chemsex (chemicals and sex) for it, and later it was adapted by healthcare professionals and researchers [11]. The first "official" definition of chemsex was described by David Stuart (2016): "*Chemsex is the use of any combination of drugs including crystal methamphetamine, mephedrone and/or gamma hydroxybutyrate (GHB), before or during sex by MSM*" [12]. Stuart argued to only include those three types of drugs in the definition because they especially provide the desired sexual pleasure and disinhibition which is said to be the core of chemsex desire [11].

However, *sexualised substance use* includes the whole range of drugs and does not focus on specific drugs. Other drugs are also oftentimes involved during chemsex sessions, but — as Stuart recently reasoned — those drugs are only an addition to the extreme “high” of the three specific drugs which men seek [11]. This “high” is described by the positive impact of an increased libido, sexual confidence and the possibility to live out one’s wildest fantasies as well as physical sexual endurance and enhanced sexual performance [8, 11, 13, 14]. On the other hand, chemsex is also associated with STIs and HIV, has consequences for one’s mental and or physical health and might lead to addiction [8, 13-16].

The following experience of a chemsex party visitor in Amsterdam gives an impression of the effects of crystal methamphetamine use during sex:

“I am curious by nature, and I like to try different drugs. Thus, also crystal meth. Some people around me and some of my fuck buddies used it before. I also wanted to give it a try. I ordered the drugs and all the stuff to use it and then I chose a day / night to use it. I also made sure I had enough time to recover.

I have experiences with other drugs and know that my limits become somewhat blurred when using. I do things that I normally would not do without drugs. My experience with crystal meth was really different from that with other drugs.

With crystal meth all boundaries faded because there were no more limits at all. Everything I thought and did, felt like the most normal thing to do. For example, suddenly I was on a bicycle towards a sex date. Just after a few hours there I saw the dirty spotty mattress and the dirty dildo full of dog’s hair.

I did it once; I will never do it again.”

(MSM, sex party visitor, interview at the Centre for Sexual Health in Amsterdam, 2020)

1.2.1 Non-consensual sex and sexualised substance use

Another recently more often discussed phenomenon among MSM is non-consensual sex (NCS). Although sexual consent is a human right, NCS can be interpreted and nuanced in many different ways for each person individually such as touching or kissing against ones will, sexual harassment, molestation, sexually transgressive behaviour, forced sex or rape [17]. The WHO defines rape as “*physically forced or otherwise coerced penetration — even if slight — of the vulva or anus, using a penis, other body parts or an object*”[18]. This indicates that subjective interpretations of non-consensual sex and existing definitions do not have to be in accordance with each other. Literature shows that NCS is more prevalent among MSM, compared to heterosexual men [19, 20]. Additionally, a link between NCS and chemsex

settings has been made in the past years [21-23]. Bourne et. al (2015) showed that MSM reported difficulties for giving sexual consent while under the influence of substances [21]. It seems that the line between consensual and NCS blurs when drugs are involved and more transgressive behaviour happens [24, 25]. In the chemsex study of Bourne et al. (2015) participants reported that the sex which happened while being unconscious after using/overdosing GHB (and a combination of more drugs), in all cases was experienced as non-consensual [21]. Still, none of the participants referred to this event as sexual assault or rape [21].

1.3 STUDY POPULATIONS AND SEXUALISED SUBSTANCE USE

The goal of this thesis is to establish data about sexualized drug use, its possible consequences, and about health care needs among different populations.

1.3.1. Men who have sex with men

The most researched study population in this thesis are **MSM**. The acronym MSM is a preferred term in sexual health care settings and in STI and HIV research to simplify that it refers to someone's behaviour rather than someone's sexual orientation such as homosexuality [26]. Due to high numbers of different sex partners and condomless anal intercourse, MSM are more often diagnosed with STIs and HIV compared to the general population [26]. In addition to the on-going transmission of STIs and HIV, a recent study reported that more than 80% of the high-risk MSM study population at the centre for sexual health (CSH) of Amsterdam scored positive in at least one of the possible psychosocial problem domains including; alcohol/ substance use, sexual compulsivity, anxiety, depression, attention deficit hyperactivity disorder, alexithymia, intimate partner violence or childhood sexual abuse [27]. This indicates the need for multicomponent interventions to work with different interacting issues regarding mental and sexual health.

The fact that online gay dating possibilities have made it easy to find likeminded people for meeting up at someone's home to engage in sexualised substance use, might contribute to sexualised drug use becoming a public health issue, especially among MSM [28-30].

1.3.2 Male sex workers

Another study population of this thesis are **male sex workers (MSW)**. As most MSW have sex with men, they often can be categorised as MSM. However, because of having a professional attitude towards sex with anticipated behaviour and the fact that not all MSW have sex with men only, we studied them as a separate group. Receiving money or other goods of value in exchange for sex is generally known by the term prostitution. The American English Cambridge dictionary for example defines a prostitute as: *"Someone, usually a woman, who has sex with people for*

money” [31]. Prostitution is stereotypically associated with women having sex for money, which isn’t actually right as men in ancient history have sold sex just as much as women [32]. Moreover, prostitution and the negative connotation associated with it brings along a lot of stigma [32]. Therefore, researchers have started using the term MSW as a more neutral definition for men who are hired to provide sexual services with monetary compensation and/or other valuable items [33]. As male-to-male sexual contact is known to be associated with an increased STI risk compared to heterosexual contact, most research focus on MSW who have sex with male clients [26, 32-38]. In the studies of this thesis, we also distinguished between MSW having sex with men (and optionally women as well) and those exclusively having sex with females.

Sex work-related substance use is a common phenomenon and a contributing factor for sexual risk behaviour, however not much is known about the motives of engaging in drug use especially during work [34, 39, 40].

1.3.3. Transgender and gender diverse people

The term **transgender** refers to someone whose gender identity differs from their assigned sex at birth, which is the opposite of a **cisgender** individual whose gender identity does align with the assigned sex at birth [41]. However, someone’s gender identity does not have to be binary, meaning only male or female, but also something else (non-binary). Transgender women (TGW) and transgender men (TGM) are the most studied subpopulations among TGDP. Still, studies among TGW and especially TGM remain scarce and include often quite small numbers of participants [42, 43]. The limited scientific research among TGDP is worrisome as they are considered as a population overly affected by HIV and STIs worldwide [42-46]. Non-binary transgender persons hardly get any attention in sexual health research, although it is needed for a better understanding of the sexual health needs of this population [46, 47]. Additionally, Tordoff et al. (2019) demonstrated that including the broader spectrum of non-binary gender identities can lead to an increase in the identification of TGDP in health care settings which is an important step towards better surveillance for this population [48].

1.3.4. Transgender women sex workers (TSW)

TSW, a sub-group of the whole transgender population, are — like MSW — considered as populations with a high chance of acquiring STIs and HIV worldwide [34, 36, 40, 45, 49, 50]. On the basis of a review on HIV epidemiology and risk factors among TSW, Poteat et al. (2015) developed a deterministic model to identify which interventions could possibly reduce new HIV infections [49]. They concluded that TSW face a unique combination of factors that heightens the chances of acquiring HIV including biological, individual, interpersonal and structural factors [49]. Previous research emphasized the importance of differentiation between TSW and

MSW, due to the dissimilar issues (especially with regard to HIV/STI vulnerability) faced by the transgender population and the misclassification of TSW as MSW [32, 34, 45, 49].

Earlier research additionally showed that substance use among TSW is common and that there is an acceptance of the belief that drug use and sex work go hand in hand [51-53]. In this thesis we studied sexualised substance use as a relevant contributing factor to the high chance of acquiring STI/HIV.

1.4. SEXUAL HEALTH CARE

1.4.1 Sexual health care in the Netherlands

In the Netherlands, general practitioners (GPs) play a central role in health care (including sexual health care). Supplementary to the GPs, sexual health care including STI screening, is offered at the CSH of public health services (PHS) of each region of the country [54]. Sexual health care as provided by these CSH is funded by the central government [55]. CSH are not only responsible for STI screening, but also sexual health in general. At the CSH in Amsterdam, we provide free STI testing and treatment, PrEP provision and sexual health counselling to people who are younger than 25 years, are MSM, are SW, are TGDP, are notified of an STI, report STI-related symptoms, are from a non-Western European or non-North American origin, have a sex partner from an STI endemic region or have been victim of sexual violence [55].

Additionally, in 2008 the CSH of Amsterdam opened the Prostitution and Health Centre (P&G292) in collaboration with HVO Querido (a social work organisation). P&G292 is located near the Red Light District of Amsterdam and aims to provide sexual health and social care for all sex workers. At P&G292 sexual health nurses offer free STI and HIV testing, prescription of contraceptives, counselling regarding sexual health matters and unplanned pregnancies. Social workers provide social services such as financial help, as well as information about health insurance and rights as sex workers. In addition to the care at the P&G292 location, they offer STI/HIV testing at outreach sex venues (window prostitution, brothels and sex clubs), as well as online outreach to also reach unlicensed or hidden sex workers.

Since 2012, trained volunteer public awareness officers of the CSH of Amsterdam (Man Tot Man) organize outreach activities for MSM at parties, fetish events and festivals in Amsterdam, to provide information concerning sexual health. During those outreach activities, healthcare professionals of the CSH oftentimes accompany the volunteers to offer STI/HIV testing and hepatitis B vaccinations to the visitors of such events. Another outreach volunteer project the CSH collaborates with is Pink Unity. Pink Unity provides alcohol and drug information in combination with sexual health information for gay/bi/queer people in the Amsterdam party scene.

1.4.2. Health care needs of study populations

When we started the studies of this thesis, one of the goals was to discover the sexual health care needs and problems of the study populations who were mostly visitors of the CSH of Amsterdam.

With the research from this thesis, we tried to answer questions which we derived from practice (e.g. during outreach activities or STI consultations at the CSH of Amsterdam). The gained knowledge is used to identify possible problems, give needed health advice, provide practical tools or harm reduction strategies or adjust our healthcare policy. When we started the first study of this thesis about sexualised substance use and the relation with STI diagnoses, not much research about this topic was done in the Netherlands. In this thesis we take common and regularly researched sexual behaviours into consideration which are known to increase the chance of acquiring STIs or HIV, such as condomless (anal) sex, fisting (without gloves), multiple sex partners and sex work. Sexual health care is more than STI management; certain behaviours and psychosocial issues also need to be addressed. The studies of this thesis also had a goal to dive deeper into the matter of sexual health instead of “only” focusing on STI/HIV incidence and prevalence. Examining sexualised substance use, non-consensual sex and motives and barriers of drug use during sex work, are first steps to look on a broader scale of factors all of which influence sexual health.

1.5 AIM AND OUTLINE OF THIS THESIS

The idea of this thesis started in 2014 with a conversation with the MSW counsellor of P&G292, who told me that strikingly more and more MSW used drugs during sex work. At that moment, not much research was done on sexualised drug use during sex work in the Netherlands. At the same time, we received more indications of visitors and sexual health care workers of the CSH of Amsterdam and other professionals we collaborate with, that drug use during sex was becoming an emerging phenomenon among MSM.

Therefore, **the aim of this thesis** was to get insight in sexualized drug use and the possible consequences, such as non-consensual sex and STI/HIV infections among MSM, sex workers and transgender and gender diverse people in the Netherlands. In **chapter 2**, we investigated the proportion of MSM visitors of the CSH engaging in chemsex, and whether it was a risk factor for an STI diagnosis. In **chapter 3**, we examined among users of a gay dating app the association of chemsex engagement with non-consensual sex. **Chapter 4** focused on differences in sexualized drug use among MSM visiting the CSH of Amsterdam and surrounding urban regions, as well as on the identification of latent classes based on specific drugs and the associations with sexual behaviour and STI positivity rate.

In **chapter 5**, we focused on male and transgender women sex workers. We quantified sexualized substance use during work and free time, as well as sexual behaviour that enhances the likelihood of STI/HIV infections. In order to better understand the reasons of drug use during sex work, in **chapter 6**, we described the outcomes of a qualitative study among male and transgender women sex workers investigating motives of sexualized drug use during sex work, as well as its effect on sexual behaviour that enhances the risk of an STI/HIV infection. When researching transgender women sex workers, the need for descriptive data of the whole population of transgender and gender diverse people appeared, irrespectively of sex work. Therefore, in **chapter 7**, we assessed the gender-identities, sexual behaviour, HIV prevalence and STI positivity rates among TGDP visiting the CSH of Amsterdam and The Hague, and also compared these outcomes between transgender and gender diverse people who reported sex work and those who did not.

In **chapter 8**, the main results of this thesis are discussed and linked with other studies in the field. The implications of all chapters are summarized and recommendations for future research and health care provision are given.

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Chapter 2

Chemsex Among Men Who Have Sex With Men:
a Sexualized Drug Use Survey Among Clients of
the Sexually Transmitted Infection Outpatient Clinic
and Users of a Gay Dating App in Amsterdam, the
Netherlands



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ABSTRACT

Objectives

Chemsex (i.e. drug use during sex) is practiced by some MSM and is associated with high-risk behavior. In a cross-sectional study at the sexually transmitted infections (STI) clinic of Amsterdam, we explored chemsex practices, risk behavior, and STI prevalence.

Method

A survey on chemsex (γ -hydroxybutyrate, crystal methamphetamine and/or mephedrone) was offered to clinic clients during routine STI screening, and to Amsterdam users of a gay online dating app. Associations were assessed using χ^2 -test and multivariable regression.

Results

Chemsex in the past 6 months was practiced by 866 (17.6%) of 4925 MSM clients, and 159 (1.5%) of 10,857 non-MSM clients. Among gay dating app users the proportion that reported chemsex engagement was higher than among MSM visiting the STI clinic (29.3% (537/1,832) vs. 17.6%; $p < 0.001$). Chemsex was a significant risk factor for bacterial STI in HIV-negative MSM at STI clinic (adjusted odd ratio, 1.5; 95% confidence interval, 1.2-1.8), but not in HIV-positive MSM. A majority practiced chemsex once a month or less, and 87.0% reported sex without drug use in the past month.

Conclusion

In Amsterdam, chemsex is frequently practiced, and significantly associated with bacterial STI in HIV-negative MSM but not in HIV-positive MSM. Future prevention strategies to reduce STI incidence, should especially target HIV-negative MSM engaging in chemsex.

INTRODUCTION

Drug use in general and before or during sex is highly prevalent among men who have sex with men (MSM).[1, 2] In 2010, a large European MSM Internet Survey (EMIS) in 44 European cities, showed that drug use was particularly prevalent in Amsterdam.[3] Associations between drug use and sexual risk behavior among MSM have frequently been reported.[3-6] However, less research focused on the phenomenon called “chemsex” which is a phenomenon frequently referred to on gay networking apps to identify those using and seeking recreational drugs use during sex.[7] A stricter definition of chemsex is “the use of any combination of drugs including crystal methamphetamine, mephedrone and/or gamma hydroxybutyrate (GHB), before or during sex by men who have sex with men (MSM)”.[7]

Positive effects and motivations of chemsex engagement are often described by users as intense sexual arousal, increased libido and enhanced performance. [8, 9] Chemsex is highly associated with sexual risk-taking behavior, physical and mental health consequences and possible addiction.[2, 8, 10] Different studies demonstrated that chemsex engagement was associated with diagnosed and self-reported sexually transmitted infections (STIs).[8, 11, 12]

In addition, there are signals of a perceived increase in chemsex in areas with a large MSM population,[8] mostly in England,[13, 14] but also in the Netherlands. [15] To identify clients with problematic drug use that should be offered additional help, it is advocated to enquire after recreational drug use and chemsex as part of routine consultations in sexual health care settings and during health promotion/prevention.[3, 6, 7, 10, 12, 16] Therefore, as of July 2016 the Amsterdam STI clinic started to routinely collect data about chemsex engagement in all clients. To investigate the representativeness of our population, the same survey was offered to Amsterdam users of a popular gay dating app. The aim of the present study is to quantify the proportion of STI clinic clients engaging in chemsex and to identify whether chemsex is a risk factor for a STI diagnosis. We hypothesized that chemsex is a predictor for bacterial STI.

MATERIALS AND METHODS

Study population

STI clinic

The STI outpatient clinic in Amsterdam, is the largest center for STI care in the Netherlands, with up to 40,000 consultations each year.[17] We test and treat (free of charge) patients who either are: younger than 25 years-old, commercial sex workers, MSM, notified of an STI by a sex partner, of non-West European or non-

North American origin, have STI-related symptoms, or have a partner from an STI endemic region.

We retrieved anonymized data from the electronic patient files of all clients of the STI clinic between July 21, 2016 and December 31, 2016. A first visit of a client was included in the present study and repeated consultations in the same client were excluded. Because all data were anonymous and the clinical data was routinely collected, ethical approval was deemed unnecessary for this study.

Dating App Online Survey

In addition, users of an online dating app (Grindr®) were offered a chemsex survey during 2 days in the period of the Europride festival in the summer of 2016 in Amsterdam. All users in the area of Amsterdam who used the app during those 2 days, received a push message on their app and were asked to fill in the survey.

Demographics, Sexual Behavior, and Chemsex

Beside routinely collected data from the electronic patient files of the STI clinic (age, ethnicity [ethnicity was defined according to Statistics Netherlands on the basis of country of birth, maternal and paternal country of birth],[18] reason of visit, HIV status, sex of sex partner, condom use during anal sex, number of sex partners), healthcare workers collected data on the use of crystal methamphetamine, GHB, and/or mephedrone during sex in the past 6 months. Chemsex was defined as the use of at least one of the above mentioned drugs during or before sex.[7] Chemsex characteristics recorded were: frequency of chemsex engagement, injecting drugs, and if so, if needles were shared, last time having sex without any of the above mentioned drugs (sober sex), and condomless receptive and/or insertive anal sex after using one of the drugs.

The same questions regarding chemsex were asked in the chemsex survey to users of the online dating app. No questions regarding demographics, risk taking behavior or STI history were asked in this study population.

Testing Procedure at the STI Clinic

Clients were tested for *Chlamydia trachomatis* (Ct) (including lymphogranuloma venereum [LGV] in case anorectal Ct was found), *Neisseria gonorrhoeae* (Ng), and syphilis. Urethral Gram stain analysis was performed only in male patients with urogenital signs or symptoms (discharge, painful and/or frequent urination). In those with more than 10 polymorph nucleated leucocytes per high power field in a urethral Gram-stained smear and no infection with Ct and Ng, a definitive diagnosis of nonspecific urethritis (NSU) was made.[19] All MSM who had not previously tested HIV-positive were tested for HIV unless they actively opted out.

Urine, pharyngeal and rectal specimens were tested for both Ct and Ng with the Aptima Combo 2 assay (Hologic, Marlborough, MA, USA). In asymptomatic MSM both urine and rectal specimens were self-collected, while in symptomatic MSM medical staff collected rectal specimens. Medical staff collected pharyngeal specimens in all MSM. HIV antibodies were tested with a rapid HIV test (Alere Determine HIV – 1/2 antibody test, Medical Co., Ltd.; Chiba, Japan) and with the HIV Ab/Ag test (LIAISON® XL, Diasorin, Saluggia, Italy), and syphilis serology was performed with the Treponema Screen (LIAISON® XL, Diasorin, Saluggia, Italy). All bacterial STI diagnoses were based on laboratory outcomes of the STI consultation in which the chemsex questions were asked.

Statistical analysis

With the χ^2 -test for independence, we compared characteristics and STI positivity and epidemiological characteristics of MSM who engaged in chemsex with those who did not. Using the χ^2 -test for independence and the Fisher's exact test we compared the specified chemsex patterns between men at the STI clinic and men who filled in the online survey. Univariable logistic regression analysis was performed to examine associations with a bacterial STI. A bacterial STI was defined as diagnosis with Ct (both non-LGV and LGV), and/or Ng, and/or infectious syphilis (NSU not included). The association with the following variables was assessed: age, ethnicity, condomless anal sex (CAS), number of partners in the preceding 6 months, HIV status, notification of STI exposure, STI-related symptoms, and chemsex engagement. Age and the number of sex partners were divided into four categories based on interquartile range (IQR). HIV status was divided into HIV-negative MSM, including MSM who refused an HIV test, and HIV-positive MSM. All variables were entered into a multivariable logistic regression model using backward selection. We checked for interactions between chemsex and all other variables.

In addition, univariable analyses were performed to examine the association of chemsex engagement with a diagnosis of chlamydia, gonorrhea and syphilis individually.

Data analyses were performed with SPSS package v21.0 (SPSS, Chicago, Illinois, USA) and STATA software (STATA Intercooled version 13.0, College Station, TX, USA). In the present study $p < 0.05$ was considered statistically significant.

RESULTS

Characteristics of Study Population

Between 21 July 2016 and 31 December 2016 16,164 consultations in unique clients took place at the STI clinic of Amsterdam. Of those clients 4,925 (31.2%) were among unique MSM in whom chemsex engagement was asked (Fig. 1).

Because chemsex engagement in non-MSM clients was rare (1.5%; n=159) and only 6 clients (3.8%) used crystal methamphetamine and 7 clients (4.4%) used mephedrone, we did not further explore this group and confined further analyses on chemsex characteristics to MSM clients.

Of all MSM questioned about chemsex in this study period, 1,049 (21.2%) used crystal methamphetamine, and/or GHB and/or mephedrone in the previous 6 months and 866 (17.6%) of all MSM, reported the use of one of the drugs during sex (chemsex). In men who reported chemsex, most demographic variables differed significantly from those who did not report chemsex (Table 1).

MSM who reported chemsex reported higher sexual risk behavior (more sex partners, more often CAS), reported more often STI-related symptoms and a notification of STI exposure, were more often on pre-exposure prophylaxis (PrEP) as participant of the Amsterdam PrEP research study [20] (25.5% vs. 5.7%; $p<0.001$), and had more often a bacterial STI diagnosis (chlamydia, gonorrhea, LGV, and/or infectious syphilis) (31.1% vs. 20.7%; $p<0.001$). New HIV diagnosis (0.4% vs. 0.7%; $p=0.26$) did not differ significantly between both study groups.

Associations with bacterial STI diagnosis

In the univariable analyses chemsex engagement was significantly associated with a diagnosis of chlamydia (OR, 1.6; 95% CI, 1.3-1.9), gonorrhea (OR, 1.9; 95% CI, 1.6-2.3) and syphilis (OR, 1.6; 95% CI, 1.1-2.4) [results not shown in tables]. In the univariable analysis using the global outcome variable bacterial STI, age, chemsex engagement in past 6 months, HIV status, notification of STI exposure, STI-related symptoms, condomless anal sex and the number of sex partners were significantly associated with a bacterial STI diagnosis (Table 2).

In the multivariable analyses, the interaction between HIV status and chemsex was significant. HIV-negative MSM who reported chemsex had a significant higher risk of an bacterial STI than HIV-negative MSM who did not report chemsex (aOR, 1.5; 95% CI, 1.2-1.8). An additional analysis with the same multivariable model, using HIV-positive men not engaging in chemsex as reference category, showed that there was no significant difference in HIV-positive men, irrespective of chemsex engagement.

Pattern of chemsex

Of the 866 MSM who engaged in chemsex in the past 6 months, GHB was the most reported drug used (93.0%) (Table 3). Crystal methamphetamine was used by 190 (22.1%), and mephedrone by 137 (16.0%) MSM. Regardless of the drug, most MSM reported the use of the drug once per month or less (GHB 62.7%, crystal methamphetamine 75.3%, mephedrone 82.5%). Most of the men (74.7%) used only one of the three drug in the past 6 months (GHB 68.1% , crystal methamphetamine

4.2% and mephedrone 2.4%). A smaller group, 19.4% of the men, used two out of the three drugs and 5.8% reported the use of all 3 drugs.

Among MSM who reported chemsex, 52 (6.1%) disclosed injecting drugs in the past 6 months, of whom one person shared needles. Most MSM (87.0%) reported sober sex in the past months, whereas for the rest of the men (13.0%) it was longer than 3 months ago that they had sex without the use of one of the three drugs. Lastly, 69.8% of the MSM who reported chemsex disclosed CAS (active/passive) while using one of the drugs.

Of all men (n=1832) who participated in the online survey 29.3% (537) reported chemsex in the past 6 months. Chemsex engagement differed significantly between STI clinic clients and men who filled in the online survey (17.6% vs. 29.3%; $p < 0.001$). There was no significant difference regarding GHB and crystal methamphetamine use between STI clinic clients and online participants who engaged in chemsex. Mephedrone use was reported more often in the online survey group than at the STI clinic (28.3% vs. 16.0%; $p < 0.001$). Compared to the clinic population, less online participants had sober sex in the past month (87.0% vs. 76.8%; $p < 0.001$) and less condomless anal chemsex (69.8% vs. 62.4%; $p = 0.005$).

DISCUSSION

Here we show that 17.6% of all MSM visiting the STI clinic of Amsterdam had engaged in chemsex in the previous 6 month. Chemsex among this group was found to be significantly associated with a bacterial STI diagnosis. This association remains significant in the group of HIV-negative MSM after adjusting for demographics and high-risk sexual behavior. However, in HIV-positive men, after adjusting there is no significant difference in the risk of a bacterial STI diagnosis between those engaging in chemsex and those not. The use of GHB during sex was most reported, with 93.0% in the past 6 months. Crystal methamphetamine use was reported by 22.1%. Moreover, 13.0% of the MSM who engaged in chemsex did not have sober sex in the last 3 months and 6.1% stated injecting drugs.

Previous studies have shown that MSM who practiced chemsex exhibit high-risk behavior.[4, 11, 16] In accordance with these findings, we found that MSM who engaged in chemsex show higher risk-taking behavior (more sex partners and more often CAS) than MSM who did not engage in chemsex. The sole use of GHB was reported by 68.1 % and the use of both crystal methamphetamine and GHB was the combination most used (11.8%). Polydrug use as a predictor for risk behavior and STI has been previously reported.[6] However, because we focused in our study only on the use of three drugs (crystal methamphetamine, GHB and mephedrone) during sex, we have no further knowledge of participants additional drug use. This

might be a potential confounder to our results, as drugs have diverse mechanisms of actions which might lead to different risk behavior.[21]

Surprisingly, our findings revealed - irrespectively of chemsex practices - a relative small number of newly diagnosed HIV cases (0.4% in chemsex group vs. 0.7%; $p=0.256$). On the basis of previous findings,[6, 8, 11] we expected a higher prevalence of new HIV diagnoses in the chemsex group. However, possible explanations for our results might be the short study period and that 25.5 % of all MSM engaging in chemsex were using PrEP.

One of the strengths of our study is the routinely collected detailed epidemiological and behavioral data of clients of the STI clinic. Moreover, by comparing the STI clinic client's pattern of chemsex with users of a gay dating app, we showed that GHB and crystal methamphetamine use during sex is representative to a wider MSM population. However, caution should be taken in generalizing these findings since no demographics or risk taking behavior was available of the gay dating app users. Moreover, as the clinic population demonstrates already care-seeking behavior by visiting the clinic, it can be suggested that the overall chemsex engagement is even greater than what our clinic MSM population revealed. Also important to notice is that to our knowledge the present study is one of the first studies to show that chemsex disclosure is a predictor for a bacterial STI among HIV-negative MSM.

However, our study has some limitations. We do not have knowledge of the intentions for drug use, and the cross-sectional design does not allow for causal explanations. Our findings show that chemsex engagement and STI diagnoses are associated with each other in HIV-negative MSM. Even though, we cannot attribute a causal relationship of chemsex to contracting STI.

Another limitation of our study might be the representativeness of the study population to the general MSM population. We could only estimate associations between chemsex and STI diagnoses in clients of the STI clinic, who are explicitly seeking STI care. However, previous studies already have shown that chemsex engagement in different MSM populations was associated with high risk behavior. [8, 11, 12] Lastly, as we did not ask the dosage of the drugs they used during sex, we could not examine dose-response relations.

This study revealed that especially among HIV-negative MSM chemsex engagement seems an attributable risk factor for a bacterial STI diagnosis. In contrast, among the total group of HIV-positive MSM the risk on an STI diagnosis is increased, irrespectively of chemsex engagement. Likewise, Bourne et al. (2015) described that the HIV-positive men in their study did not attribute sexual risk behavior to chemsex, in contrast to HIV-negative men who perceived that drug use directly

influenced unintentional sexual risk behavior.[8] Therefore, future STI prevention strategies and health promotion should especially target HIV-negative men engaging in chemsex beside HIV-positive men.

Future research should have a cohort design to monitor change in chemsex over time and study causal relations. Moreover, data is required of chemsex-related drug dependence, the perception of whether chemsex engagement is personally perceived as a problem and the impact on users' well-being.

Our study revealed that 87.0% of all MSM engaging in chemsex reported sober sex in the past month, indicating that dependency might not be an issue. Those findings are in agreement with Martin Holm (2014) who commented in *the Lancet HIV* that we should not forget that most men who engage in sex and drugs "do not experience harm and are not a threat to others".[22] Conversely, Stuart et al.(2015), found that 70% of the MSM of their study population reported no chem-free sex in in the previous 6 months.[16]

We are in the early stages of fully understanding the impact of the uprising phenomenon of chemsex, and it remains to be seen whether we are at a start of an emerging epidemic. Nonetheless, the present results show that there is a group of MSM in Amsterdam engaging in chemsex and that especially HIV-negative men are at higher risk for STI's and potentially for HIV in the future. Therefore, the STI clinic of Amsterdam implemented a low threshold community-led counseling service for MSM who want to discuss chemsex and underlying motivations.[7] If desired, referral to professional substance use and psychological care is possible.

Contributors

S Drückler, M van Rooijen, and H de Vries designed the study protocol. S Drückler performed the statistical analysis. Results were thoroughly discussed by S Drückler, M van Rooijen and H de Vries. S Drückler drafted the paper, all authors commented on draft versions, and all approved the final version.

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TABLES AND FIGURES

Table 1. Demographics, consultation characteristics, STI diagnosis, and new HIV diagnosis among 866 MSM practicing chemsex and 4,059 MSM not practicing chemsex at the STI clinic, Public Health Service of Amsterdam, the Netherlands, July - December 2016.

	Chemsex yes	Chemsex no	p value	All MSM
Variables	n=866 (%)	n=4,059 (%)		n=4,925 (%)
Median age in years (IQR)	37 (29-48)	34 (26-45)	<0.001	35 (27-46)
Age categories in years				
≤27	167 (19.3)	1,212 (29.9)	<0.001	1,379 (28.0)
28-35	210 (24.2)	998 (24.6)		1,208 (24.5)
36-46	250 (28.9)	957 (23.6)		1,207 (24.5)
≥47	239 (27.6)	892 (22.0)		1,131 (23.0)
Ethnicity ^a				
Western	600 (69.3)	2,644 (65.1)	0.020	3,244 (65.9)
Non-Western	266 (30.7)	1,415 (34.9)		1,681 (34.1)
HIV status ^b			<0.001	
HIV-positive	298 (34.4)	653 (16.1)		951 (19.3)
HIV-negative	568 (65.6)	3,406 (83.9)		3,974 (80.7)
Reason of consultation				
Notification of STI exposure	266 (30.7)	878 (21.6)	<0.001	1,144 (23.2)
STI-related symptoms	218 (25.2)	869 (21.4)	0.015	1,087 (22.1)
Sexual behavior				
Median number of sex partners in <6 months (IQR) ^c	15 (6.5-30)	6 (3-10)	<0.001	6 (4-15)
Number of sex partners in <6 months ^c				
≤3 partners	66 (7.6)	1,124 (27.7)	<0.001	1,190 (24.2)
4-6	150 (17.3)	1,150 (28.4)		1,300 (26.4)
7-15	282 (32.6)	1,100 (27.1)		1,382 (28.1)
16 or more partners	367 (42.4)	679 (16.8)		1,046 (21.3)
Condomless anal sex (CAS) ^d	726 (84.3)	2,461 (61.1)	<0.001	3,187 (65.2)
STI diagnoses				
Any bacterial STI ^e	269 (31.1)	839 (20.7)	<0.001	1,108 (22.5)
Chlamydia (Non LGV)	110 (12.7)	378 (9.3)	0.002	488 (9.9)
Pharyngeal	14 (1.6)	45 (1.1)	0.212	59 (1.2)
Rectal	97 (11.2)	290 (7.1)	<0.001	387 (7.9)
Urethral	42 (4.8)	134 (3.3)	0.026	176 (3.6)
LGV	16 (1.8)	20 (0.5)	<0.001	36 (0.7)
Gonorrhoea	165 (19.1)	445 (11.0)	<0.001	610 (12.4)
Pharyngeal	81 (9.4)	248 (6.1)	0.001	329 (6.7)
Rectal	115 (13.3)	267 (6.6)	<0.001	382 (7.8)
Urethral	42 (4.8)	103 (2.5)	<0.001	145 (2.9)

Table 1. *Continued.*

	Chemsex yes	Chemsex no	p value	All MSM
Variables	n=866 (%)	n=4,059 (%)		n=4,925 (%)
Non-specific urethritis ^f	27 (3.1)	127 (3.1)	.986	154 (3.1)
Infectious syphilis	37 (4.3)	109 (2.7)	0.012	146 (3.0)
New HIV diagnosis ^g	2/570 (0.4)	27/3,432 (0.7)	0.256	29/4,002 (0.7)
On PrEP ^h	145/568 (25.5)	195/3,406 (5.7)	<0.001	340/3,974 (8.6)

List of used abbreviations

STI=sexually transmitted infections; LGV=Lymphogranuloma venereum; MSM=men who have sex with men; IQR=interquartile range; PrEP=pre-exposure prophylaxis

^aEthnicity was defined according to Statistics Netherlands on the basis of country of birth, maternal and paternal country of birth.¹⁸ ^bHIV status also includes results of the current HIV test. MSM who refused an HIV test (N=15) were added to the HIV-negative group. ^cMissing number of sex partners is n=7. ^dCAS: No or inconsistent condom use or condom failure during anal sex. Missing number of CAS is n=35. ^eBacterial STI: Diagnosis with chlamydia, gonorrhea, LGV, and/or infectious syphilis. ^fIn those with >10 polymorph nucleated leucocytes per high power field in a urethral Gram-stained smear and no infection with Ct and Ng, a definitive diagnosis of non-specific urethritis was made. ^gOnly tested in MSM not previously tested HIV-positive. ^hHIV-negative participants who used PrEP as part of the Amsterdam PrEP research study.

Table 2. Univariable and multivariable analysis of determinants associated with a bacterial STI^a diagnosis among 4,925 MSM, attending the STI clinic, Public Health Service of Amsterdam, the Netherlands, July - December 2016.

	Total (N=4,925) n (% within group)	Univariable OR [95%CI]	p value	Multivariable ^b aOR [95%CI]	p value
Age (years)			0.012		<0.001
≤27	330/1,379 (23.9)	1		1	
28-35	283/1,208 (23.4)	1.0 [0.8-1.2]		0.8 [0.7-1.0]	
36-46	281/1,207 (23.3)	1.0 [0.8-1.2]		0.7 [0.6-0.9]	
≥47	214/1,131 (18.9)	0.7 [0.6-0.9]		0.5 [0.4-0.6]	
Ethnicity			0.087		
Western	706/3,244 (21.8)	1			
Non-Western	402/1,681 (23.9)	1.1 [1.0-1.3]			
chemsex <6 months			<0.001		
Not using chems during sex	839/4,059 (20.7)	1			
Using chems during sex	269/866 (31.1)	1.7 [1.5-2.0]			
HIV status ^c			<0.001		
HIV-negative	794/3,974 (20.0)	1			
HIV-positive	314/951 (33.0)	2.0 [1.7-2.3]			
Interaction chemsex*HIV-status ^d			<0.001		<0.001
No chemsex: HIV -	628/3,406 (18.4)	1		No chemsex: HIV -	1
No chemsex: HIV +	211/653 (32.3)	2.1 [1.8-2.5]		No chemsex: HIV +	2.0 [1.6-2.5]
Yes chemsex: HIV -	166/568 (29.2)	1.8 [1.5-2.2]		Yes chemsex: HIV -	1.5 [1.2-1.8]
Yes chemsex: HIV +	103/298 (34.6)	2.3 [1.8-3.0]		Yes chemsex: HIV +	1.8 [1.3-2.3]
Reason of visit					
Not notified of STI exposure	742/3,781 (19.6)	1	<0.001	1	<0.001
Notification of STI exposure	366/1,144 (32.0)	1.9 [1.7-2.2]		2.0 [1.7-2.3]	
No STI-related symptoms	686/3,838 (17.9)	1	<0.001	1	<0.001
STI-related symptoms	422/1,087 (38.8)	2.9 [2.5-3.4]		3.0 [2.5-3.4]	

Condomless anal sex (CAS) <6 months ^e					
No CAS	287/1,703 (16.9)	1			
CAS	813/3,187 (25.5)	1.7 [1.5-2.0]		1.4 [1.2-1.7]	<0.001
Number of sex partners <6 months ^f					
≤3 partners	218/1,190 (18.3)	1			
4-6	274/1,300 (21.1)	1.2 [1.0-1.5]		1.2 [1.0-1.5]	
7-15	312/1,382 (22.6)	1.3 [1.1-1.6]		1.3 [1.1-1.6]	
16 or more partners	302/1,046 (28.9)	1.8 [1.5-2.2]		1.8 [1.5-2.3]	<0.001

List of used abbreviations

STI=sexually transmitted infections; MSM=men who have sex with men; OR=odds ratio; aOR=adjusted odds ratio

^aBacterial STI: Diagnosis with chlamydia, gonorrhoea, LGV, and/or infectious syphilis. ^bIn multivariable model 4,883 MSM were included of whom 1,108 had a bacterial

STI. ^cMSM who refused an HIV test were added to the HIV-negative group (n=15). ^dThe interaction between chemsex and HIV-status for any bacterial STI was included in the multivariable model as a dummy variable with four categories. ^eMissing number of CAS is n=35. No CAS: Always condom use during anal sex or no anal sex. CAS:

No or inconsistent condom use or condom failure during anal sex. ^fMissing number of sex partners is n=7.

Table 3. Pattern of chemsex and drugs used among 866 MSM, at the STI clinic, Public Health Service of Amsterdam, the Netherlands, July - December 2016 and 537 MSM visitors of an online dating app.

Chemsex Yes	866/4,925 (17.6)	537/1,832 (29.3)	<0.001	1403/6,757 (20.8)
	STI clinic N=866 (%)	Online survey N=537 (%)	p value	Total N=1,403 (%)
Gamma-hydroxybutyrate (G) use during sex <6 months^{a,b}				
Yes	798 (93.0)	453 (91.1)	0.215	1,251 (92.3)
Once per month or less	500 (62.7)	263 (58.1)	0.173	763 (61.0)
2-4 per month	266 (33.3)	163 (36.0)		429 (34.3)
2-3 a week	27 (3.4)	20 (4.4)		47 (3.8)
4 or more per week	5 (0.6)	7 (1.5)		12 (1.0)
Crystal methamphetamine (T) use during sex <6 months^{a,c}				
Yes	190 (22.1)	107 (24.9)	0.271	297 (23.1)
Once per month or less	143 (75.3)	84 (78.5)	0.448	227 (76.4)
2-4 per month	39 (20.5)	17 (15.9)		56 (18.9)
2-3 a week	6 (3.2)	6 (5.6)		12 (4.0)
4 or more per week	2 (1.1)	0		2 (0.7)
Mephedrone (M) use during sex <6 months				
Yes^{a,d}	137 (16.0)	121 (28.3)	<0.001	258 (20.1)
Once per month or less	113 (82.5)	94 (77.7)	0.649	207 (80.2)
2-4 per month	22 (16.1)	26 (21.5)		48 (18.6)
2-3 a week	1 (0.7)	1 (0.8)		2 (0.8)
4 or more per week	1 (0.7)	0		1 (0.4)

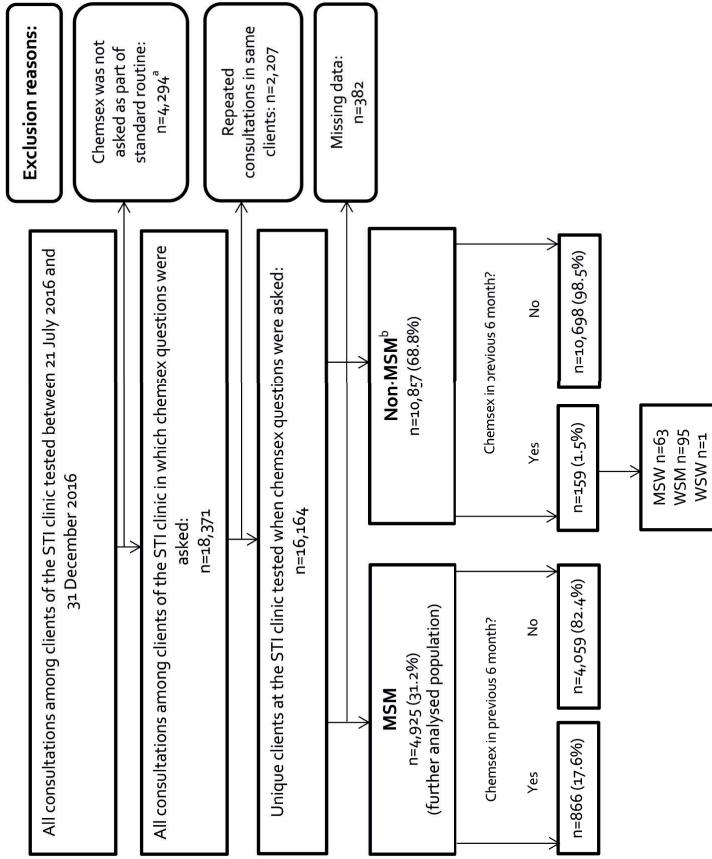


Figure 1. Flowchart of all STI clinic consultations in which chemsex practices were asked at the Public Health Service of Amsterdam, the Netherlands, July-December 2016.

^aChemsex characteristics were not asked when someone was tested: 1) through the online Men who have sex with Men (MSM) screening program (Man Tot Man); 2) through participation of the Amsterdam Cohort Study, 3) as part of a sexual health (SENSE) consultation for clients till the age of 25 without STI screening; and 4) through a self-screening test (not applicable to MSM). ^bNon-MSM are defined as Men who have sex with women (MSW), Women who have sex with men (WSM) and Women who have sex with Women (WSW).

Chapter 3

Sexual consent and Chemsex: A quantitative study
on sexualised drug use and non-consensual sex
among men who have sex with men in Amsterdam,
the Netherlands



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ABSTRACT

Background

Chemsex (drug-use to enhance sex) has emerged among men who have sex with men (MSM). Non-consensual sex (NCS) is hypothesized to occur frequently under the influence of chemsex, however data are scarce. In this cross-sectional study it was aimed to assess whether NCS is associated with chemsex.

Methods

We offered a survey about chemsex in the past 6 months (crystal methamphetamine, mephedrone and/or gamma-hydroxybutyrate/gamma-butyrolacton use) and NCS (sexual experiences beyond one's limits or unpleasant sexual experiences) in the past 5 years to Amsterdam-located gay dating platform users. Associations were assessed using χ^2 -test, Fisher's exact test, and multivariable logistic regression.

Results

Of 891 participants, 30.6% (273/891) engaged in chemsex; 21.2% engaging and 16.7% not engaging in chemsex reported any NCS experiences ($p=0.109$).

Among MSM who reported any NCS experiences; chemsex engagers reported being touched against ones will less often compared to non-engagers (22.4% vs. 39.8%; $p=0.036$). Yet, chemsex engagers reported passing out and not remembering what happened during drug use more often (41.4% vs. 8.7%; $p<0.001$). The level of suffering from NCS experiences did not differ between chemsex engagers and non-engagers ($p=0.539$); and was rated by most participants with no suffering at all or low suffering (77.1%). In the multivariable regression analyses chemsex engagement in the past 6 months was associated with NCS (adjusted OR, 1.46; 95% CI 1.01-2.11).

Conclusions

A substantial proportion of MSM (regardless of chemsex engagement) reported NCS in the past 5 years. In multivariate logistic regression analysis, chemsex engagement was associated with an NCS experience. Among participants who reported NCS, suffering related to NCS however, did not differ between chemsex engagers and non-engagers. Sexual healthcare professionals need to address chemsex and NCS during consultations involving MSM and refer men for specialized help if deemed necessary.

INTRODUCTION

Over the last decade chemsex has become a rising phenomenon in the gay-community[1-3]. While there are different definitions of chemsex, here we define it as the use of any combination of the following drugs: crystal methamphetamine, mephedrone, and/or gamma-hydroxybutyrate/gamma-butyrolacton (GHB/GBL) before or during sex by men who have sex with men (MSM)[4]. Chemsex can also include different or more drugs depending on the social context or geographic region[5]. The majority of MSM engaging in chemsex do not self-identify with problematic drug use and hardly report any disadvantages in everyday life[6, 7]. Yet, some report a negative impact on their life and pressure from friends to engage in chemsex[8]. Moreover, chemsex engagement is associated with sexual risk-taking behaviour such as condomless anal sex (CAS), and may possibly lead to negative physical and mental health consequences and addiction[1, 9]. Amsterdam, among other big European cities, has shown a high prevalence of chemsex[9, 10]. Rising numbers in European countries like England, Belgium and the Netherlands are of concern, especially with regard to crystal methamphetamine use which is known to be highly addictive and can produce acute and chronic medical and psychiatric conditions[11-13].

The meaning of chemsex engagement does not take into account the subculture and multifactorial issues surrounding the phenomenon of chemsex; for example gay online dating culture and the fine line between consensual and non-consensual sex (NCS) are tightly linked to chemsex engagement and have become a more discussed topic in recent years[14-16]. Chemsex engagement often takes place at home during sexualized parties with a small number of men who have met through dating applications or websites[17-19]. A qualitative study reported that giving a notion of consent in a chemsex environment (characterised by sexually thrilling, and loss of sexual desire control) felt difficult for some men[14].

There are many variations in terms for NCS, such as sexual harassment, molestation and forced sex; here we use the term NCS to address all sexual experiences beyond one's limits or unpleasant sexual experiences. In the Netherlands, approximately 3.8% of men, regardless of sexuality, experienced oral/anal penetration without consent at least once in their life[20]. Moreover, the prevalence of NCS is higher among gay and bisexual men, compared with heterosexual men[21, 22].

Sexual consent is a human right, yet when drugs are involved it oftentimes becomes more difficult to consent and sexually transgressive behaviour seems to occur more easily[23]. NCS among MSM – and especially during chemsex engagement – has been under examined in research. Moreover, most research concerning chemsex have (sexual) health outcomes as main focus. Therefore, here we aimed to study

chemsex engagement in relation to NCS. So we assessed whether NCS is associated with chemsex engagement.

METHOD

Data collection and study population

Users of two online gay dating platforms (Grindr and Gayromeo) were invited to participate in an anonymous online survey through interstitial advertisement. The survey was online on both platforms until the paid budget was depleted and was only shown to users in the Amsterdam area, based on their Global Positioning System location/Internet Protocol address. As we provided the survey sequentially on two different platforms – starting with Grindr first in August 2018 during Pride Amsterdam, Gayromeo users who answered that they previously filled in the survey were excluded from the analysis.

Sociodemographic characteristics

Sociodemographic data we collected were: age, gender, sexuality (having sex with men, women, both) and residency (Amsterdam, elsewhere in the Netherlands, abroad). We furthermore asked whether one had been tested for STI/HIV in the past year and if they had tested at the Public Health Service of Amsterdam or elsewhere.

Chemsex engagement characteristics

Chemsex engagement was defined as the use of any of the following drugs before or during sex in the past 6 months: crystal methamphetamine, mephedrone and/or GHB/GBL. Chemsex specific characteristics that were asked included the frequency of chemsex per substance (once per month or less, 2-4 per month, 2-3 per week, ≥ 4 per week), frequency of condomless insertive and/or receptive anal sex during chemsex, last time having sex without any of the chemsex associated drugs (sober sex), intravenous drug use and if so, whether needles were shared.

Non-consensual sex characteristics

NCS was defined at the beginning of the survey as 'sexual experience(s) where someone went beyond your limits or where you had an unpleasant experience'; this was explained with four examples; being filmed/photographed without permission, being touched against my will, had sex against my will, passed out and did not know what happened.

We asked participants whether they have had an NCS experience in the past 5 years. Then we instructed participants to think of the last NCS experience they had, we asked when that experiences happened, and whether it was under the influence of chems.

To specify their own last NCS experience, participants were given the option of eight different types and one write-in option: (1) I have been filmed/photographed without permission, (2) I am blackmailed (e.g. with images), (3) I have been given drugs (chems or other substances) against my will, (4) I have been touched against my will, (5) I have had sex against my will, (6) I had sex without a condom against my will, (7) I passed out (chems, other substances and/or alcohol) and do not remember what happened, (8) I have exceeded the limit of my sex partner.

Lastly, we asked for the current amount of emotional suffering due to one's last NCS experience using a 5-point Likert scale in order to allow the participant to express how much they still emotionally suffer. Given the sensitive nature of the subject, we offered participants two different services where they could seek help regarding sexual assault.

Statistical analysis

Using the χ^2 -test for independence and Fisher's exact test, we compared demographics and NCS experiences amongst participants who engaged in chemsex with those who did not. Using the χ^2 -test for independence and the Fisher's exact test, we compared demographics and chemsex behaviour between men having experienced NCS with those who did not. To investigate associations of chemsex engagement with NCS, a multivariable backward logistic regression analysis was done including all variables that were associated with NCS at $p \leq 0.10$ in the univariable analysis. Chemsex engagement was forced into the model as it was the variable of interest. Additionally, the multivariable model was repeated three times to test whether the three different types of drugs were independent variables for NCS. $P < 0.05$ was considered statistically significant. Data were collected with LimeSurvey and data analyses were performed using IBM SPSS Statistics v21.0.

RESULTS

Between August 2018 and August 2019 a total of 1107 (Grindr $n=828$ and Gayromeo $n=279$) participants started the survey. Due to missing data on chemsex and/or NCS experience, previously filled in surveys, the exclusion of women and one transgender person, $n=216$ participants were excluded and $n=891$ were included in the analyses (Figure 1). The median age of participants was 39 years (IQR, 30-50), 46.3% (412/891) had their residency in Amsterdam and 93.2% (830/891) reported sex with men exclusively (Table 1). Of all participants, 30.6% (273/891) engaged in chemsex in the past 6 months.

Non-consensual sexual experiences

Of all participants, 161/891 (18.1%) reported at least one NCS experience in the past 5 years (Table 1). Overall, the group of participants engaging in chemsex and the

group of participants who did not engage chemsex did not differ in prevalence of NCS in the past 5 years (58/237, 21.2% vs. 103/618, 16.7%; $p=0.109$). However, among participants who reported NCS, two specified types of NCS differed significantly between chemsex and non chemsex engagers: 1) MSM who engaged in chemsex reported 'being touched against ones will' less often (13/58; 22.4%; vs. 41/103; 39.8%; $p=0.036$). 2) MSM who engaged in chemsex reported 'having passed out and not remembering what happened during drug use' (all possible drugs and/or alcohol) more often (24/58; 41.4% vs. 9/103; 8.7%; $p<0.001$).

Participants who engaged in chemsex and had NCS reported more recent NCS experiences than participants who did not engaged in chemsex and had NCS ($p=0.002$); meaning most participants (65/102; 63.7%) in the non-chemsex group reported that their most recent NCS experience was longer than one year ago (chemsex group: 22/56;39.3%).

Most participants (77.1%) rated the level of current suffering due to one's last NCS on a five-point Likert scale with no suffering at all (61/161; 38.9%) or low suffering (60/161; 38.2%) and this was not significantly different between participants who engaged in chemsex and who did not ($p=0.539$). However, 1.8% (1/58) of participants who engaged in chemsex and 5.0% (5/103) of participants who did not rated their suffering with the highest possible option (suffering a lot). In online supplement table 1 and 2, we display the amount of suffering in relation to the different types of NCS and timeframe.

Non-consensual sexual experiences and chemsex characteristics

Participants who experienced NCS were younger (median 33 vs. 40 $p<0.001$), more often crystal methamphetamine users (15.5% vs. 8.5% $p=0.009$) and reported more often intravenous drugs use (6.2% vs. 2.1% $p=0.008$) compared to participants who did not experienced NCS (Table 2).

Participants who engaged in chemsex and reported NCS, differed significantly from those who also engaged in chemsex but did not reported NCS as far as having had sober sex in the last month and not remembering the last time they had sober sex (overall $p=0.045$).

Associations with non-consensual sexual experiences

In the univariable analysis chemsex engagement in the past 6 months was not associated with NCS in the past 5 years (odds-ratio [OR], 1.35; 95% confidence interval [CI],0.94-1.93) (Table 3).

Whereas age (OR, 0.96; 95% CI, 0.90-0.98), having sex with both men and women, as opposed to with men only (OR, 2.38; 95% CI 1.36-4.19), mephedrone use (OR, 2.06;

95% CI 1.19-3.59) and crystal methamphetamine use in the past 6 months (OR, 1.98; 95% CI 1.20-3.26) were significant determinants of NCS.

In the multivariable regression analyses chemsex engagement in the past 6 months was associated with NCS (adjusted odds-ratio [aOR], 1.46; 95% CI 1.01-2.11), as well as younger age (aOR, 0.96; 95% CI, 0.95-0.98) and having sex with both men and women as opposed to men only (aOR, 2.21; 95% CI 1.24-3.92). In the multivariable model for the three different types of drugs as independent variable for NCS, significant associations were found for mephedrone (aOR, 1.93; 95% CI 1.10-3.40) and crystal methamphetamine use (aOR, 2.18; 95% CI 1.25-3.96).

DISCUSSION

In this study we found that a considerable proportion of MSM recently engaged in chemsex and had an NCS experience in the past 5 years. Moreover, in a multivariate logistic regression analysis we established that chemsex engagement is associated with NCS. The advertisement strategy via online gay dating platforms gave insight in the Dutch chemsex subculture and the associations with NCS.

In our study the overall prevalence of NCS was 18.1% in the past 5 years. A bit less than the half (44.9%) of all experiences was within the past year. In an earlier report on sexual violence (defined as 'forced into sex') among men in the Netherlands (sexual preference was not specified), the lifetime prevalence was 6%[24]. When including all sexual transgressive behaviour, which also includes kissing and sexual contiguity, they reported a 19% lifetime prevalence. Findings published by Haas (2012) showed a 7.7% lifetime prevalence of sexual violence among men[20]. This percentage dropped to 1.2% when only focusing on the previous year. In our study we find much higher percentages; in the chemsex group 12.5% of all participants reported NCS in the past year only (vs. 6.0% among non chemsex engagers; $p=0.002$). The difference between both groups suggests that MSM engaging in chemsex experience NCS more frequently and therefore more recently. However, the definition or concept used to describe NCS in the literature often varies and can lead to differences in findings. For example, *Ward et al.* found a 42.9% prevalence among chemsex users after changing the terminology from 'forced into sex' to 'non-consensual sex' compared to 16.7% before[16]. We therefore purposely chose to use the term 'non-consensual sex' to include as many forms of sexually transgressive behaviour as possible. To prevent a misinterpretation, yet also gather more in-depth information on participants own specific experiences, we offered some examples of NCS at the start, and enquired their own specific experiences at the end of the survey.

Among men who practice chemsex, sexual consent can be experienced as complicated and vague[14]. In a qualitative study of *Bourne et al.* among MSM

engaging in chemsex, 10% of the participants reported to have overdosed on GHB with loss of consciousness and therefore could not have given consent to the sex which occurred but still did not refer to it as sexual assault or rape[14]. In our study also, 8.8% of all chemsex engagers, reported loss of consciousness due to chems, other substances and/or alcohol. Besides the feelings of guilt and shame that could go along with NCS, the cognitive dissonance theory could explain that men who attend chemsex parties might accept this ambiguity, change their attitudes towards consent (to avoid dissonance) and set a norm in which participation in such a party equals consent[25]. This also might explain why most participants in our study who had an NCS experience reported little to no emotional distress afterwards. However, 1.8% (1/58) of MSM engaging in chemsex and 5.0% (5/103) of the MSM not engaging in chemsex rated their suffering with the highest option possible. This is in line with our finding that in the non chemsex group 'being touched against ones will' was reported more often compared to the chemsex group. However, we do not know whether men engaging in chemsex talked beforehand about the possibility of passing out during a chemsex session and which rules would apply at this point regarding consent.

In our study we found that men having sex with both men and women compared to men having sex with men only have higher odds of an NCS experience in the past 5 years. Earlier studies also found that bisexual individuals are more vulnerable for mental health issues, show poorer social and psychological well-being and report a poorer overall health compared to gay men or other sexual minority[26, 27]. However, the terminology bisexuality often is used as identity measure and in our study we only asked the gender of the sex partners and therefore cannot clearly interpret this.

A strength of our study was that the survey was anonymous, therefore participants might have felt particularly open to disclose both chemsex engagement and NCS. Healthcare workers need to be aware that criminalization, shame and stigma form barriers to disclose chemsex and NCS in institutional settings[22, 28]. It is necessary to develop strategies in which chemsex and NCS can be addressed freely. Interventions such as post-exposure prophylaxis after NCS experiences, offering pre-exposure prophylaxis to MSM engaging in sex with an increased risk of HIV transmission, or the manual "the Chemsex First Aid" (a booklet that covers some general First Aid practices for some specific chemsex-related emergencies) can offer support and facilitate the appropriate referrals for professional help[23, 29]. We recommend healthcare workers to be alert that NCS is an issue among MSM (regardless of chemsex engagement) and to create an open space men to talk about NCS and offer them a referral to a professional. The Amsterdam public health service has developed a chemsex support walk-in held by peers. Those peers are trained by employees of a sexual assault centre in how to handle with NCS

experiences from clients and refer to a sexual assault centre if wanted. Referral is also part of standard care, irrespective of chemsex engagement. These efforts help to destigmatize chemsex and communicate a welcoming attitude towards sexual assault victims in need of care.

Our study has also some limitations. To our regret we did not ask for the quantity of NCS experiences, but solely focused on one's last experience. Consequently, the quantity could affect the timeframe and therefore we have an incomplete picture of the impact. To study the association of chemsex engagement and NCS experiences, we used different time periods (past 6 months vs past 5 years).

In our study we only considered crystal methamphetamine, mephedrone, and/or GHB/GBL as chemsex drugs. However, future research should take into account that within the ever-changing landscape with regional differences in availability and new drugs, also other drugs are associated with an increased risk for STIs[5]. Another limitation of the present study is that we did not ask about polysubstance use (the use of more than one drug or type of drug consumed at the same time or sequentially) as it is another phenomenon associated with risk behaviour and psychosocial problems[30]. Moreover, according to the syndemic theory, drug use is one of a variety of factors driving risk behaviour among MSM[31]. Other factors such as psychosocial problems, discrimination and minority stress were not considered. It is of great importance to include the complete spectrum of risk behaviour drivers to better understand motivations for chemsex and find solutions to tackle problematic chemsex use. To also better understand the impact NCS experiences might have on one's well-being, future research with a bigger sample size should study the associations of suffering and types of NCS. Qualitative research could also help gaining more in-depth insights on the matter as well as on the discussion about what actually constitutes 'consent to sex' in a chemsex environment. These insights might lead to knowledge on how to support men confronted with NCS and prevent it from happening again.

To conclude, we showed that NCS frequently occurs among MSM, and NCS and chemsex are associated.

Whereas chemsex engagement is a new and emerging phenomenon, MSM have been victims of NCS for so long. The close associations between the two issues urge a more coherent response that needs to be addressed in drug-use and sexual healthcare settings. Therefore, healthcare professionals need to be open during consultation hours involving MSM in addressing chemsex, NCS (regardless of chemsex engagement), and also intimate partner violence as it is strongly associated with sexualized drug use[32]. Referral to other healthcare facilities specialized in chemsex or NCS remains important.

Key messages

- A substantial proportion of men who have sex with men (MSM) (regardless of chemsex engagement) reported non-consensual sex (NCS) in the past 5 years.
- In multivariate logistic regression analysis, chemsex engagement is associated with an NCS experience.
- Among participants who reported NCS, suffering related to NCS did not differ between chemsex engagers and non-engagers.
- Sexual healthcare professionals need to address chemsex and NCS during consultations involving MSM and refer men for specialized help if deemed necessary.

Contributors

SD and JS attributed equally to the article. JS, SD, MvR and HCJdV designed the study protocol. SD and JS performed the statistical analyses. Results were thoroughly discussed by JS, SD, MvR and HCJdV. JS and SD drafted the paper, all authors commented on draft versions, and all approved the final version.

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FIGURES AND TABLES

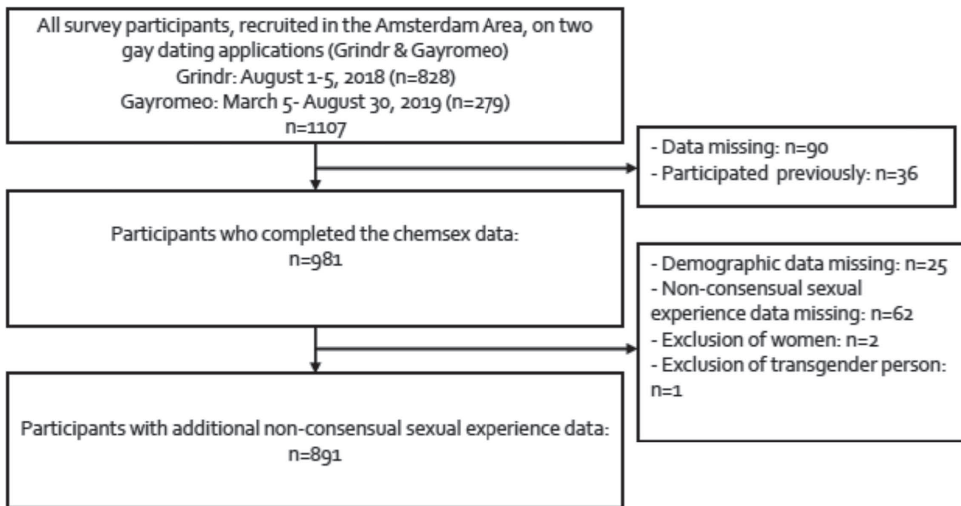


Figure 1. Flow chart of participants in an online survey on chemsex behaviour and non-consensual sexual experiences among men who have sex with men, Amsterdam, the Netherlands, 2018–2019.

Table 1. Demographics and non-consensual sexual¹ (NCS) experiences of 273 MSM who practiced and 620 MSM who did not practice chemsex² in the past 6 months, Amsterdam area, the Netherlands, between August 2018 and August 2019.

Variables	Chemsex ² yes, n=273 (30.6%), n (%)	Chemsex ² no, n=618 (69.4%), n (%)	P	Total n=891 (%), n (%)
Median age in years (IQR)	40 (31-50)	39 (29-49)	0.071	39 (30-50)
Age categories in years			0.054	
≤24	22 (8.1)	76 (12.3)		98 (11.0)
25-34	72 (26.4)	174 (28.2)		246 (27.6)
35-44	66 (24.2)	138 (22.4)		204 (22.9)
45-54	75 (27.5)	155 (25.0)		230 (25.8)
55-64	36 (13.2)	57 (9.2)		93 (10.4)
≥65	2 (0.7)	18 (2.9)		20 (2.2)
Residency (missing n=1)			0.004	
Amsterdam	106 (38.8)	306 (49.6)		412 (46.3)
Elsewhere in the Netherlands	164 (60.1)	298 (48.3)		462 (51.9)
Abroad	3 (1.1)	13 (2.1)		16 (1.8)
Sex in <6 months with			0.706	
Men	253 (92.7)	577 (93.4)		830 (93.2)
Both men & women	20 (7.3)	41 (6.6)		61 (6.8)
STI/HIV test in the last year			<0.001	
No	21 (7.7)	170 (27.5)		191 (21.4)
Yes, at the Public Health Service of Amsterdam	71 (26.0)	183 (29.6)		254 (28.5)
Yes, elsewhere	181 (66.3)	265 (42.9)		446 (50.1)
Condomless anal chemsex	202/273 (74.0)	n.a.		
Frequency				
Always without	72 (35.6)	n.a.		
Most of the time without	53 (26.2)	n.a.		
Sometimes with	38 (18.8)	n.a.		
Most of the time with	39 (19.3)	n.a.		
Always with	0	n.a.		
Non-consensual sexual experience¹ in the past 5 years				
Yes	58/273(21.2)	103/618(16.7)	0.109	161/891 (18.1)
Timeframe (missing n=3)			0.002	
Past month	9/56 (16.1)	4/102 (3.9)		13/158 (8.2)
1-3 months ago	12/56 (21.4)	7/102 (6.9)		19/158 (12.0)
3-6 months ago	7/56 (12.5)	12/102(11.8)		19/158 (12.0)
6-12 months ago	6/56 (10.7)	14/102(13.7)		20/158 (12.7)
>1 year ago	22/56 (39.3)	65/102(63.7)		87/158 (55.1)

	Chemsex² yes & NCS yes, n=58 (36.0%), n (%)	Chemsex² no & NCS yes, n=103 (64.0%), n (%)	P	Total n=161 (%), n (%)
Types of experience (multiple answers possible)				
Filmed/photographed without consent	15 (25.9)	14 (13.6)	0.058	29 (18.0)
Blackmailed (e.g. with images)	4 (6.9)	4 (3.9)	0.460	8 (5.0)
Used drugs against my will	10 (17.2)	9 (8.7)	0.130	19 (11.8)
Touched against my will	13 (22.4)	41 (39.8)	0.036	54 (33.5)
Had sexual contact against my will	17 (29.3)	37 (35.9)	0.487	54 (33.5)
Had sex without a condom against my will	12 (20.7)	26 (25.2)	0.566	38 (23.6)
I passed out and don't remember (under influence of chems, other substances and/or alcohol)	24 (41.4)	9 (8.7)	<0.001	33 (20.5)
I crossed the limits of my sex partner	4 (6.9)	8 (7.8)	0.999	12 (7.5)
Other	1 (1.7)	5 (4.9)	0.420	6 (3.7)
Current level of suffering (missing n=4)			0.539	
- - no suffering	25 (44.6)	36 (35.6)		61 (38.9)
- low suffering	18 (32.1)	42 (41.6)		60 (38.2)
- + medium suffering	8 (14.3)	14 (13.9)		22 (14.0)
+ a bit suffering	4 (7.1)	4 (4.0)		8 (5.1)
++ suffering a lot	1 (1.8)	5 (5.0)		6 (3.8)

List of abbreviations: MSM: men who have sex with men, STI: sexually transmitted infection, HIV: human immunodeficiency virus, n.a.: not applicable.

¹Non-consensual sexual experience was defined as 'where someone went beyond ones limits or where one had an unpleasant experience'. ²The use of any combination of drugs, including crystal methamphetamine, mephedrone, and/or gamma-hydroxybutyrate/gamma-butyrolacton (GHB/GBL) before or during sex in past 6 months.

Table 2. Chemsex¹ behaviour and drug used, among 161 MSM who reported non-consensual sexual experience² and 730 MSM who did not, in Amsterdam, the Netherlands between August 2018 and August 2019

Variables	Non-consensual sexual experience ² , yes n=161 (18.1%), n (%)	Non-consensual sexual experience ² , no n=730 (81.9%), n (%)	P	Total n = 891 (%), n (%)
Median age (IQR), y	33 (25-46)	40 (30-50)	<0.001	39 (30-50)
Age categories, y (missing n=2)			<0.001	
≤24	36 (22.4)	62 (8.5)		98 (11.0)
25-34	49 (30.4)	197 (27.0)		246 (27.6)
35-44	29 (18.0)	175 (24.0)		204 (22.9)
45-54	34 (21.1)	196 (26.8)		230 (25.8)
55-64	11 (6.8)	82 (11.2)		93 (10.4)
≥65	2 (1.2)	18 (2.5)		20 (2.2)
Sex in <6 months with			0.003	
Men	141 (87.6)	689 (94.4)		830 (93.2)
Both men & women	20 (12.4)	41 (5.6)		61 (6.8)
Residency (missing n=1)			0.729	
Amsterdam	78 (48.4)	334 (45.8)		412 (46.3)
Outside of Amsterdam	81 (50.3)	381 (52.3)		462 (51.9)
Abroad	2 (1.2)	14 (1.9)		16 (1.8)
STI/HIV test in the last year			0.561	
No	30 (18.6)	161 (22.1)		191 (21.4)
Yes, at the Public Health Service of Amsterdam	50 (31.1)	204 (27.9)		254 (28.5)
Yes, somewhere else	81 (50.3)	365 (50.0)		446 (50.1)
Chemsex ¹ <6 months	58 (36.0)	215 (29.5)	0.109	273 (30.6)
GHB/GBL (G) use during sex <6 months	53 (32.9)	200 (27.4)	0.176	253 (28.4)
Frequency			0.053	
Once per month or less	22/53 (41.5)	120/200 (60.0)		142/253 (56.1)
2-4 per month	23/53 (43.4)	67/200 (33.5)		90/253 (35.6)
2-3 a week	4/53 (7.5)	7/200 (3.5)		11/253 (4.3)
≥ 4 a week	4/53 (7.5)	6/200 (3.0)		10/253 (4.0)
Crystal methamphetamine (C) use during sex <6 months	25 (15.5)	62 (8.5)	0.009	87 (9.8)
Frequency			0.434	
Once per month or less	14/25 (56.0)	46/62 (74.2)		60/87 (69.0)
2-4 per month	8/25 (32.0)	12/62 (19.4)		20/87 (23.0)
2-3 a week	2/25 (8.0)	2/62 (3.2)		4/87 (4.6)
≥ 4 a week	1/25 (4.0)	2/62 (3.2)		3/87 (3.4)

Table 2. *Continued.*

Variables	Non-consensual sexual experience ² , yes n=161 (18.1%), n (%)	Non-consensual sexual experience ² , no n=730 (81.9%), n (%)	P	Total n = 891 (%), n (%)
Mephedrone (M) use during sex <6 months	20 (12.4)	47 (6.4)	0.013	67 (7.5)
Frequency			0.059	
Once per month or less	11/20 (55.0)	39/47 (83.0)		50/67 (74.6)
2-4 per month	5/20 (25.0)	4/47 (8.5)		9/67 (13.4)
2-3 a week	2/20 (10.0)	1/47 (2.1)		3/67 (4.5)
≥ 4 a week	2/20 (10.0)	3/47 (6.4)		5/67 (7.5)
Type of chemsex drugs used during sex <6 months ³			0.078	
G only	24/58 (41.4)	129/215 (60.0)		153/273 (56.0)
G and C	9/58 (15.5)	30/215 (14.0)		39/273 (14.3)
G and M	9/58 (15.5)	20/215 (9.3)		29/273 (10.6)
C and G and M	11/58 (19.0)	21/215 (9.8)		32/273 (11.7)
C only	5/58 (8.6)	9/215 (4.2)		14/273 (5.1)
M only	0/58 (0)	4/215 (1.9)		4/273 (1.5)
C and M	0/58 (0)	2/215 (0.9)		2/273 (0.7)
Injecting drugs <6 months	10 (6.2)	15 (2.1)	0.008	25 (2.8)
Shared needles	3/10 (30.0)	1/15 (6.7)	0.267	4/25 (16.0)
Sober sex last time ⁴			0.045	
In the past month	36/58 (62.1)	166/215 (77.2)		202/273 (74.0)
Longer than 3 months ago	5/58 (8.6)	20/215 (9.3)		25/273 (9.2)
Longer than 6 months ago	5/58 (8.6)	11/215 (5.1)		16/273 (5.9)
Longer than 1 year ago	8/58 (13.8)	14/215 (6.5)		22/273 (8.1)
I do not remember	4/58 (6.9)	4/215 (1.9)		8/273 (2.9)
Condomless anal chemsex	44 (27.3)	161 (22.1)	0.178	205 (23.0)

List of abbreviations:

MSM: men who have sex with men, STI: sexually transmitted infection, HIV: human immunodeficiency virus.

¹The use of any combination of drugs, including crystal methamphetamine, mephedrone, and/or gamma-hydroxybutyrate/gamma-butyrolacton (GHB/GBL) before or during sex in past 6 months. ²Non-consensual sexual experience was defined as 'where someone went beyond your limits or where you had an unpleasant experience' (e.g. filmed/photographed without consent, had sexual contact against their will etc). ³It is not known whether drugs were consumed at the same time or sequential. ⁴Last time having sex without any of the chemsex associated drugs.

Table 3. Univariable and multivariable analyses of determinants associated with non-consensual sex¹ in the past 5 years among 891 MSM recruited on online dating apps between August 2018 and August 2019, the Netherlands.

	Univariable, OR (95% CI)	P	Multivariable, aOR (95% CI)	P	Multivariable, Mephedrone aOR (95% CI)	P	Multivariable, aOR (95% CI)	P	Multivariable, aOR (95% CI)	P
			Chemsex				GHB/GBL		Crystal Meth	
Age (IQR), y	0.96 (0.90-0.98)	<0.001	0.96 (0.95-0.98)	<0.001	0.97 (0.95-0.98)	<0.001	0.96 (0.95-0.98)	<0.001	0.96 (0.95-0.98)	<0.001
Condomless anal chemsex ² (CAS)		0.151	-	-	-	-	-	-	-	-
No	1									
Yes	1.33 (0.90-1.96)									
Sex in <6 months with		0.003		0.007		0.012		0.007		0.007
Men	1		1		1		1		1	
Men & Women	2.38 (1.36-4.19)		2.21 (1.24-3.92)		2.10 (1.18-3.75)		2.20 (1.24-3.91)		2.22 (1.25-3.96)	
Chemsex ² <6 mo		0.102		0.044		-		-		-
Not using chems during sex	1		1		-		-		-	
Using chems during sex	1.35 (0.94-1.93)		1.46 (1.01-2.11)							
Mephedrone (M) use <6 mo		0.010		-		0.023		-		-
Not using M during sex	1				1					
Using M during sex	2.06 (1.19-3.59)				1.93 (1.10-3.40)					0.079
GHB/GBL (G) use <6 mo		0.160		-		-				
Not using G during sex	1						1			
Using G during sex	1.30 (0.90-1.88)						1.40 (0.96-2.04)			

Crystal methamphetamine use (C) <6 mo	0.007	-	-	-	0.003
Not using C during sex	1				1
Using C during sex	1.98 (1.20-3.26)				2.18 (1.25-3.96)

¹Non-consensual sexual experience was defined as 'where someone went beyond your limits or where you had an unpleasant experience' (e.g. filmed/photographed without consent, had sexual contact against their will). ²The use of any combination of drugs, including crystal methamphetamine, mephedrone, and/or gamma-hydroxybutyrate/gamma-butyrolacton (GHB/GBL) before or during sex.

SUPPLEMENT TABLES

Supplement Table 1. Specific types of non-consensual sex (NCS) experiences in relation to any amount of reported current suffering.

	Any amount of suffering,	No suffering at all,	Total (missing n=4)
Types of NCS experienced (multiple answers possible)¹	96 (61.1%)	61 (38.9%)	157
Filmed/photographed without consent	13 (44.8)	16 (55.2)	29
Blackmailed (e.g. with images)	8 (100)	0	8
Used drugs against my will	16 (84.2)	3 (15.8)	19
Touched against my will	35 (64.8)	19 (35.2)	54
Had sexual contact against my will	36 (67.9)	17 (32.1)	53
Had sex without a condom against my will	30 (78.9)	8 (21.1)	38
I passed out and don't remember (under influence of chems, other substances and/or alcohol)	22 (66.7)	11 (33.3)	33
I crossed the limits of my sex partner	8 (66.7)	4 (33.3)	12
Other	3 (60.0)	2 (40.0)	5

¹Multiple answers possible. A total of 251 types of NCS were reported by 157 individuals.

Supplement Table 2. Timeframe of one's last of non-consensual sex experiences in relation to any amount of reported current suffering.

	Any amount of suffering, n=95 (61.1%), n (%)	No suffering at all, n= 61 (38.9%)	Total n=156 (%), n (%) (missing n=5)
Timeframe			
Past month	10 (76.9)	3 (23.1)	13
1-3 months ago	15 (78.9)	4 (21.1)	19
3-6 months ago	10 (55.6)	8 (44.4)	18
6-12 months ago	10 (50.0)	10 (50.0)	20
>1 year ago	50 (58.1)	36 (41.9)	86

Chapter 4

Sex, drugs, and sexually transmitted infections: a latent class analysis among men who have sex with men in Amsterdam and surrounding urban regions, the Netherlands



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ABSTRACT

Background

Men who have sex with men (MSM) are at high risk for sexually transmitted infections (STI) and often have sex while under the influence of drugs (sexualized drug use). We aimed to identify classes of MSM in Amsterdam and in surrounding urban regions with distinctive patterns of sexualized drug use and their association with STI.

Methods

In this cross-sectional study, data on MSM were collected at STI clinics in the Netherlands between September-December 2017. Information on drug use, sociodemographics and sexual risk behaviour, including lab-confirmed STI (chlamydia, gonorrhoea, syphilis and HIV) was collected and compared between Amsterdam and surrounding urban regions. Latent class analysis was used to identify classes with similar drug use patterns, which were then linked to sexual behaviour and STI.

Results

We included 4461 MSM who were a median 35 years old (IQR=27-47) and mostly Dutch (56.9%). Use of all drugs was more often reported in Amsterdam compared to surrounding regions ($p<0.001$). We identified four different classes based on sexualized drug use among Amsterdam participants and three classes in surrounding regions. In both regions, polydrug use classes (compared to classes of no drug use; alcohol use; or few, various drugs) were defined by higher numbers of sexual partners (median range 8-15 vs 4-6, respectively) and higher STI prevalence (range 30.5%-31.8% vs 18.6%-22.8%, respectively).

Conclusion

Given the high prevalence of risk behaviour and STIs, MSM in urban settings partaking in sexualized polydrug use might benefit from tailored outreach, screening, and safe sex and drug use interventions.

INTRODUCTION

Compared to the heterosexual population, men who have sex with men (MSM) are more likely to use recreational drugs and engage in sexual activity associated with high risk of contracting sexually transmitted infections (STI)(1, 2). MSM who have sex while under the influence of drugs (herein defined as sexualized drug use) are known to increase sexual risk behaviour, such as condomless sex with a human immunodeficiency virus (HIV)-serodiscordant partner, and to be at heightened risk of contracting STI and HIV (3-9). In particular, chemsex – usually defined as the use of γ -hydroxybutyrate (GHB)/ γ -butyrolactone (GBL), methamphetamine (Crystal Meth) and mephedrone during sex – has been described as a major driver of STI/HIV infection(10). While the use of methamphetamines has been a public health problem in the U.S. and Australia for several decades, chemsex has only been described in Europe since 2014 and a recent study has reported its increase over the last few years (11, 12). Of concern, chemsex is associated with drug overdosing, hospitalization for both physical and mental disorders, as well as other societal consequences (e.g. unemployment)(13, 14). Reasons for sexualized drug use often described by users are increased sexual arousal, increased sexual confidence and enhanced performance(15, 16).

In a previous cross-sectional study of MSM in Amsterdam with high-risk sexual behaviour, we were able to identify five classes of reported sexualized drug use(17). Based on these classes, STI prevalence was 22.9% among MSM with “chems” use, 19.6%-7.0% in classes with more distinct patterns of drug use (termed polydrug, nitrites and erectile dysfunction drugs, and alcohol), and 1.9% in a class with no drug use during sex. Notwithstanding the potential use of these classes as a means to identify individuals at risk of STI/HIV, these findings were obtained from cohort data of MSM who engaged in an ostensibly higher level of at-risk behaviour than MSM in a non-research setting. Additionally, this study was conducted in a large city setting and akin to most studies on chemsex wherein the included population was MSM residing in cities with large MSM populations, such as London, Barcelona and Manchester(1, 4, 5, 7-9, 14-17), the characteristics of drug use could be different compared to urban settings with smaller MSM populations. Given that Amsterdam is an international metropolis with a large MSM community, it remains to be determined if similar clustering patterns are also observed in different MSM populations residing in Amsterdam or MSM living in urban regions outside Amsterdam(18-20). These differences could have implications on the effectiveness of interventions aimed to minimize harm related to sexualized drug use and allow for tailored approaches and testing policies in different urban settings.

The aims of this study were (1) to assess differences in sexualized drug use among MSM in Amsterdam and surrounding urban regions, (2) to assess patterns in

sexualized drug use, as determined by identifying latent classes of drug use, and (3) to assess associated risk behaviour and STI prevalence.

METHODS

Study design

In the Netherlands, STI clinics managed by public health services (PHS) provide STI testing services anonymously and free of charge. Demographics and sexual behaviour data are routinely collected. Data from 24 health regions (*Centra seksuele gezondheid*) covering the whole of the Netherlands are merged into a centralized, nationwide database by the National Institute of Public Health and the Environment (RIVM). A single clinic provides STI testing for one specific region, making a total of 24 centres. Individuals residing in one region are in principle not allowed to seek STI testing services in a different region.

In this cross-sectional study, data were restricted to MSM attending Dutch STI clinics for three consecutive months between September-December 2017. During this period, additional data on drug use were collected. Ethical approval for the study was not necessary following Dutch law, as the study used routinely collected, de-identified surveillance data.

Data collection and definitions

Socio-demographic characteristics and information on sexual behaviour and other STI risk factors in the preceding 6 months were routinely collected, including number of partners, being notified by a sex partner or having STI-related symptoms. MSM were defined based on self-declared sexual behaviour (having had sex with a man in the last 6 months). STI screening included nucleic acid amplification testing (NAAT) for *Chlamydia trachomatis* and *Neisseria gonorrhoea* at three anatomical locations (pharyngeal, urethral and anorectal) and serum testing for syphilis and HIV.

Data on drug use were collected either via computer-assisted self-interviewing or during consultation by a health care professional. All MSM were asked if they used drugs or were inebriated before or during sex in the past six months ('Did you use drugs or were you tipsy/drunk by alcohol before or during sex in the past six months?') and if so, which drugs they used from a predefined list. This list included the following substances: alcohol, amphetamine (speed), cannabis, cocaine, GHB/GBL, ketamine, methamphetamine (crystal meth), mephedrone, nitrites, 3,4-methylenedioxy-N-methylamphetamine (XTC/MDMA) or other drugs. Any drug use was defined as self-declared use of at least one of the drugs mentioned above, including alcohol, within the past six months.

Educational level was divided into low (primary school and lower secondary vocational education), medium (intermediate secondary general education, higher secondary general education, senior secondary vocational education and pre-university secondary education) or high (higher professional or university education). Ethnicity was defined according to Statistics Netherlands on the basis of country of birth and maternal and paternal country of birth, with “non-Dutch” defined as any individual with at least one parent not born in the Netherlands(21).

Statistical analysis

To prevent reporting bias from centres with excessive missing data, only STI clinics where more than 90% of visitors had data on drug use were included ($n=5$) while those with less than 90% with data were excluded ($n=19$). Since we intended to provide internal validity for the previously observed latent classes (in Amsterdam) (17) and external validity (in surrounding urban areas), we performed separate analysis for Amsterdam and the surrounding urban regions (defined as STI clinics not in the Amsterdam region). Participant characteristics were described and compared between those from Amsterdam versus surrounding urban regions. For individuals with more than one visit during the study period, any visit after the initial visit was excluded.

A latent class analysis was performed to distinguish classes of drug use during sex. A generalized structural equation modelling approach was employed whereby the probability of using each drug given latent class k is modelled by an intercept, α_{dk} , specific to each drug use variable d and class k . Variables were dichotomous drug use during sex in the preceding 6 months and included the following: alcohol, amphetamine, cannabis, cocaine, EDD, GHB/GBL, ketamine, methyl amphetamine, mephedrone, nitrites and XTC. Models were estimated using maximum likelihood, which was calculated by summing all conditional likelihoods of each latent class multiplied by the associated latent class probabilities. The posteriori probability of an individual i belonging to each class k , π_{ik} , was determined from this likelihood. Participants were then assigned a latent class k corresponding to the highest probability π_{ik} . In order to determine the number of classes, k , models with consecutively increasing k were estimated and compared using Bayesian Information Criteria (BIC). We selected the model with the lowest BIC while maintaining a class without drug use during sex (as this was an evident class prior to analysis). The degree to which classes could be separated from this model was examined using a variable-specific entropy contribution statistic, ranging from 0 to 1 with higher levels indicating more distinct separation of classes(22). In sensitivity analysis we repeated latent class analysis without MSM who were notified by a sex partner or had STI related symptoms.

Correlations between drugs used were determined using tetrachoric correlations and visualized in networks using Cytoscape v3.6.1 (23).

Demographic characteristics, sexual behaviour and STI prevalence were compared between the identified latent classes. All comparisons were tested using Pearson's χ^2 test for categorical variables and rank-sum tests for continuous variables. We then used logistic regression to compare STI prevalence between each cluster and the no drug cluster as a reference group. Unadjusted odds ratios (OR) and 95% confidence intervals (CIs) were calculated from a univariable model. A multivariable model was then estimated adjusting for individual level characteristics of age (continuous), ethnicity (in categories: Dutch, Dutch Antilles, Turkish/Moroccan, Asian, Middle and South American, Eastern European or Sub Saharan Africa and Western/other), and HIV-status. To account for between-region differences, another multivariable model was estimated with the same covariables as above and a random-intercept of PHS region.

Statistical analyses were performed with STATA Intercooled 13.1 (STATA Corporation, College Station, TX, USA). Significance was defined as a p -value <0.05 .

RESULTS

Description of the study population

Between September 2017 and December 2017, 11300 consultations involving MSM were recorded. Five centres recorded $>90\%$ data on drug use (mean 99.6%, range=98.9%-100%). The other 19 centres had a mean 45.9% (range=28.8%-76.5%) of consultations with available drug use data and were excluded. This resulted in 5060 of 11300 (44.8%) consultations performed at included centres. We excluded 582 repeat visits during the study period and 17 visits without data on drug use. Thus, 4461 MSM were analysed: 3201 from the Amsterdam PHS and 1260 from PHS in surrounding urban regions (Flevoland, Hollands Noorden, Den Haag and Utrecht).

Participant characteristics are summarized in Table 1. The overall median age was 35 years (IQR=27-47) and 64.6% had a high educational level. In total, 56.9% were of Dutch ethnicity and most non-Dutch were Western/other (13.9%) followed by Asian (8.7%), from Dutch Antilles (7.0%), Middle and South American (4.8%), Turkish/Moroccan (3.7%), Eastern European (3.1%) or from Sub Saharan Africa (1.9%). In Amsterdam, participants were more often known to be HIV-positive (19.0% vs 8.3%, $p<0.001$) than in the surrounding urban regions and reported less often having sex with both women and men (8.3% vs 20.0%, $p<0.001$). STI prevalence did not differ per region (22.3% in Amsterdam vs 21.4% in the surrounding urban regions, $p=0.540$). Of the 3714 individuals without a previous HIV-positive diagnosis, 32 (0.9%) were newly diagnosed with HIV.

Description of drug use

In total, 2445/4461 (54.8%) participants reported sexualized drug use in the preceding 6 months and 234 (5.3%) of whom reported using 5 types of drugs or more. For each drug, a higher proportion was used in Amsterdam than in the surrounding urban regions ($p < 0.001$ for all). Alcohol was most often reported respectively in Amsterdam vs surrounding urban regions (42.9% vs 28.6%), followed by XTC (20.2% vs 14.1%), GHB/GBL (17.7% vs 10.2%) and nitrites (19.3% vs 8.3%). Cannabis, cocaine, ketamine and amphetamine use ranged between 2.5% and 12.7%. Methamphetamine (3.1% vs 0.8%) and mephedrone (1.9% vs 0.5%) were the least frequently reported drugs.

Patterns of drug use in Amsterdam and surrounding urban regions

In Amsterdam, we distinguished four distinct classes of drug use (Figure 1a). The first class ($n=1287$, 40.2%) included MSM reporting no drug use, which was defined herein as 'no drug' users. The second class ($n=528$, 16.5%) consisted of MSM reporting use of only alcohol ('alcohol' users). In the third class ($n=932$, 29.1%), MSM reported a low but wide variety of drug use including alcohol, cannabis, cocaine, GHB/GBL, nitrites and XTC ('few, various drugs' users). MSM in the fourth class ($n=454$, 14.2%) also reported a variety of drugs and in contrast to MSM in the third class, it included high levels of amphetamine, GHB/GBL, ketamine, methamphetamine, mephedrone and XTC use ('polydrug' users). Correlation network demonstrated low correlations between alcohol, cannabis and other drugs, but relatively high correlations between ketamine, GHB/GBL and XTC (Figure 1b).

In the surrounding urban regions, three distinct patterns of drug use emerged (Figure 2a). The first class ($n=732$, 58.1%) consisted of MSM showing no sexualized drug use ('no drugs' users), while the second class ($n=348$, 27.6%) consisted of MSM using mainly alcohol and low levels of cannabis, nitrites and XTC ('alcohol and soft drugs' users). MSM in the third cluster ($n=180$, 14.3%) reported use of a broad range of drugs, including cocaine, GHB/GBL, ketamine, nitrites and XTC ('polydrug' users). Correlation network analysis again demonstrated relatively high correlations between ketamine, GHB/GBL and methylamphetamine, but also between cocaine and amphetamine (Figure 2b).

The distributions of *posteriori* probabilities according to participants' assigned class membership are shown in Supplementary Figure 1. In a sensitivity analysis, excluding MSM visiting STI clinics with symptoms or after a partner notification rendered comparable results (data not shown).

Association of drug-use classes with sexual behaviour and STI in Amsterdam and surrounding urban regions

In Amsterdam, demographic characteristics, sexual behaviour and STI prevalence are reported per class in Table 2. Compared to 'no drug' users, 'polydrug' users were more often of Dutch ethnicity (63.2% vs 49.7%, $p < 0.001$) and reported more sexual partners in the preceding 6 months (median 15, IQR=6-30 vs. 5, IQR=3-10, $p < 0.001$) and lower condom use during the last sex act (75.5% vs 59.9%, $p < 0.001$). 'Alcohol' users were younger ($p < 0.001$) and more often HIV negative ($p < 0.001$) compared to MSM in other classes.

'Polydrug' users had the highest proportion diagnosed with an STI (30.5%, 95% CI=26.2%-34.7%), which was significantly higher compared to 'no drug' users (20.6%, 95% CI=18.4%-22.8%, $p < 0.001$), 'alcohol' users (18.6%, 95% CI=15.2%-21.9%, $p < 0.001$) and 'few, various drugs' users (22.8%, 95% CI=20.1%-25.5%, $p = 0.002$). No differences in proportion with newly diagnosed HIV were found between classes ($p = 0.983$). Differences in STI prevalence remained when adjusting for age, HIV-status and ethnicity (Table 4).

In the surrounding urban regions, as shown in Table 3, MSM in the 'polydrug' class reported the highest number of sexual partners (median 8, IQR=4-15), which was significantly higher than those in the 'no drugs' (median 4, IQR=3-8, $p < 0.001$) and 'alcohol and soft drugs' class (median 5, IQR=3-10, $p < 0.001$). MSM in the 'alcohol and soft drugs' class were younger (median age 28, IQR=23-35) than those in other classes (median age 37, IQR=26-49, $p < 0.001$).

STI prevalence differed across classes and was significantly higher in the 'polydrug' class (31.8%, 95% CI=25.0%-38.7%) vs the 'no drugs' class (18.7%, 95% CI=15.9%-21.6%, $p > 0.001$) and the 'alcohol and soft drugs' class (21.8%, 95% CI=17.5%-26.2%, $p = 0.012$). The 'no drug' class did not significantly differ from the 'alcohol and soft drugs' class ($p = 0.232$). No differences in proportion with newly diagnosed HIV were found between classes ($p = 0.084$). Again, differences in STI prevalence were comparable when adjusting for age, HIV-status, ethnicity and when additionally accounting for between-centre differences (Table 4).

Table 1. Demographics, sexual behaviour, sexual transmitted infections (STI) and drug use of 4461 MSM visiting STI clinics in Amsterdam and surrounding urban areas (Sept-dec 2017).

	Amsterdam (N=3201)		Surrounding STI clinics of Amsterdam [#] (N=1260)		P value
	n	% [*]	n	% [*]	
Age (years)					
Median [IQR]	36	[28-47]	33	[25-47]	<0.001
Ethnicity					
Non-Dutch	1480	46.2%	443	35.2%	<0.001
Dutch	1721	53.8%	817	64.8%	
Educational level[‡]					
Low & Middle	897	30.9%	550	46.3%	<0.001
High	2003	69.1%	638	53.7%	
HIV status^b					
Positive	608	19.0%	105	8.3%	<0.001
Negative	2593	81.0%	1155	91.7%	
Reason for consultation					
Notified of an STI	734	22.9%	235	18.7%	0.002
STI-related symptoms	685	21.4%	204	16.2%	<0.001
Sexual partners					
Men only	2934	91.7%	1008	80.0%	<0.001
Both men and women	267	8.3%	252	20.0%	
Median number of sex partners^c					
Median [IQR]	7	[4-15]	5	[3-10]	<0.001
Condom use during last sex act					
No condom use	2022	64.0%	716	61.1%	0.077
STI diagnosed					
Chlamydia any site	315/3200	9.8%	120/1260	9.5%	0.746
Pharyngeal	48/3193	1.5%	13/1234	1.1%	0.250
Urethral	112/3195	3.5%	32/1252	2.6%	0.101
Anorectal	227/3190	7.1%	93/1209	7.7%	0.511
Of which LGV	25/188	13.3%	4/74	5.4%	0.173
Gonorrhoea any site	389/3205	12.2%	141/1260	11.1%	0.331
Pharyngeal	201/3194	6.3%	55/1235	4.5%	0.019
Urethral	103/3196	3.2%	39/1255	3.1%	0.844
Anorectal	261/3184	8.2%	103/1210	8.5%	0.735
Syphilis ^d	102/3197	3.2%	57/1258	4.5%	0.030
Any bacterial STI ^e	713/3196	22.3%	270/1258	21.4%	0.540
New HIV diagnosis	21/2571	0.8%	11/1143	1.0%	0.658

Table 1. [Continued]

	Amsterdam (N=3201)		Surrounding STI clinics of Amsterdam [#] (N=1260)		P value
	n	% [*]	n	% [*]	
Drug use during sex^c					
Alcohol	1372	42.9%	360	28.6%	<0.001
Amphetamine	159	5.0%	32	2.5%	<0.001
Cannabis	405	12.7%	107	8.5%	<0.001
Cocaine	386	12.1%	57	4.5%	<0.001
GHB/GBL	565	17.7%	128	10.2%	<0.001
Ketamine	208	6.5%	30	2.4%	<0.001
Nitrites	618	19.3%	105	8.3%	<0.001
Mephedrone	60	1.9%	6	0.5%	<0.001
Methylamphetamine	100	3.1%	10	0.8%	<0.001
XTC	647	20.2%	178	14.1%	<0.001
Other ^f	59	1.8%	18	1.4%	0.338
Number of different drugs used^g					
0	1285	40.1%	731	58.0%	<0.001
1	724	22.6%	258	20.5%	
2	488	15.3%	152	12.1%	
3	334	10.4%	65	5.2%	
4	163	5.1%	27	2.1%	
≥5	207	6.5%	27	2.1%	

[#]GGD Den Haag, Flevoland, Hollands Noorden and region Utrecht ^a373 missing, ^bdoes not include new diagnoses, ^cin the past 6 months, ^dincludes all stages, ^eincludes chlamydia, gonorrhoea and syphilis diagnoses, ^fother included erectile dysfunction drugs (n=10), LSD (n=4), unknown (n=3), 4FMP (n=2), MXE (n=1), 3MMC (n=1), mushrooms (n=1), 2cb (n=1) and laughing gas (n=1) or was otherwise not further specified, ^gincludes alcohol

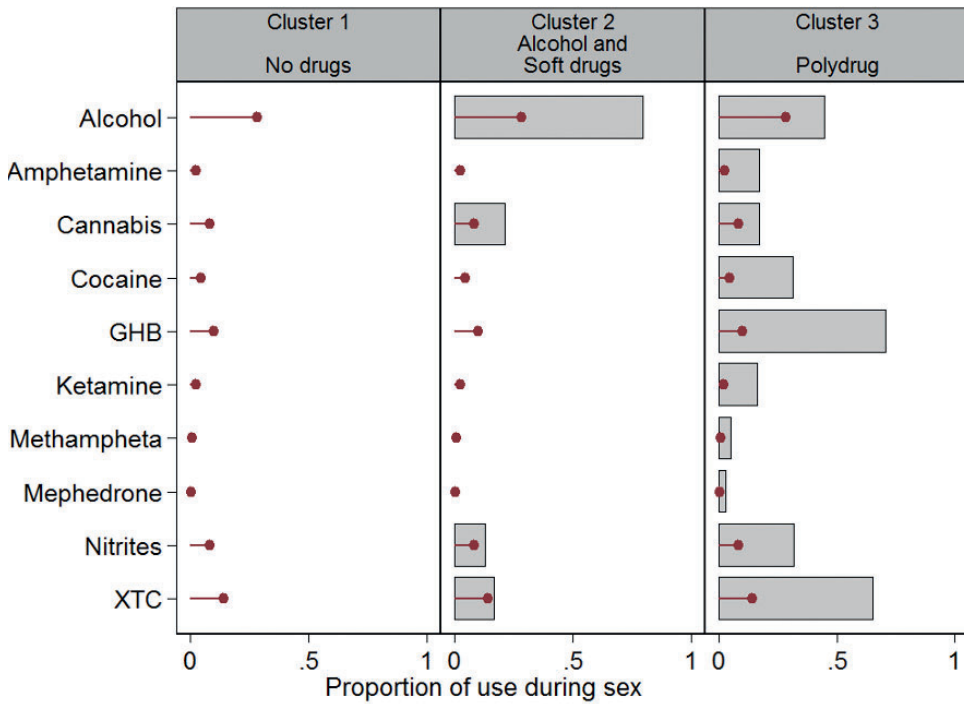


Figure 1A. Patterns of drugs use among 3201 men who have sex with men having an STI consultation at the STI clinic of Amsterdam.

•The overall percentage of specific drug use among MSM in all clusters. Bars indicate proportion of MSM within a cluster who use a specific drug.

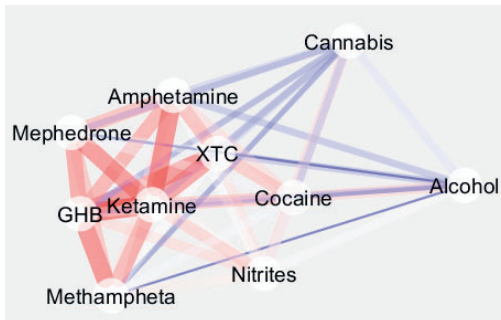


Figure 1B. Correlation networks between drugs when used during sex in Amsterdam. Positive and negative correlations of all MSM (independent of clusters) are depicted in red and blue, respectively. Stronger correlations have thicker lines and coloured shading.

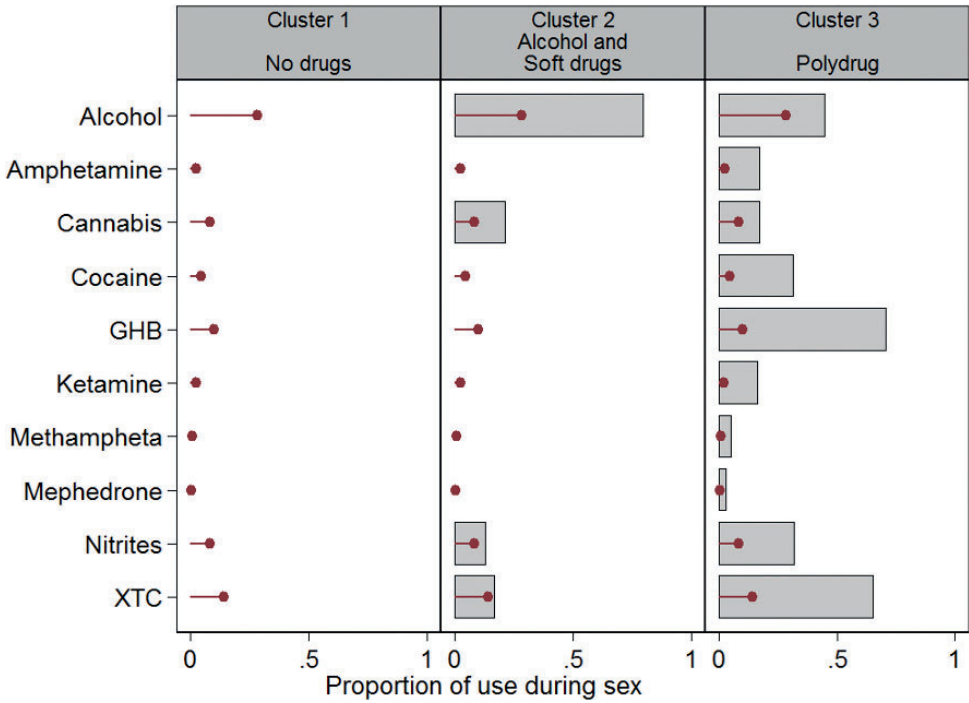


Figure 2A. Patterns of drugs use among 1260 men who have sex with men having an STI consultation at the STI clinic in the surrounding urban regions of Amsterdam.

•The overall percentage of specific drug use among MSM in all clusters. Bars indicate proportion of MSM within a cluster who use a specific drug.

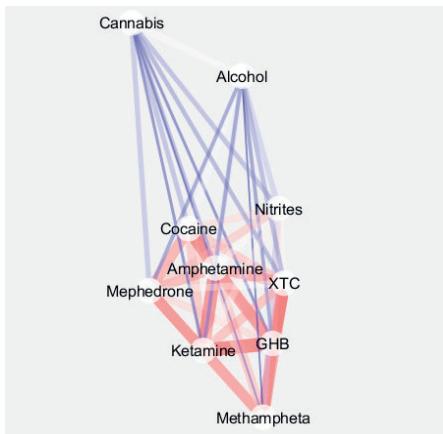


Figure 2B. Correlation networks between drugs when used during sex in surrounding urban regions of Amsterdam.

Positive and negative correlations of all MSM (independent of clusters) are depicted in red and blue, respectively. Stronger correlations have thicker lines and coloured shading.

Table 2. Characteristics of 4 classes among 3201 MSM attending the STI clinic in Amsterdam.

	Class 1 N=1287 No drugs		Class 2 N=528 Alcohol		Class 3 N=932 Few, various drugs		Class 4 N=454 Polydrug		P-value
	N	%	N	%	N	%	N	%	
SOCIO-DEMOGRAPHIC CHARACTERISTICS									
Age in years									
Median [IQR]	38	[29-49]	31	[25-41]	36	[27-46]	38	[28-48]	<0.001
Ethnicity									
Dutch	640	49.7%	316	60.2%	478	51.3%	287	63.2%	
Turkey/Morocco	56	4.4%	18	3.4%	32	3.4	11	2.4%	
Dutch Antilles	106	8.3%	27	5.1%	57	6.1	24	5.3%	
Eastern Europe	41	3.2%	20	3.8%	36	3.9	11	2.4%	
Sub Saharan Africa	27	2.1%	7	1.3%	21	2.3	5	1.1%	
Middle & South America	73	5.7%	21	4.0%	72	7.7	16	3.5%	
Asia	127	9.9%	42	8.0%	79	8.5	36	7.9%	
Western other	214	16.7%	74	14.1%	157	16.9	64	14.1%	
Educational level^a									0.035
Low & Middle	388	33.6%	126	26.6%	259	30.7%	124	29.0%	
High	768	66.4%	347	73.4%	584	69.3%	304	71.0%	
HIV status^b									<0.001
Positive	217	16.9%	57	10.8%	199	21.4%	135	29.7%	
Reason of consultation									
Partner notification	276	21.5%	105	19.9%	218	23.4%	135	29.7%	0.001
STI related symptoms	261	20.3%	107	20.3%	206	22.1%	111	24.5%	0.246
SEXUAL BEHAVIOUR CHARACTERISTICS in the past 6 months									
Sexual partners									0.018
Both male and female partners	91	7.1%	47	8.9%	98	10.5%	31	6.8%	

Condom use during last sex act		757	59.9%	307	59.0%	619	66.8%	339	75.5%	<0.001
No condom use/condom failure										
Number of sex partners		5	[3-10]	6	[3-10]	10	[5-16.5]	15	[6-30]	<0.001
Median [IQR]										
SEXUALLY TRANSMITTED INFECTIONS										
Chlamydia any site		127	9.9%	34	6.4%	97	10.4%	57	12.6%	0.012
Pharyngeal		17	1.3%	4	0.8%	18	1.9%	9	2.0%	0.247
Urethral		45	3.5%	14	2.7%	35	3.8%	18	4.0%	0.658
Anorectal		87	6.8%	27	5.1%	71	7.6%	42	9.3%	0.075
Of which LGV		11/75	14.7%	3/20	15.0%	8/56	14.3%	3/37	8.1%	0.781
Gonorrhoea any site		125	9.7%	59	11.2%	118	12.7%	87	19.2%	<0.001
Pharyngeal		61	4.8%	40	7.6%	46	5.0%	54	11.8%	<0.001
Urethral		38	3.0%	13	2.5%	33	3.5%	19	4.2%	0.397
Anorectal		79	6.2%	28	5.3%	87	9.4%	67	14.8%	<0.001
Syphilis		46	3.6%	10	1.9%	31	3.3%	15	3.3%	0.314
Primary/secondary/recent		34	2.6%	10	3.3%	6	6.4%	3	2.3%	0.328
Latens tarda/unknown stage		12	0.9%	2	0.4%	3	0.3%	1	0.2%	0.146
Any bacterial STI		265	20.6%	98	18.6%	212	22.8%	138	30.5%	<0.001
New HIV diagnosis		9/1056	0.9%	4/467	0.9%	6	0.8%	2	0.6%	0.983

^a304 missing, ^bdoes not include new diagnoses. Abbreviations: MSM, Men who have sex with men; IQR, Interquartile range; STI, sexually transmitted infection; LGV, lymphogranuloma venereum,

Table 3. Characteristics of 3 clusters among 1260 MSM attending STI clinics in the surrounding urban regions of Amsterdam.

	Cluster 1 N=732		Cluster 2 N=348		Cluster 3 N=180		P-value
	N	%	N	%	N	%	
SOCIO-DEMOGRAPHIC CHARACTERISTICS							
Age in years							
Median [IQR]	36	[26-49]	28	[23-39]	36	[26-48]	<0.001
Ethnicity							
Dutch	459	62.9%	220	63.2%	138	76.7%	0.096
Turkey/Morocco	23	3.2%	18	5.2%	5	2.8%	
Dutch Antilles	67	9.2%	26	7.5%	6	3.3%	
Eastern Europe	18	2.5%	10	2.9%	3	1.7%	
Sub Saharan Africa	17	2.3%	4	1.2%	1	0.6%	
Middle & South America	20	2.7%	10	2.9%	4	2.2%	
Asia	60	8.2%	26	7.5%	13	7.2%	
Western other	66	9.0%	34	9.8%	10	5.6%	
Educational level^a							
Low & Middle	302	44.1%	156	47.3%	92	53.2%	0.092
High	383	55.9%	174	52.7%	81	46.8%	
HIV status^b							
Positive	46	6.3%	24	6.9%	35	19.4%	<0.001
Reason of consultation							
Partner notification	138	18.9%	57	16.4%	40	22.2%	0.257
STI related symptoms	108	14.8%	70	20.1%	26	14.4%	0.065
SEXUAL BEHAVIOUR CHARACTERISTICS in the past 6 months							
Sexual partners							
Both male and female partners	120	16.4%	89	25.6%	43	23.9%	0.001
Condom use during last sex act							
No condom use/condom failure	411	60.4%	180	55.7%	125	74.0%	<0.001
Number of sex partners							
Median [IQR]	4	[3-8]	5	[3-10]	8	[4-15]	<0.001

SEXUALLY TRANSMITTED INFECTIONS									
Chlamydia any site									
Pharyngeal	59	8.1%	36	10.3%	25	13.9%	0.048		
Urethral	6	0.8%	4	1.2%	3	1.7%	0.587		
Anorectal	20	2.7%	7	2.0%	5	2.8%	0.772		
Of which LGV	42	6.0%	30	9.0%	21	11.9%	0.018		
	0/32	0%	4/21	16.0%	0/17	14.3%	0.013		
Gonorrhoea any site									
Pharyngeal	66	9.0%	42	12.1%	32	17.8%	0.003		
Urethral	26	3.6%	16	4.7%	13	7.3%	0.097		
Anorectal	19	2.6%	10	2.9%	10	5.6%	0.111		
	48	6.9%	32	9.6%	23	13.0%	0.023		
Syphilis									
Primary/secondary/recent	35	4.8%	12	3.9%	7	7.5%	0.308		
Latens tarda/unknown stage	22	3.0%	14	4.0%	5	2.8%	0.629		
Any bacterial STI	13	1.8%	2	0.6%	1	0.6%	0.168		
New HIV diagnosis	137	18.7%	76	21.8%	57	31.8%	0.001		
	3/676	0.4%	5/322	1.6%	3	2.1%	0.084		

^a74 missing, ^bdoes not include new diagnoses. Abbreviations: MSM, Men who have sex with men; IQR, Interquartile range; STI, sexually transmitted infection; LGV, lymphogranuloma venereum,

Table 4. STI prevalence per cluster among 3201 MSM attending the STI clinic in Amsterdam and 1260 MSM in the surrounding urban regions

	STI prevalence		Unadjusted		Model 1*		Model 2**	
	n/N	%	OR	95% CI	aOR	95% CI	aOR	95% CI
Amsterdam								
Cluster 1 'no drugs'	265/1287	20.6%	Ref	Ref	Ref	Ref	--	--
Cluster 2 'alcohol'	98/528	18.6%	0.9	0.7-1.1	0.8	0.6-1.1	--	--
Cluster 3 'few, various drugs'	212/932	22.8%	1.1	0.9-1.4	1.0	0.8-1.3	--	--
Cluster 4 'polydrugs'	138/454	30.5%	1.7	1.3-2.1	1.5	1.1-1.9	--	--
Surrounding urban regions								
Cluster 1 'no drugs'	137/732	18.7%	Ref	Ref	Ref	Ref	Ref	Ref
Cluster 2 'alcohol and soft drugs'	76/348	21.8%	1.2	0.9-1.7	1.2	0.8-1.6	1.1	0.8-1.6
Cluster 3 'polydrugs'	57/180	31.8%	2.0	1.4-2.9	1.9	1.3-2.7	1.8	1.2-2.6

*adjusted for age, ethnicity (non-dichotomous) and HIV status. **adjusted for age, ethnicity (non-dichotomous), and HIV status including a random intercept for PHS region.

DISCUSSION

Using a large database of STI clinic visitors across the Netherlands, we identified four distinct patterns of drug use in Amsterdam and three patterns in surrounding urban regions. In both regions, MSM belonging to classes involved in high levels of drug use ('Polydrug' classes) reported increased sexual risk behaviour and had a 2-fold higher risk of being diagnosed with an STI compared to MSM belonging to other classes. MSM in classes established on the use of low number of drugs or mainly alcohol ('no drugs', 'alcohol', 'alcohol and soft drugs', and 'few, various drugs' classes) had a comparable proportion with detected STI.

Importantly, we demonstrate that drug use during sexual activity is common among MSM, with 54.8% reporting having used drugs during sex in the preceding 6 months. Examining previous data of MSM at the STI clinic in Amsterdam from 2008-2009, use of GHB/GBL, XTC, and cocaine were similar to our study, but use of nitrites and cannabis were substantially lower compared to the current analysis (38.3% to 19.3% for nitrites and 21.1% to 12.7% for cannabis)(5). This is in contrast to Sewell et al. who found an increased use of GHB/GBL from 13.1% to 19.8% between 2013 until 2016 in the UK(11). Compared to MSM outside of Europe, research in Australia conducted in 2014-2017 has revealed higher levels of methamphetamine use (15.0% vs 2.5% in our study) but lower levels of GHB use (8.3% vs 15.5% in our study)(24). The discrepancy between studies could be explained by geographical location(9) or different recruitment settings(11).

We noticed marked differences in sexualized drug use between Amsterdam and the surrounding urban regions and for all drugs, use was much more common in Amsterdam than in the surrounding urban regions. Despite these differences, certain classes were similar between the geographic groups, namely 'no drug' use and 'polydrug' use, the latter of which was defined by higher use of nitrites, GHB, XTC and relatively higher use of ketamine, methamphetamine and mephedrone. Certain classes were nevertheless more nuanced within regions. In Amsterdam, we identified an alcohol only group and a more diverse subgroup using varied drug combinations, while in the surrounding urban regions, the alcohol and soft drugs subgroup seemed to be limited to nitrites, cannabis and XTC. The reasons for such regional differences are difficult to explain. Perhaps individual patterns of use can be shaped by the role of peers and partners in addition to positive norms for drinking and drug-taking. These patterns could be further enhanced by structural or environmental proximity enabling excessive alcohol and illicit drug use(15, 25). These external factors could play out differently within regions.

Previous research using latent class analysis in Malaysia and the US (specifically Chicago) has consistently identified groups of MSM engaging in polydrug use. (6, 7, 26). Some of these studies have also linked polydrug use to sexual behaviour(7) or self-reported STI prevalence(6). In a recent LCA at the STI clinic of Amsterdam, three distinct classes of higher drug use, including one group of 'polydrug' use, significantly coincided with higher levels of sexual risk behaviour and sexually transmitted infections. In contrast, only individuals belonging to the 'polydrug' class in our study had a higher risk of prevalent STI. The previous finding in Amsterdam, relying on data from a cohort setting, likely included a greater number of 'no drug' using individuals with low risk sexual activity. Since the present study included more individuals actively screening for STIs, most of whom having a reason for seeking care, their STI risk was likely higher even when not using drugs.

'Chemsex', one of the more common forms of polydrug use, is generally considered the hallmark of increased STI risk(27). It should be noted that 18.5% of MSM belonging to the 'few, various drugs' users also reported GHB/GBL use, while STI prevalence was not significantly higher than the 'no drugs' class. Our data would contend that not all GHB/GBL users bear the same STI risk, particularly in metropolitan settings.

Recent work has shown that alcohol use, especially binge drinking, was associated with increased risk of condomless anal sex (3, 28). We found no differences in condomless anal sex or STI prevalence between the 'alcohol' and 'no user' classes. Alcohol use was based on whether a participant was drunk/tipsy on alcohol, which could encompass wider extremes of behaviour or, given its subjective interpretation, could induce misclassification. Considering that participants in the 'alcohol' classes were younger, their sexual at risk behaviour could be different compared to other groups. Yet since more detailed information on sexual behaviour, such as number of oral and anal sex partners or number of sex acts, were not measured, this would be difficult to demonstrate.

Several limitations of our study need to be mentioned. First, we recognize that this study is not representative of all MSM in the Netherlands, due to both missing data of the remaining STI centres and MSM not attending STI clinics. MSM in the overall population might show lower sexual risk and drug-use behaviour. Second, due to legal restrictions on data use from the RIVM, we could not further stratify urban surroundings on their individual regions. Third, our previous analysis in high-risk MSM from Amsterdam demonstrated a class with relatively high levels of erectile dysfunction drug (EDD) use combined with nitrites and alcohol (17). Since information on EDD use was not collected in the presented database, we were unable to further elaborate the role of these drugs in our study population. Fourth, data on frequency of use, drug dependency, injecting drug use and drug-related harm were lacking. Nevertheless, previous research among MSM visiting the STI clinic in Amsterdam

has suggested low levels of dependency for GHB/GBL, mephedrone, and methylamphetamine and only 1.1% reported injecting drug use(1). Lastly, we did not ask for intent of drug use. Some studies specifically define chemsex as intentionally using drugs to facilitate or enhance sexual encounters, not drug use for partying that leads to sex (8, 16). Its association with behavioural or prevalent STI could be rather different. Despite these limitations, our study is one of the first with detailed epidemiologic and behavioural data within the context of a national network of STI clinics, enabling us to compare different geographical regions. This framework also allowed us to include laboratory confirmed STI, whereas many other studies rely on self-reported STI or only on sexual behaviour(4, 6, 7, 9). Since drug policies are liberal in the Netherlands compared to other countries, drug use might be more openly discussed, making underreporting less likely in our study population(31).

Public health interventions, such as pre-exposure prophylaxis against HIV in MSM, are soon to roll out in the Netherlands and based on Dutch recommendations, would coincide with STI screening four times a year(29). As increasing demand for STI-associated care in the Netherlands could be likely, increasing healthcare costs warrant more efficient methods for screening(30). Targeting interventions, particularly among individuals with specific profiles of drug use, could be helpful; however, given that STI prevalence was at 18.7%-20.6%% in the no drug use classes, other factors would likely be needed to identify MSM at high-risk of having an STI. In addition, the polydrug classes underscore the need for STI clinics to collaborate with specialized drug dependency services in order to offer a more appropriate response for the complex needs of some clients.

In conclusion, several patterns of sexualized drug use among MSM were identified, with noticeable differences between Amsterdam versus surrounding urban areas. Classes involving polydrug use were associated with higher STI prevalence in both regions, while STI risk did not significantly differ between the other classes. Substance misuse services provided at STI clinics might be beneficial for MSM with polydrug use in order to reduce harm and prevent ongoing STI transmission.

Highlights

- Drug use was higher among MSM in Amsterdam than surrounding urban regions
- We found 4 classes in Amsterdam: no drug, alcohol, few & various drugs and polydrug
- We found 3 classes in surrounding regions: no drug, alcohol & soft drugs and polydrug
- STI risk occurred mainly in the polydrug class

Acknowledgements

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Competing interest

The Public Health Service of Amsterdam received study drug from Gilead for the Amsterdam Pre-exposure prophylaxis (AMPrEP) demonstration project.

Contributors

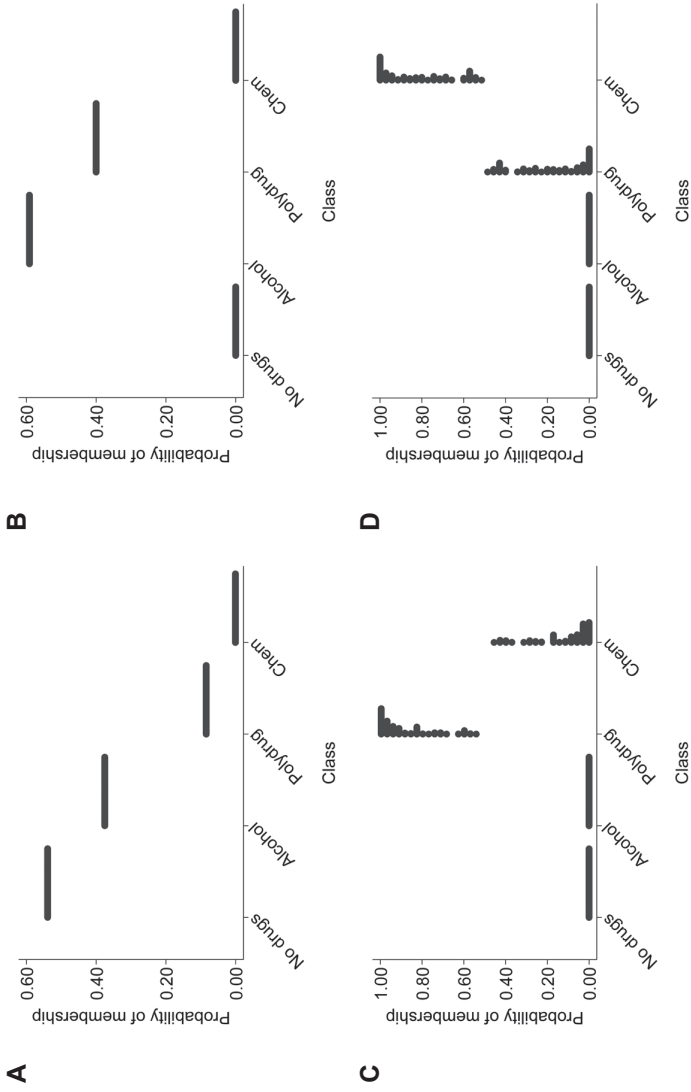
RA and SD designed the study. FvA coordinated national data collection. RA and AB performed the data analysis and drafted the manuscript, supported by MvR. All authors commented on drafts of the manuscript and approved the final version.

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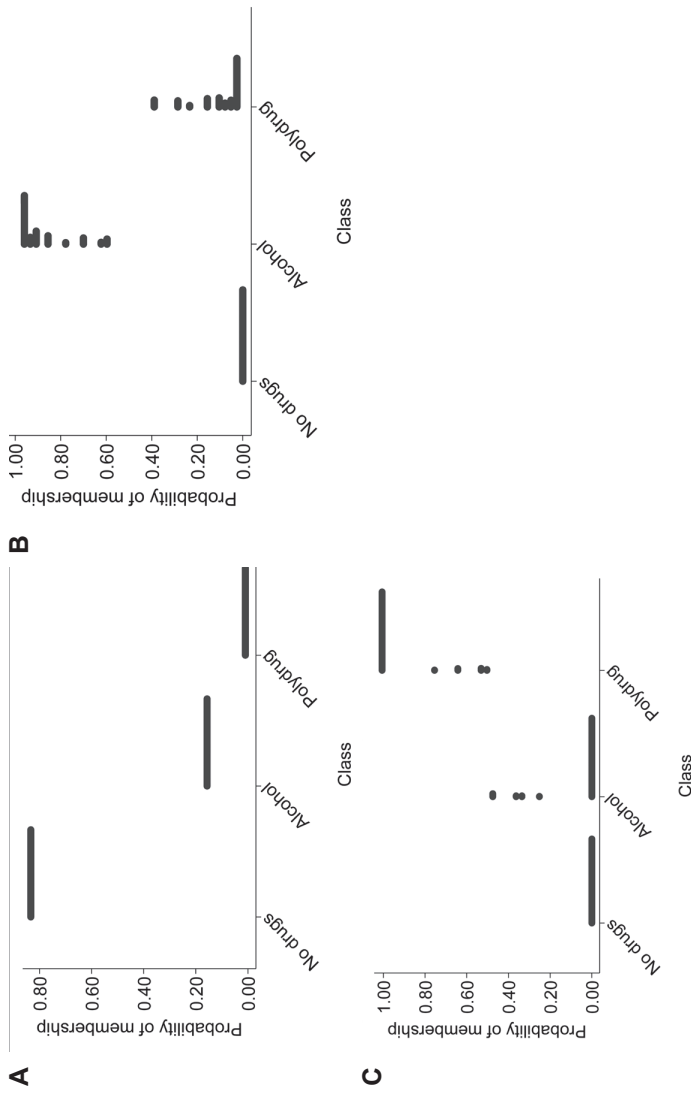
Supplementary material



Supplementary material. The per class a posteriori probabilities of belonging to each class for Amsterdam.

From the latent class analysis, an *a posteriori* probability of an individual i belonging to each class k is estimated. Participants were then assigned a latent class k corresponding to the highest probability. The figures below show the distribution of probabilities for belonging to a class k given their assigned class membership. Each point represents an individual. These figures were produced for MSM in Amsterdam assigned to the 'no drug' ($n=1287$, **A**), 'alcohol' ($n=528$, **B**), 'few, various drugs' ($n=932$, **C**), 'polydrug' ($n=454$, **D**) classes.

Appendix



Appendix. The per class a posteriori probabilities of belonging to each class surrounding urban regions of Amsterdam.

These figures were produced for MSM in surrounding urban regions of Amsterdam assigned to the 'no drug' ($n=732$, **A**), 'alcohol and soft drugs' ($n=348$, **B**), 'polydrug' ($n=180$, **C**) classes.

Chapter 5

Substance use and sexual risk behavior among
male and transgender women sex workers at
the prostitution outreach center P&G292 in
Amsterdam, the Netherlands



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ABSTRACT

Objectives

Male and transgender women sex workers are vulnerable for STIs and HIV, and substance use might be a relevant contributing factor. We assessed sociodemographic characteristics and substance use among sex workers; divided into three groups: Transgender women sex workers (TSW), male sex workers who have sex with men only or also with females (MSW-M), male sex workers who have sex with females only (MSW-F).

Methods

A survey on substance use and sexual (risk)behavior was offered during routine STI screening at the Prostitution & Health Centre (P&G292) in Amsterdam. Bacterial STI positivity (chlamydia (including LGV), gonorrhoea, and/or infectious syphilis), and substance use were compared (χ^2 -test, Fisher's exact test).

Results

From 2014 until 2015, 99/164 eligible visitors (60.4%) participated; n=69 MSW-M (69.7%), n=15 TSW (15.2%) and n=15 MSW-F (15.2%). TSW reported the highest number of sex partners in <6 months (median: MSW-M 60 vs. TSW 300 vs. MSW-F 12; $p<0.001$). The three groups did not differ in having condomless anal or oral sex. Bacterial STI positivity was 29.0% in MSW-M, 26.7% in TSW, and 13.3% in MSW-F ($p=0.56$). Three new HIV infections were diagnosed, all in MSW-M, whereas 20.3% of MSW-M and 20.0% of TSW were known HIV-positive, compared to none of MSW-F ($p=0.14$). Illicit substance use during working time in <6 months was 40.5% among MSW-M, 40.0% among TSW and 20.0% among MSW-F ($p=0.02$). The most reported reason for substance use was: "sex work becomes physically easier".

Conclusions

Bacterial STI positivity and illicit substances use during work were high in all 3 sex worker groups, emphasizing the importance of combined and targeted interventions. In-depth qualitative research is needed to better understand intentions and reasons for substance use.

INTRODUCTION

Male and transgender women sex workers are worldwide considered as a high-risk population for sexually transmitted infections (STIs) and HIV (1-6). They are known to engage in high risk sexual behavior such as having multiple sex partners with unknown HIV status and condomless anal sex (1, 2, 4). In different countries, substance use among male and transgender women sex workers was associated with high-risk sexual behavior (1, 4, 7-10). Consistently among different studies, substance use among male and transgender sex workers was considered a relevant contributing factor for sexual risk behavior (1, 6, 10). Dias and colleagues showed that a reported HIV infection was higher among transgender who ever used psychoactive substances (11). Most of the studies however, looked at injecting substance use among male and transgender sex workers (1, 4, 7-9). Thus, data regarding a broader use of psychoactive substances among sex workers during sex with their clients and with their non-paying partners is limited. Besides, previous studies emphasized the importance to distinguish transgender women sex workers from male sex workers, due to their differences in biological and structural risk factors (1, 4). We therefore looked in detail at sex work-related substance use and distinguished between transgender women sex workers (TSW) and male sex workers (12). Since male-male sexual contact is associated with increased STI risk compared to heterosexual contact, we looked separately within the group of male sex workers between those having sex with men and those exclusively having sex with females (13). Here, we aimed to assess the sociodemographic, sexual health, and work-related substance use characteristics among distinctive groups of male and transgender sex workers.

MATERIALS AND METHODS

Visitors of the Prostitution & Health Centre (P&G292)

The Prostitution & Health Centre (P&G292) in Amsterdam opened its doors in 2008 with the aim to provide sexual health care for sex workers at a clinic located near the Red-Light District. P&G292 is a collaboration of the Public Health Service of Amsterdam (offering sexual and other health care) and HVO-Querido (offering social work). P&G292 is a specialized care facility for male, female and transgender sex workers, offering information, advice and support from social workers (e.g. social services such as financial help, issues around health insurance, rights as sex workers) as well as STI testing and sexual health counseling. Next to sex workers who request a consultation at P&G292, it is a standard practice to approach sex workers online, in sex clubs, and in the red light district (window prostitution) via outreach activities.

Routinely collected data of all visitors of P&G292

We retrieved data from the electronic patient files (EPD) of all sex workers (male, female and transgender) who visited P&G292 between January 2014 and December 2015. Routinely collected data were age, ethnicity (Western vs. non-western, ethnicity was defined according to Statistics Netherlands on the basis of country of birth, maternal and paternal country of birth) (14), reason of visit (symptoms or being notified of an STI by a sex partner), HIV status, sex of sex partner(s), condomless anal sex (CAS) and condomless vaginal sex in the previous 6 months and the number of sex partners in the previous 6 months. Also, clinical outcomes of bacterial STIs (chlamydia (including LGV), gonorrhea, infectious syphilis), syphilis serology and new HIV diagnoses were retrieved from the EPD and analyzed among all groups of sex workers.

Participants of the study

Only male and transgender women sex workers who had an STI consultation at P&G292 in the study period were asked to participate in the study and participate in a questionnaire-based interview (FSW were not included).

The study population was divided into three subpopulations; 1) men having sex with men only or also with females (MSW-M), 2) transgender women sex workers (those assigned male at birth who identify themselves as women) (TSW) and 3) men having sex with females only (MSW-F). We included transgender women who were assigned male at birth and had not undergone genital reconstructive surgery.

Questionnaire data on substance use and work-related-sexual behavior

All MSW and TSW who participated in the questionnaire-based interview were asked by a healthcare worker from P&G292 about their sexual (working) career, work-related sexual (risk) behavior, substance use and reasons for substance use during working time. The reasons for substance use were registered by nine different response options and also with a write in option. The use of the following substances in the previous six months was scored; 1) illicit substances: cocaine (snuff coke), XTC (Ecstasy)/MDMA, ketamine, mephedrone, GHB/GBL, amphetamines, methylamphetamine, and 2) tolerated substances: erectile stimulation drugs, nitrites, marijuana (not an illicit substance in the Netherlands) and/or alcohol. Moreover, they were asked in which context these substances were used: during sex work; during sex, but not work-related; and/or not sex related. Work-related sexual (risk) behavior was scored as engaging in condomless oral sex (COS) (insertive and/or receptive), and CAS (insertive and/or receptive) in the previous 6 months with clients. Work-related condomless vaginal sex was not asked. All EPD data were merged with the questionnaire data and were anonymized afterwards.

The study protocol was evaluated by the Medical Ethics Committee of the Academic Medical Centre in Amsterdam (letter reference no. W13_308) and deemed not to require a full review of the board since the emotional impact of the additional questionnaire was considered negligible.

STI testing procedure

Sex workers were tested for *Chlamydia trachomatis* (Ct) (including lymphogranuloma venereum (LGV) in case of anorectal Ct in MSW and TSW), *Neisseria gonorrhoeae* (Ng), and syphilis. All sex workers who had not previously tested HIV-positive were tested for HIV unless they actively opted out.

Urine, pharyngeal, rectal, and vaginal specimens were tested for both Ct and Ng with the Aptima Combo 2 assay (Hologic, Marlborough, MA, USA). In asymptomatic visitors both urine, rectal, and vaginal specimens were self-collected, while in symptomatic visitors medical staff collected rectal specimens. Medical staff collected pharyngeal specimens in all sex workers. HIV antibodies were tested with the HIV Ab/Ag test (LIAISON® XL, Diasorin, Saluggia, Italy), and a treponemal test for syphilis serology was performed with the Treponema Screen (LIAISON® XL, Diasorin, Saluggia, Italy). All bacterial STI diagnoses were based on laboratory outcomes of the STI consultation in which the substance questionnaire was taken.

Statistical analysis

During the study period, the first consultation of a visitor of P&G292 was used for the analyses. All routinely collected data from the EPD of all sex workers who visited P&G292 during the study period were compared with the χ^2 -test for independence, the Fisher's exact test, and the Mann-Whitney U test. With the above mentioned statistical tests we compared the STI positivity, sociodemographic characteristics, sexual behavior, and substance using behavior retrieved by the additional questionnaire between the three sub-study populations (MSW-M, TSW, MSW-F).

Age was divided into four categories (15). HIV status was divided into HIV-negative including visitors who refused an HIV test, and HIV-positive. Data analyses were performed with SPSS package v21.0 (SPSS, Chicago, Illinois, USA). In the present study a $p < 0.05$ was considered statistically significant.

RESULTS

Visitors of P&G292

Between 1 January 2014 and 19 November 2015, 1557 unique male, female and transwomen sex workers had an STI consultation at P&G292 (Figure 1) with a total of 3631 consultations. Of those 1557 sex workers, 6.4 % were MSW-M, 2.6 % were TSW, 1.6 % were MSW-F and 89.5 % were female sex workers (FSW) (Table

1). TSW were significantly older compared to the three other groups (median age: MSW-M 28 vs. TSW 43 vs. MSW-F 29 vs. FSW 28; $p < 0.001$). The groups also differed significantly regarding their ethnicity (non-western: MSW-M 62.2% vs. TSW 87.5% vs. MSW-F 60.0% vs. FSW 78.3%; $p < 0.001$). Only among MSW-M (5/28; 6.1%) and FSW (4/1356; 0.3%) new HIV diagnoses were found. Bacterial STI positivity was among MSW-M 31.3% vs. TSW 25.0% vs. MSW-F 12.0% vs. FSW 10.0% ($p < 0.001$).

Study participation

Of all male and transgender women sex workers who were asked to fill in the questionnaire, 60.4% ($n=99/164$) participated in the present study of whom 69.7% were MSW-M, 15.2% were TSW and 15.2% were MSW-F (Supplement 1). Participants were significantly younger (median 29 vs. 34 years; $p=0.036$), more often Western (38.4% vs. 21.5%; $p=0.026$), and less often transgender women (15.2% vs. 38.5%; $p < 0.001$) compared to non-participants. Participants did not differ from non-participants regarding STI positivity, HIV status, number of sex partners, and CAS in the previous 6 months.

Demographics and sexual (risk) behavior of study participants

TSW in our study were significantly older (median age: MSW-M 28 vs. TSW 39 vs. MSW-F 29; $p < 0.001$) (Table 2). More than half of the participants in all three groups were of non-western ethnicity (MSW-M 59.4% vs. TSW 73.3% vs. MSW-F 60%; $p=0.658$). TSW reported the highest number of sex partners in the previous 6 months (median: MSW-M 60 vs. TSW 300 vs. MSW-F 12; $p < 0.001$) compared to MSW-M and MSW-F (Table 2). No significant differences in the proportion who engaged in CAS or COS were found. Of all TSW 80.0% reported solely sexual contact with men (during work and private), whereas only 50.7% of the MSW-M reported solely sex with men. Most MSW-M got in contact with their clients online (81.2% vs. TSW 33.3% vs. MSW-F 40.0%; $p < 0.001$), whereas 66.7% of TSW worked in window prostitution (MSW-M 2.9% vs. MSW-F 0%; $p < 0.001$). Most sex workers reported working at least once a week (MSW-M 83.8% vs. TSW 100% vs. MSW-F 80.0%; $p=0.85$).

STI and HIV diagnosis of study participants

Bacterial STI positivity was 29.0% in MSW-M, 26.7% in TSW and 13.3% in MSW-F ($p=0.56$) (Table 2). Syphilis serology was positive in 21.7% of the MSW-M, 53.3% of the TSW, and 0% of the MSW-F ($p=0.002$). None of the MSW-F were known HIV positive, whereas 20.3% of MSW-M and 20.0% of TSW were known HIV positive ($p=0.14$). Only in the group of MSW-M, new HIV infections were diagnosed ($n=3$; 5.2%).

Substance use characteristics

Overall, 65.2% of the MSW, 60.0% of all TSW and 35.6% of MSW-F used illicit substances in the previous six months, either during work or free time (Table 3). During work 40.5% of the MSW-M and 40.0% of all TSW used illicit substances,

whereas 20.0% of MSW-F ($p=0.02$). Cocaine was used in 45.6% of all sex workers. Notably, 21.7% of all MSW-M and 26.7% of all TSW used cocaine during work only. Other substances that were often used during work only were nitrites (MSW-M 24.6% vs. TSW 40.0% vs. MSW-F 6.7%; $p=0.07$) and erectile performance drugs (MSW-M 50.7% vs. TSW 26.7% vs. MSW-F 53.3%; $p=0.22$). XTC was mostly used during free time only and hardly during working time. Chemsex (with associated substances GHB/GBL, mephedrone and/or methylamphetamine) was almost only practiced by MSW-M (27.5% vs. TSW 6.7% vs. MSW-F 6.7%; $p=0.88$) and 5.8% of all MSW-M reported chemsex during working time only.

Reasons for substance use during work

Sex workers reported several reasons for substance use during work. The most reported reason, regardless of the subpopulation, was that “sex work becomes physically easier” (MSW-M 48.4% vs. TSW 55.6% vs. MSW-F 28.6%; $p=0.36$) (Table 3). The reason “the client asked for it” was the second most by MSW-M, and the first most frequently named reason by TSW (MSW-M 37.1% vs. TSW 55.6% vs. MSW-F 7.1%; $p=0.27$). Other frequently reported reasons were “work becomes mentally easier” and “I dare to do things I would otherwise not dare”. Dependency as reason for using substances during work was mentioned in 4.8% of MSW-M, in 11.1% of TSW and in 7.1% of MSW-F ($p=0.41$). Two TSW and 7 MSW-M filled in the write in option for this item. Their answers were: “I make more money”, “works against stress”, “for my erection”, “for social feeling”, “to calm down” and “for fun”.

Substance use and STI positivity

The bacterial STI positivity among sex workers using illicit substances during working time was 17.9% (5/28) among MSW-M, 50.0% (3/6) among TSW, and 0% (0/3) among MSW-F ($p=0.21$) (Table 4). Among MSW-M and MSW-F, illicit substance use during working and/or free time was not associated with an STI diagnosis. Among TSW, a significant association ($p=0.04$) of illicit substance use and STI positivity was found.

DISCUSSION

We found discerningly high-risk sexual behavior and substance use among MSW and TSW in Amsterdam, the Netherlands. All three study groups (MSW-M, MSW-F and TSW) differed concerning demographics, sexual risk behavior and substance use. Nonetheless, almost half of all sex workers reported condomless anal sex with clients and/or private sex partners and most of all sex workers reported illicit substance use. By differentiating MSW based on the sex of their clients, we were able to distinguish differences in risk behavior between MSW-M and MSW-F. Our study showed a high bacterial STI positivity particularly among MSW-M (29.0%), and TSW (26.7%) visiting the Prostitution and Health Centre P&G292 in Amsterdam.

The 3 groups also differed significantly in substance use during work: MSW-M (40.5%) and TSW (40.0%) most frequently reported work-related substance use as opposed to MSW-F (20.0%). Also, working time only related use of cocaine was reported frequent among MSW-M (21.7%) and TSW (26.7%).

As motivation for work-related substance use, all sex workers reported most often that “sex work becomes physically easier”. Interpreting this as risky behavior and a short term solution to endure their work, can be explained by Sosa-Rubi and colleagues who found that those male sex workers more inclined toward the present perspective than the future perspective tended to engage in more risky sexual behavior (16). The second most often reported reason for substance use during work by MSW-M and most often reported reason by TSW was that “the client asked for it”. This was also described by Galárrae et al. who found that male sex workers get paid higher prices by their clients for risky sexual behavior (17).

Surprisingly few sex workers (5.9%) reported dependency as reason for substance use during work, whereas around 45% reported cocaine use (private and/or work-related) which is known to be a highly addictive substance and associated with sexual risk behavior (18). Participants’ possible underestimation of drug dependency is worrying if it hinders their motivation to enter substance use programs.

We found that 50% of TSW and 17.9% of MSW-M who used substances during work had a bacterial STI diagnosis. In contrast, none of the MSW-F using substances during work were infected with a bacterial STI confirming earlier reports on the increased risk for STI transmission in male-male sexual contact (13). Only among TSW we found a significant association ($p=0.04$) of illicit substance use and STI positivity.

As already stated by Poteat et al, we confirmed the importance to distinguish TSW as a separate group from other male sex workers regarding their sexual (risk) behavior (4). TSW reported 5 times more sexual partners in the previous six months than MSW-M and even 25 times more sex partners than MSW-F. One possible explanation is that these TSW more often engaged in window prostitution, which allows for more clients compared to the other groups who have to rely on other ways to seek clients such as dating sites.

The proportion of TSW who were known HIV-positive (20.0%) was comparably high to MSW-M (20.3%). This is also in accordance with previous studies in the Netherlands and a systematic review by Baral et al. (2013) who found a pooled HIV prevalence of 19.1% among all transgender women worldwide (2, 6). Comparable figures were found among sex workers who declined participation (Supplement 1). The 3 new HIV infections were all diagnosed among MSW-M. In contrast with the comparable

HIV prevalence, syphilis serology was more often positive among TSW (53.3%) than among MSW-M (21.7%). High syphilis serology rates among transgender persons were also described by Zoni et al. in a systematic review among at-risk populations in Latin America and the Caribbean (compared to MSM, MSW and FSW) (19).

Strengths of this study are the routinely collected and laboratory confirmed STI data, and detailed sociodemographic, (sexual) behavioral data as well as detailed information on drug use during sex work. Previous studies had to rely on self-reported STI diagnoses (11). Moreover, by sub-analyzing all sex workers in separate groups (TSW, MSW-M, and MSW-F), the surprising differences in risk behavior and substance use between these populations underlines the importance of acknowledging nuances such as the sex and gender of sex workers as well as their clients (1, 4). Our results can help to formulate tailor-made care for sub-populations of sex workers. Another strength of the present study is that we described a group that engaged in sex work frequently (i.e. more than 85% reported to work at least once a week). This in contrast to earlier studies including men who just every now and then have sex in exchange for goods or food and do not recognize their practice as a regular income-generating activity (1).

Our study also has some limitations. Due to the small sample size of our study, the findings should be interpreted with caution. However, studies involving MSW and TSW are often hampered by small numbers, emphasizing the difficulty to recruit members of these key populations. Earlier studies from Baral et al. likewise report on small samples of MSW and TSW (1). Moreover, our findings apply to the Dutch situation where sex work is legal. In settings where sex work is criminalized, other outcomes can be expected. Lastly, we lack data on poly substance use, frequency, and amount of substance(s) used, and we cannot specify the reason for substance use for each substance separately.

Future research on sexual risk behavior in relation to substance use among MSW and TSW should invest in recruiting larger samples of TSW and MSW. Moreover, in-depth qualitative research is needed to better understand the intentions and reasons for substance use during work and the effect of substance use on risk behavior and daily life.

To our knowledge we present the first study describing the sociodemographic characteristics, sex work-related substance use characteristics and STI diagnosis of male and transwomen sex workers in the Netherlands. Moreover, our study distinguishes between different groups of sex workers as suggested by earlier research (1, 4). The present results demonstrate that MSW-M and TSW sex workers are at high risk for STIs and HIV, considering the high proportion that are known HIV positive, and the newly diagnosed HIV infections among MSW-M. Therefore,

biomedical interventions such as pre-exposure prophylaxis should be offered actively to MSW-M and TSW (20). Only a minority acknowledges drug dependency which is possibly an underestimation because a large number of sex workers use highly addictive substances, health services working with MSW-M and/or TSW should consider to implement substance counseling services and offer referral to substance use clinics once motivated.

Contributors

S Drückler, M van Rooijen, and H de Vries designed the study protocol. S Drückler performed the statistical analysis. Results were thoroughly discussed by S Drückler, M van Rooijen and H de Vries. S Drückler drafted the paper, all authors commented on draft versions, and all approved the final version.

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FIGURES AND TABLES

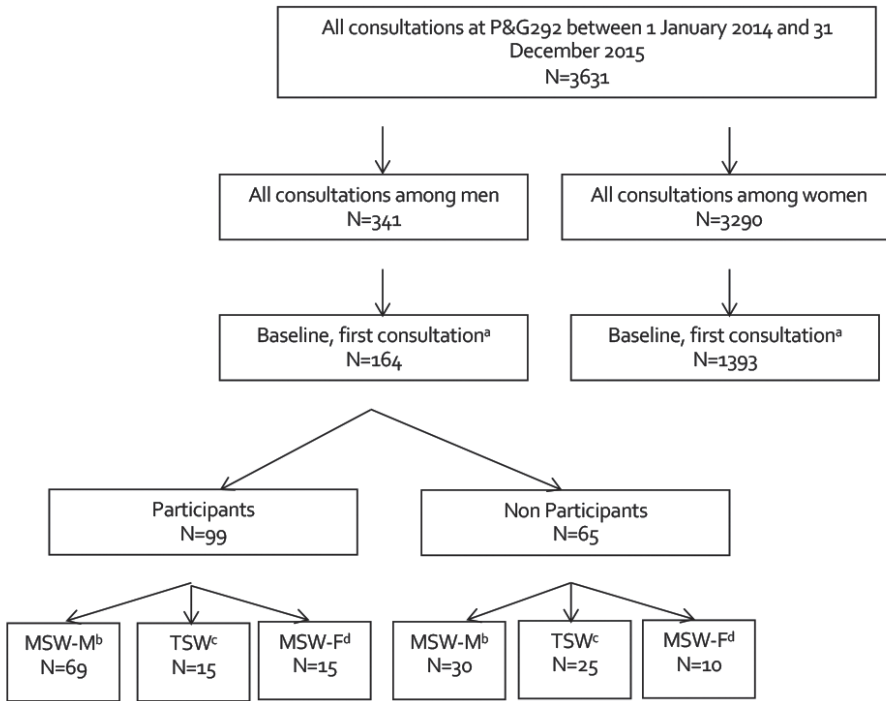


Figure 1. Flowchart of all consultations among sex workers visiting the Prostitution & Health Centre (P&G292) in Amsterdam, the Netherlands, between January 2014 and December 2015.

^a Baseline data of the first consultation of all male, female and transgender sex workers was used for comparing those groups. ^b MSW-M=Male sex workers who have sex with men only or also with females.

^c TSW=Transgender women sex workers. ^d MSW-F=Male sex workers who have sex with females only.

Table 1. Routinely collected data of sociodemographic characteristics, sexual behavior, STI diagnosis, and new HIV diagnosis among all visitors of the Prostitution & Health Centre (P&G292) in Amsterdam, the Netherlands, January 2014 - December 2015; divided into 4 groups: 1) male sex workers having sex with men only or with both men and women (MSW-M), 2) transgender women^a sex workers (TSW), 3) male sex workers having sex with females only (MSW-F) and 4) female sex workers (FSW).

Variables	MSW-M n=99 (6.4%)	TSW n=40 (2.6%)	MSW-F n=25 (1.6%)	FSW n=1393 (89.5%)	p value	Total
Demographics						
Median age in years (IQR) (missing n=2)	28 (25-34)	43 (33.5-46)	29 (25-32)	28 (24-35)	<.001	28 (24-35)
Age categories in years (missing n=2)					<.001	
≤24	19 (19.2)	4 (10.0)	3 (12.0)	401 (28.8)		427 (27.5)
25-28	31 (31.3)	1 (2.5)	9 (36.0)	334 (24.0)		375 (24.1)
29-35	33 (33.3)	6 (15.0)	10 (40.0)	335 (24.1)		384 (24.7)
≥36	16 (16.2)	29 (72.5)	3 (12.0)	321 (23.1)		369 (23.7)
Ethnicity ^b (missing n=8)					<.001	
Western	37 (37.4)	5 (12.5)	10 (40.0)	301 (21.7)		353 (22.8)
Non-Western	62 (62.6)	35 (87.5)	15 (60.0)	1084 (78.3)		1196 (77.2)
Sexual behavior						
Sex of sex partners (missing n=34)					<.001	
Men only	56 (56.6)	37 (92.5)	0	1311 (96.5)		1404 (93.7)
Men and women	43 (43.4)	3 (7.5)	0	46 (3.4)		92 (6.1)
Women only	0	0	25 (100)	2 (0.1)		2 (0.1)
Median number of sex partners in <6 months (IQR) (vaginal, oral and/or anal) (missing n=35)	50 (25-150)	325 (200-430)	10 (5-50)	250 (60-500)	<.001	200 (50-450)
Condomless anal sex in <6 months (missing n=40)	43 (43.4)	20 (50.0)	9 (36.0)	175 (12.9)	<.001	247 (16.3)
Condomless vaginal sex in <6 months (n=144 missing, or no vaginal sex) ^c	21/33 (63.6)	0	23/25 (92.0)	976/1355 (72.0)	.047	1020/1413 (72.2)
Reason of visiting P&G292 (missing n=34)						
STI notification from a sex partner	5 (5.1)	0	1 (4.0)	10 (0.7)	<.001	16 (1.1)
Symptoms	14 (14.1)	3 (7.5)	7 (28.0)	141 (10.4)	.023	165 (10.8)

HIV & STI's								
HIV Status ^d (opt-out; n=44)								
HIV-positive	22 (22.2)	4 (10.0)	0	7 (0.5)	<.001	33 (2.2)		
HIV-negative	77 (77.8)	36 (90.0)	25 (100)	1342 (99.5)		1480 (97.8)		
New HIV diagnosis ^e	5/82 (6.1)	0	0	4/1356 (0.3)	<.001	9/1489 (0.6)		
Any bacterial STI ^f	31 (31.3)	10 (25.0)	3 (12.0)	136/1359 (10.0)	<.001	180/1359 (11.8)		
Chlamydia (non LGV)	15 (15.2)	9 (22.5)	3 (12.0)	110 (7.9)	.001	137 (8.8)		
Pharyngeal	6 (6.1)	2 (5.0)	0/20	19/1352 (1.4)	.003	27/1511 (1.8)		
Rectal	5/93 (5.4)	5 (12.5)	Not tested	74/1217 (6.1)	.240	84/1350 (6.2)		
Urogenital	5 (5.1)	3 (7.5)	3 (12.0)	72/1356 (5.3)	.481	83/1517 (5.5)		
Gonorrhea	19 (19.2)	1 (2.5)	0	31 (2.2)	<.001	51 (3.3)		
Pharyngeal	7 (7.1)	1 (2.5)	0/20	20/1352 (1.5)	.001	28/1511 (1.9)		
Rectal	13/93 (13.1)	0	Not tested	17/1217 (1.4)	<.001	30/1350 (2.2)		
Urogenital	4/99 (4.0)	0	0/20	14/1353 (1.0)	.048	18/1517 (1.2)		
Infectious syphilis	3 (3.0)	0	0	2/1356 (0.1)	<.001	5/1520 (0.3)		
Positive syphilis serology (TPPA) (missing n=33)	25 (25.3)	22 (55.0)	0	63 (4.6)	<.001	110 (7.2)		
Participating in the additional questionnaire (FSW were not asked)	69 (69.7)	15 (37.5)	15 (60.0)	NA		99/164 (60.4)		

List of used abbreviations

STI=sexually transmitted infections; LGV=Lymphogranuloma venereum; IQR=interquartile range; TPPA= treponema pallidum particle agglutination assay; NA= Not applicable

^aTransgender women who had not undergone genital reconstructive surgery. ^bEthnicity was defined according to Statistics Netherlands on the basis of country of birth, maternal and paternal country of birth. ^cNo or inconsistent condom use or condom failure during vaginal sex. ^dHIV status also includes results of the current HIV test. ^eAmong visitors not previously tested HIV positive: n=1489. ^fBacterial STI: chlamydia, gonorrhea, LGV, and/or infectious syphilis. No LGV was diagnosed.

Table 2. Routinely collected data and additional questionnaire data of sociodemographic characteristics, sexual behavior, STI diagnosis, and new HIV diagnosis among study participants; 69 male sex workers having sex with men only or with both men and women (MSW-M), 15 transgender women^a sex workers (TSW) and 15 male sex workers having sex with females only (MSW-F) at P&G292, Public Health Service of Amsterdam, the Netherlands, January 2014 - December 2015.

Variables	MSW-M	TSW	MSW-F	p value	Study population n=99 (%)
	n=69 (%)	n=15 (%)	n=15 (%)		
Demographics					
Median age in years (IQR)	28 (25-33)	39 (33-45)	29 (25-32)	<0.001	29 (25-35)
Age categories in years					
≤25	20 (29.0)	2 (13.3)	4 (26.7)	.002	26 (26.3)
26-29	21 (30.4)	0	5 (33.3)		26 (26.3)
30-35	18 (26.1)	3 (20.0)	4 (26.7)		25 (25.3)
≥36	10 (14.5)	10 (66.7)	2 (13.3)		22 (22.2)
Ethnicity ^b					
Western	28 (40.6)	4 (26.7)	6 (40.0)	.658	38 (38.4)
Non-western	41 (59.4)	11 (73.3)	9 (60.0)		61 (61.6)
Sexual behavior					
Routinely collected data					
Sex of sex partners					
Men only	35/69 (50.7)	12/15 (80.0)	NA	.047	47 (56.0)
Men and women	34/69 (49.3)	3/15 (20.0)	NA		37 (44.0)
Condomless anal sex in <6 months (CAS) ^c	31 (44.9)	5 (33.3)	9 (60.0)	.337	45 (45.5)
Median number of sex partners in <6 months (IQR) (vaginal, oral and/or anal)	60 (25-150)	300 (120-450)	12 (5-80)	<0.001	60 (20-200)
Sexual behavior during working time					
Additional questionnaire					
Median age first time sex (IQR)	16 (13-18)	14 (12-16)	15 (14-16)	.250	15 (13-17)
Median age first time sex work (IQR)	21 (18-25)	21 (18-25)	25 (22-27)	.026	22 (18-26)
CAS with clients ^c in <6 months	19 (27.5)	3 (20.0)	2 (13.3)	.516	24 (24.2)
Condomless oral sex ^d in <6 months	58 (84.1)	11 (73.3)	12 (80.0)	.612	81 (81.8)

Main source of clients (multiple answers possible)						
Online ^e	56 (81.2)	5 (33.3)	6 (40.0)	< 0.001	67 (67.7)	
Window	2 (2.9)	10 (66.7)	0	< 0.001	12 (12.1)	
Male sex club	17 (24.6)	0	0	.009	17 (17.2)	
Other ^f	19 (27.5)	2 (13.3)	11 (73.3)	.001	32 (32.3)	
Current frequency of sex work						
At least once a week	57/68 (83.8)	14/14 (100)	12 (80.0)	.848	83 (85.6)	
At least once a month	5/68 (7.4)	0	1 (6.7)		6 (6.2)	
A few months a year	3/68 (4.4)	0	1 (6.7)		4 (4.1)	
At least once a year	3/68 (4.4)	0	1 (6.7)		4 (4.1)	
HIV & STI's						
HIV status ^g						
HIV-positive	14 (20.3)	3 (20.0)	0	.142	17 (17.2)	
HIV-negative	55 (79.7)	12 (80.0)	15 (100)		82 (82.8)	
New HIV diagnosis ^h	3/58 (5.2)	0/12	0	.999	3/85 (3.5)	
Any bacterial STI ⁱ	20 (29.0)	4 (26.7)	2 (13.3)	.562	26 (26.3)	
Chlamydia (non LGV)						
Pharyngeal	6 (8.7)	1 (6.7)	0/13	.537	7/97 (7.2)	
Rectal	3/64 (4.7)	2 (13.3)	NA	.315	5/79 (6.3)	
Urethral	3 (4.3)	1 (6.7)	2 (13.3)	.257	6/99 (6.1)	
Gonorrhea						
Pharyngeal	6 (8.7)	0	0/13	.526	6/97 (6.2)	
Rectal	7/67 (10.4)	0	0/3	.247	7/85 (8.2)	
Urethral	2 (2.9)	0	0	.999	2/99 (2.0)	
Positive syphilis serology (TPPA)	15 (21.7)	8 (53.3)	0	.002	23 (23.3)	

List of used abbreviations STI=sexually transmitted infections; LGV=Lymphogranuloma venereum; IQR=interquartile range^a Transgender women who had not undergone genital reconstructive surgery. ^bEthnicity was defined according to Statistics Netherlands on the basis of country of birth, maternal and paternal country of birth. ^cCAS: no or inconsistent condom use or condom failure during anal sex. ^dCondomless oral sex: no or inconsistent condom use or condom failure during oral sex. ^eOnline: apps, dating sites and chats. ^fSuch as: escort, known clients, via parties, porno. ^gHIV status also includes results of the current HIV test. ^hOnly tested in MSM not previously tested HIV-positive. ⁱBacterial STI: chlamydia, gonorrhea, LGV, and/or infectious syphilis. No LGV and infectious syphilis infections were diagnosed.

Table 3. Drug use characteristics among 69 male sex workers having sex with men only or both men and women (MSW-M), 15 transgender women^a sex workers (TSW) and 15 male sex workers having sex with females only (MSW-F) at P&G292, Public Health Service of Amsterdam, the Netherlands, January 2014- December 2015.

Variables	MSW-M	TSW	MSW-F	p value ^b	Total study population n=99 (%)
	n=69 (%)	n=15 (%)	n=15 (%)		
Tolerated drugs in the Netherlands					
Erectile stimulation drugs					
Free & working time	12 (17.4)	1 (6.7)	3 (20.0)	.224/.028	16 (16.2)
Working time only	35 (50.7)	4 (26.7)	8 (53.3)		47 (47.5)
Free time only	1 (1.4)	0	0		1 (1.0)
None at all	21 (30.4)	10 (66.7)	4 (26.7)		35 (35.4)
Nitrites					
Free & working time	12 (17.4)	1 (6.7)	0	.070/.027	13 (13.1)
Working time only	17 (24.6)	6 (40.0)	1 (6.7)		24 (24.2)
Free time only	4 (5.8)	1 (6.7)	0		5 (5.1)
None at all	36 (52.2)	7 (46.7)	14 (93.3)		57 (57.6)
Alcohol					
Free & working time	32 (46.4)	4 (26.7)	4 (26.7)	.098/.081	40 (40.4)
Working time only	7 (10.1)	2 (13.3)	0		9 (9.1)
Free time only	14 (20.3)	7 (46.7)	8 (53.3)		29 (29.3)
None at all	16 (23.2)	2 (13.3)	3 (20.0)	.023/.007	21 (21.2)
Marihuana					
Free & working time	14 (20.3)	0	5 (33.3)		19 (19.2)
Working time only	3 (4.3)	0	2 (13.3)		5 (5.1)
Free time only	19 (27.5)	2 (13.3)	4 (26.7)		25 (25.3)
None at all	33 (47.8)	13 (86.7)	4 (26.7)		50 (50.5)

Illicit drugs in the Netherlands						
Cocaine						.323/.135
Free & working time	7 (10.1)	1 (6.7)	1 (6.7)	1 (6.7)		9 (9.1)
Working time only	15 (21.7)	4 (26.7)	0	0		19 (19.2)
Free time only	13 (18.8)	1 (6.7)	3 (20.0)			17 (17.2)
None at all	34 (49.3)	9 (60.0)	11 (73.3)			54 (54.4)
XTC (Ecstasy)/MDMA						.172/.756
Free & working time	4 (5.8)	1 (6.7)	1 (6.7)			6 (6.1)
Working time only	8 (11.6)	0	1 (6.7)			9 (9.1)
Free time only	23 (33.3)	1 (6.7)	5 (33.3)			29 (29.3)
None at all	34 (49.3)	13 (86.7)	8 (53.3)			55 (55.6)
Chemsex^c						.623/.061
Free & working time	8 (11.6)	0	0			8 (8.1)
Working time only	4 (5.8)	0	0			4 (4.0)
Free time only	7 (10.1)	1 (6.7)	1 (6.7)			9 (9.1)
No chemsex	50 (72.5)	14 (93.3)	14 (93.3)			78 (78.8)
Ketamine						.881/.999
Free & working time	2 (2.9)	0	0			2 (2.0)
Working time only	2 (2.9)	0	0			2 (2.0)
Free time only	5 (7.2)	0	0			5 (5.1)
None at all	60 (87.0)	15 (100)	15 (100)			90 (90.9)
Amphetamine						.592/.526
Free & working time	6 (8.7)	0	0			6 (6.1)
Working time only	0	0	0			0
Free time only	5 (7.2)	0	0			5 (5.1)
None at all	58 (84.1)	15 (100)	15 (100)			88 (88.9)

Table 3. Continued.

Variables	MSW-M	TSW	MSW-F	p value ^b	Total study population
	n=69 (%)	n=15 (%)	n=15 (%)		n=99 (%)
All illicit drugs				.144/.022	
Free & working time	21 (30.4)	2 (13.3)	2 (13.3)		25 (25.3)
Working time only	7 (10.1)	4 (26.7)	1 (6.7)		12 (12.1)
Free time only	17 (24.6)	3 (20.0)	5 (33.3)		25 (25.3)
None at all	24 (34.8)	6 (40.0)	7 (46.4)		37 (37.4)
Injecting drugs ever (3 missing)	8/66 (12.1)	0	0	.254	8 (8.3)
Injecting drugs in past 6 month (3 missing)	2/66 (3.0)	0	0	.999	2 (2.1)
Reasons for drug use during work^d (multiple answers possible)					
Makes work physically easier	30/62 (48.4)	5/9 (55.6)	4/14 (28.6)	.359	39/85 (45.9)
Client asked for it	23/62 (37.1)	5/9 (55.6)	1/14 (7.1)	.027	29/85 (34.1)
Makes work mentally easier	17/62 (27.4)	2/9 (22.2)	4/14 (28.6)	.999	23/85 (27.1)
Makes work more fun	15/62 (24.2)	3/9 (33.3)	3/14 (21.4)	.840	21/85 (24.7)
Sex is more intense	11/62 (17.7)	1/9 (11.1)	0/14	.291	12/85 (14.1)
Sex last longer	10/62 (16.1)	0/9	2/14 (15.3)	.525	12/85 (14.1)
Other	9/62 (14.5)	2/9 (22.2)	2/14 (14.3)	.881	13/85 (15.3)
I dare to do things I would not dare	8/62 (12.9)	1/9 (11.1)	0/14	.428	9/85 (10.6)
Fewer sexual inhibitions	6/62 (9.7)	0/9	0/14	.632	6/85 (7.1)
I am addicted	3/62 (4.8)	1/9 (11.1)	1/14 (7.1)	.412	5/85 (5.9)

^aTransgender women who had not undergone genital reconstructive surgery. ^bAdditional p values were calculated for comparing two categories only; 1) using substances during working time vs. 2) no substance use during working time. ^cChemsex is defined as the use of one of the following substances before or during sex: Mephedrone, GHB/GBL, Methylamphetamine. ^dSex workers who used at least one of the above listed substances before or during work in the preceding six month.

Table 4. Relation between illicit substance use^a settings and STI diagnoses^b among 69 male sex workers having sex with men only or with both men and women (MSW-M), 15 transwomen^c sex workers (TSW) and 15 male sex workers having sex with females only (MSW-F) at P&G292, Public Health Service of Amsterdam, the Netherlands, January 2014 - December 2015.

Study population	Substance use ^a settings	Bacterial STI diagnosis ^b		P value ^d
		No, n (%)	Yes, n (%)	
MSW-M				.227/.090
	Free & working time	16 (76.2)	5 (23.8)	
	Working time only	7 (100)	0	
	Free time only	11 (64.7)	6 (35.3)	
	None at all	15 (62.5)	9 (37.5)	
	Total	49 (71.0)	20 (29.0)	
TSW				.040/.240
	Free & working time	2 (100)	0	
	Working time only	1 (25.0)	3 (75.0)	
	Free time only	2 (66.7)	1 (33.3)	
	None at all	6 (100)	0	
	Total	11 (73.3)	4 (26.7)	
MSW-F				.999/.999
	Free & working time	2 (100)	0	
	Working time only	1 (100)	0	
	Free time only	4 (80.0)	1 (20.0)	
	None at all	6 (85.7)	1 (14.3)	
	Total	13 (86.7)	2 (13.3)	
All sex workers				.827/.418
	Free & working time	20 (80.0)	5 (20.0)	
	Working time only	9 (75.0)	3 (25.0)	
	Free time only	17 (68.0)	8 (32.0)	
	None at all	27 (73.0)	10 (27.0)	
	Total	73 (73.7)	26 (26.3)	

^aSubstance use is defined as the use of one of the illicit substances before or during sex: cocaine (snuff coke), XTC (Ecstasy)/MDMA, ketamine, mephedrone, GHB/GBL, amphetamines, methylamphetamine. A sub-analyses with marijuana added to the listed illicit substances, showed similar results. ^bBacterial STI: chlamydia, gonorrhoea, LGV, and/or infectious syphilis. ^cTransgender women who had not undergone genital reconstructive surgery. ^dFirst p value = the distribution between all four outcomes; Second p value = drug used during working time versus no drug use during working time.

SUPPLEMENT TABLES

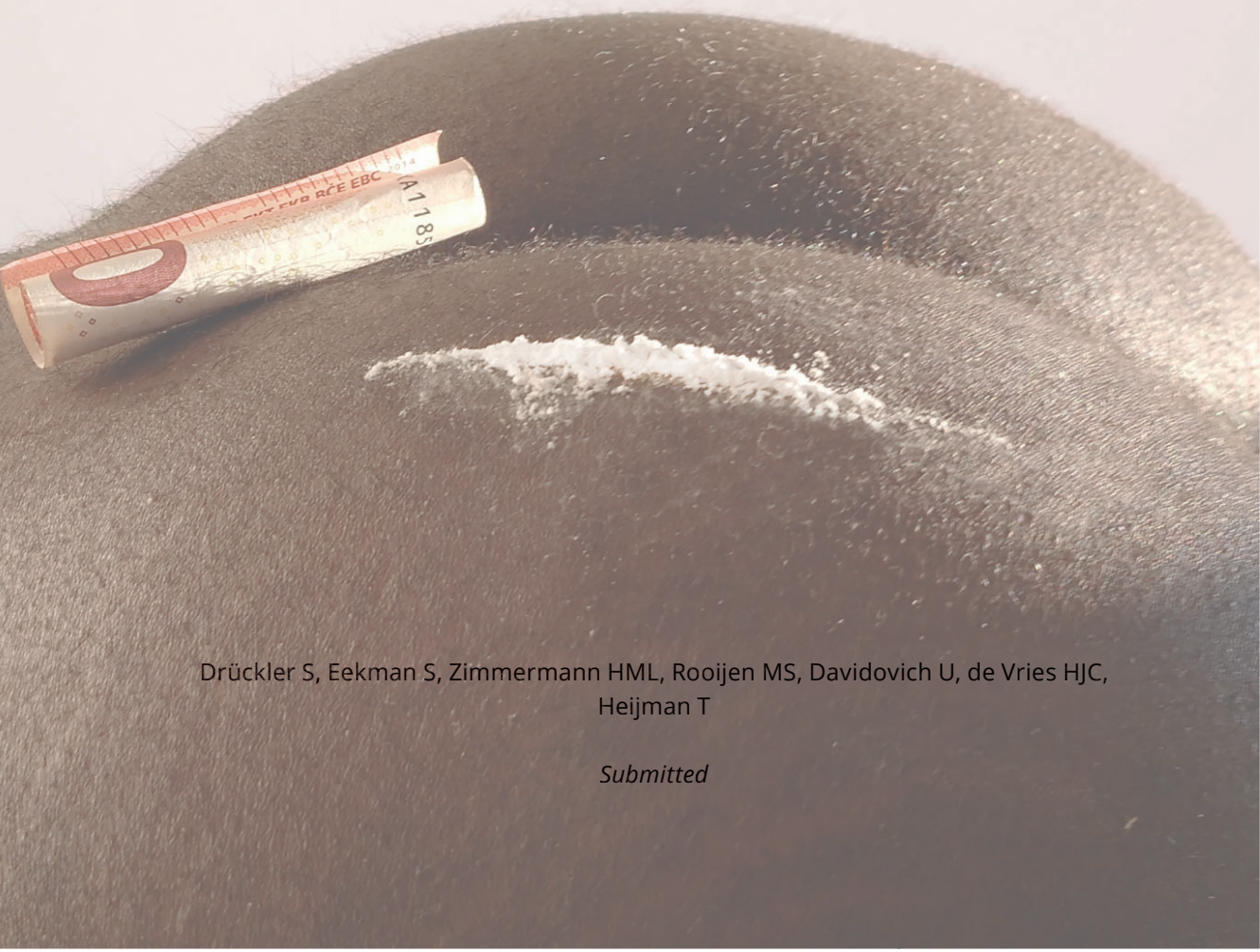
Supplement Table 1. Routinely collected data of sociodemographic characteristics, sexual behavior, STI diagnosis, and new HIV diagnosis among 99 male sex workers (MSW) study participants and 65 MSW non-participants at P&G292, Public Health Service of Amsterdam, the Netherlands, January 2014 - December 2015.

Variables	Participant		Non-participant		p value	Total n=164 (%)
	n=99 (%)	n=65 (%)	n=99 (%)	n=65 (%)		
Median age in years (IQR)	29 (25-35)	34 (26-43)			.036	30 (26-37)
Ethnicity ^a						
Western	38 (38.4)	14 (21.5)			.026	52 (31.7)
Non-western	61 (61.6)	51 (78.5)				112 (68.3)
HIV status ^b						
HIV-positive	17 (17.2)	9 (13.8)			.645	26 (15.9)
HIV-negative	82 (82.8)	56 (86.2)				138 (84.1)
Sexual behavior						
Median number of sex partners in <6 months (IQR)	60 (20-200)	100 (22-24)			.188	75 (21-24)
Condomless anal sex in <6 months (CAS) ^c	45 (45.5)	27 (41.5)			.634	72 (43.9)
STI diagnoses						
Any bacterial STI ^d	29 (29.3)	18 (27.7)			.861	47 (28.7)
New HIV diagnosis ^e	3/85 (3.5)	2/58 (3.4)			.999	5/143 (3.5)
Transgender women	15 (15.2)	25 (38.5) ^f			.001	40 (24.4)

^aEthnicity was defined according to Statistics Netherlands (CBS) on the basis of country of birth, maternal and paternal country of birth. ^bHIV status also includes results of the current HIV test. ^cCAS: No or inconsistent condom use or condom failure during passive and/or active anal sex. ^dBacterial STI: Chlamydia (including lymphogranuloma venereum (LGV)), gonorrhea, and/or infectious syphilis. ^eOnly tested in MSM not previously tested HIV-positive; total n=143. ^fHIV status of transwomen not participating in the study: n=1 known HIV positive; no new HIV diagnosis during consultation.

Chapter 6

A qualitative study on sexualised drug use among
male and transgender women sex workers in
Amsterdam, the Netherlands



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Submitted

ABSTRACT

Aims

This study aims to elucidate motives for using or not using drugs during sex work among male sex workers (MSW) and transgender women sex workers (TSW) and its possible effect on the increased risk of STI/HIV.

Method

We performed a qualitative study conducting in-depth interviews among MSW and TSW visiting the Prostitution and Health Center in Amsterdam, the Netherlands. We interviewed 15 MSW and 8 TSW. For the analysis we used the qualitative data analysis software MaxQDA.

Results

Almost all sex workers reported any sexualised drug use and the majority reported illicit drug use during sex work, most often initiated by their clients. Motives for drug use were categorized into self-oriented and client-oriented motives. Self-oriented motives to use drugs included receiving more money, increasing pleasure during sex and the ability to work more hours. Self-oriented motives to NOT use drugs included keeping track of time, controlling safe sex and maintaining professional distance. A client-oriented motive to use drugs was compliance with the clients' wishes. A client-oriented motive to NOT use drugs was preserving sexual functioning. Sex workers reported harm reduction strategies concerning drug use during work and self-applied means to reduce the risk of an STI/HIV infection.

Conclusion

The results of the present study may be considered when developing interventions targeting MSW and TSW to reduce drug use, apply harm reduction strategies or help to decrease the chances of STI/HIV acquisition during sex work.

Keywords

Sex work, sexualised substance use, male sex workers, transgender women sex workers, STI, HIV

INTRODUCTION

Sex work is often defined as the provision of sexual services for money or its equivalent, such as necessities of living (food, clothing, protection) or other items of monetary value [1, 2]. Globally, sex workers are disproportionately affected by the human immunodeficiency virus (HIV) and other sexually transmitted infections (STIs) compared to the general population [3, 4]. Compared to female sex workers, HIV and STI prevalence is especially high among male sex workers (MSW) and transgender women (i.e. individuals whose assigned sex at birth was male and currently self-identify as female) sex workers (TSW) having sex with men [3-5]. Worldwide, HIV prevalence among transgender women, TSW and MSW ranges between 15% to 27% [3, 4, 6, 7]. More recent studies in the Netherlands found comparable high prevalences [8-10].

Earlier studies have explored potential explanations for the high prevalence of HIV and STIs among TSW and MSW such as frequent condomless (anal) sex, multiple sex partners with unknown HIV status or sexualised drug use (the use of drugs before or during sex) as well as the unique combination of factors attributed to transgender women (eg, (illicit) hormone injections, stigma, discrimination, need for gender affirmation) [4-6, 8, 11].

The syndemic theory states that the co-occurrence of multiple health problems can have an additive effect and thus increase the chance of an HIV infection [12]. Other studies additionally described that syndemic domains such as individual level factors as mental health problems, sexual violence, childhood abuse and drugs and/or alcohol abuse can contribute also to an increased likelihood of STIs/HIV [13, 14].

The abuse of drugs and/or alcohol are important factors for STIs/HIV acquisition as it lowers (consequent) condom use [15]. In a previous study, we showed that drug use during sex work among MSW and TSW is common (62.6%), and the most frequently mentioned reasons for use were: to make sex work physically easier and the client's desire to use drugs together with the sex worker [8]. However, detailed motivators, intentions and reasons for work-related sexualised drug use and its effect on sexual behaviour that potentially increases STIs/HIV acquisition are not well described yet. We used qualitative research to elucidate motives of sexualized drug use among TSW and MSW and its effect on sexual behaviour that increase the chance of STIs/HIV in order to form recommendations for future development of interventions to support healthier sex-work and related drug use.

METHOD

Study population

From March to June 2018, sex workers were recruited for semi-structured in-depth interviews at the Prostitution and Health Center (P&G292) in Amsterdam. P&G292 provides sex-related healthcare such as HIV/STI testing as well as sexual health counselling to sex workers. P&G292 is located near the Red-Light District (a window prostitution area) and is a collaboration of the Public Health Service of Amsterdam (PHS) and HVO-Querido (offering social work) [8].

Eligibility criteria for participation were being male or transgender woman, reporting sex work in the past six months and speaking Dutch or English.

Study procedure

All eligible visitors of P&G292 were given a recruitment flyer with information. When interested in participating and consenting to be approached, healthcare workers registered contact details which the researchers used to make an interview appointment. Prior to the interview, participants received an more extensive information letter with the rationale for the study and topics of the interview and route description.

The semi-structured in-depth interviews were conducted face-to-face by two skilled researchers from different backgrounds: health sciences [SE] and psychology [SD]. The interviews lasted approximately 40-60 minutes and were conducted at the PHS or P&G292. The interviews were led by an interview guide including the main topics to identify motives of sexualized drug use and its effect on sexual behaviour based on knowledge of previous research [8]. We were also preserving room for open investigation of new topics if these came up and were deemed relevant which we then subsequently added to the interview guide. The interviews started with a short explanation of the study and signing an informed consent. This was followed by a list of socio-demographic questions concerning age, country of birth, education level, gender identity, and - in the case of a transgender person - assigned gender of birth and current gender identity. These were followed by questions regarding sex work: location, gender of clients and how clients are recruited (e.g. online, window prostitution, sex club).

Then the main topics of sexualized drug use were discussed, starting with 1) which drugs were used during sex in private or during sex work, followed by 2) the effect of those drugs on one's mental and physical state, 3) the motives why drugs were used, and 4) which influence drugs had on one's sexual behaviour such as condom use.

When the following topics would arise during the interview we probed asking for more information: HIV status, STI diagnoses, pre-exposure prophylaxis (PrEP) use, mental health issues, and situations one had sex without the use of any STI/HIV prevention tool.

Recruitment of new participants was stopped once thematic saturation of the main topics was reached. All interviews were audio-recorded and transcribed. Participants received a gift voucher of 50 euros after the interview.

Data analyses

Qualitative data analysis was performed by the same two researchers who conducted the interviews (SE and SD) using the qualitative data analysis software MaxQDA. The interviews were analysed immediately after transcription. The first two transcripts were coded independently by SE and SD using an open-coding process, after which a first version of a codebook emerged and then was the basis to code subsequent interviews. After the next four transcripts, the codebook was adjusted by SD and SE and several main themes were created by discussing the codes until consensus was reached with two additional qualified qualitative researchers (HZ and UD). SD and SE refined the codebook after every two interviews and checked whether thematic saturation was reached. In the results, we present English (translated from Dutch if necessary) quotes to exemplify the findings.

Ethical considerations

The ethical committee of the Amsterdam UMC approved the study conduct and deemed a full ethical review of the study was not necessary (letter reference no. W17_438). All participants provided written and oral informed consent for the recording and usage of interviews. The collected data were de-identified by deleting personal identifiers from the transcript.

RESULTS

From March to June 2018 a total of 24 interviews were conducted, of which 23 were used for qualitative analysis. One interview was excluded because during the interview the participant reported no sex work.

The median age of the 23 included participants was 32 years (range 24-49) (**Table 1**). Most participants were born in the Netherlands or other European countries. All participants were assigned male at birth. Fifteen participants were cisgender male and eight were transgender of whom six identify as transgender women, one as gender fluid and one as woman. In further results we use the term TSW for all transgender persons who work as sex worker. Eighteen participants were HIV

negative, of whom four reported PrEP use, and five participants reported being HIV positive.

Participants reported several mental health issues and experiences of (sexual) abuse. Those mental health issues were mostly self-determined and not diagnosed by a professional. The following issues were reported by one or more participants: depression, suicidal thoughts, anxiety disorder, panic attacks, attention addiction, sex addiction, borderline personality, drug addiction, burn out, (sexual) abuse or rape victim.

The interviews revealed that the motives of the participants to engage in or start with sex work can be divided into two main groups: 1) to financially survive / to finance drug habits or 2) for a better or financially easier future. Sex workers of the second group explained not being dependent on the income out of sex work. Other reasons starting with sex work mentioned were: "for fun", "for attention", "because it fits the skill set", "enjoying it" or "because the partner does it".

Interviewee#9 (MSW)

"I just have a "normal job" with which I just earn a good salary, so I really don't depend on it. It's a nice extra, but I really like the kick."

Interviewee#4 (MSW)

"It helps me survive in Amsterdam."

Sexualised drug use

Almost all participants (n=21/23) reported any use of drugs during sex (irrespective of work or private situation) (**Table 1**). The majority (n=14) of the participants reported drug use during work. Seven participants reported drug use only off-sex work. Two TSW self-identified as addicted. Cocaine (n=12) was the most reported illicit drug during sex work, followed by gamma-hydroxybutyrate/gamma-butyrolacton (GHB/ GBL) (n=8), MDMA/XTC (n=7), and crystal methamphetamine (n=4). In **table 1** we display the specified drug which use was reported by the participants.

Motives for using or not using drugs during sex work

The interviews revealed that the motives to use or not use drugs during work can be subdivided into two main categories ; 1) Self-oriented motives and 2) Client-oriented motives (**Table 2**). The self-oriented motives *pleasure* and *work facilitation* applied for both sides, meaning that they were motives for using drugs during work and as well as motives for NOT using drugs during work. Another self-oriented motive for using drugs during work was *money* and a client-oriented motive was *compliance*. *Professional distance* on the other hand was a self-oriented motive for not using drugs and *professional performance* was a client-oriented motive for not using drugs

during work. For all specific motives among the two categories, including quotes of participants, see **Table 2**.

Participants reported that the initiative to use drugs during sex most often comes from the clients. Also, participants emphasised during the interviews mostly the perceived negative impact that drugs have on the relationship with their client as they describe their clients as “less fun” or “aggressive” and also that they have a “unsafe feeling” when being with their clients. Two sex workers reported that they refuse all clients who use drugs.

Interviewee#10 (MSW)

“Because I’m afraid of them. They don’t know what they are doing. You don’t know what drugs they are on, you don’t know what they’re going to do.”

Participants distinguished between drug use during sex with private partners and paid sex. Some reported not to use drugs with clients because they don’t want to lose control but want to perform professionally (client-oriented motive: professional performance). On the other hand, some reported drugs use with clients only because it pays better, since sessions with drug-using clients tend to take longer (self-oriented motive: money).

Interviewee#15 (TSW)

“No, I don’t, but they want us to use. And they use a lot, yes, a lot ... Yes they often pay more, because they want to stay longer. Three hours, four hours.”

Participants differentiated between type of drugs they use with clients. For example, most participants used cocaine during sex work because it makes them feel more confident and they can stay sharp.

Interviewee#4 (MSW)

“Coke gives you a lot of confidence and it makes you feel super energized and able to do things in a good and better way.”

Participants described that GHB makes them to enjoy work more, feeling more horny and “not getting out of space”.

Interviewee#9 (MSW)

“And I notice that with G you have a bit more fun than without.”

Crystal methamphetamine use was mentioned with either regular clients only, or during long work sessions and during private sex.

Interviewee#24 (MSW)

"I have to perform. Must deliver something. And if you are on drugs, it becomes more difficult. Or it must be someone you have established a relationship with, a regular client, and it takes several hours. Then it is possible."

Interviewee#1 (MSW)

"But that was more on a night date. So if I just stayed with someone all night."

TSW specific drug using behaviour

Five out of eight TSW in our study population reported no illicit drug use during work. Of the three TSW who reported drug use, two labelled themselves addicted to drugs. One TSW described that since she started her gender transition (the process of changing one's gender appearance and/or sex characteristics according with one's gender identity), not only her depression disappeared but also her massive drug and alcohol use stopped.

Interviewee#12 (TSW)

"I always felt that I was a woman instead of a boy.[...] So you become an insecure creature. From there I became depressed, used a lot of drugs and drink a lot. And yes, that has all changed systematically after I got my hormones. And the peace I found in it. I feel like the hormones were my salvation too. By going into transition, I am still alive today."

One TSW explained that she thinks most TSW use drugs with their clients and she prefers to have drug using clients as they also pay more when she uses drugs with them together.

Interviewee#14 (TSW)

"Sometimes I use one line because a client...they want to...to use with them. But the reason they pay more is why you take drugs. And most of the girls do... I prefer to work with clients using drugs. And I know they're paying two thousand euros for a couple of hours."

One TSW also described that since she went in gender transition her clients seem different to her than the clients she had when she worked as a male sex worker. She described that those clients use more drugs and seem more insecure due to same gender sex while not identifying themselves as gay.

Interviewee#21 (TSW)

"They use more drugs. And they are more insecure. Gay are not as insecure as our trans clients. The trans clients, sometimes they come and ask "I'm not gay, am I?" and then I have to explain to them... just like a therapist, "No baby you're not gay, it's normal what you do."

Harm reduction strategies to reduce risk with regard to drugs

To minimize drugs associated risks such as addiction, injury and accidents or health problems, participants reported certain behaviour like; “only using drugs which are known”, “tried before or bought by themselves”, “drug use have been discussed online before the sex date” and “only using with known/regular clients”. One participant also explained that he would pretend sniffing cocaine just to please the clients wishes. Participants also reported that in window prostitution there is an alarm system, which alarms the police and staff and offers sex workers protection against clients who demand drug use, use violence or demonstrate non-consensual sexual behaviour.

Some participants revealed that feeling in control to say no to drugs is important to them. This can refer to one’s own declining of drug use or refusing drugs using clients.

Interviewee#22 (MSW)

“The important factor in the work that we always had, is the right to refuse...we had always right to refuse if the clients wanted you and you didn’t want, you can always say no and it was always the same with the drugs.”

Another participant explained that he does not feel in control with regard to drug abuse as clients might secretly put drugs into his drinks.

Interviewee#11 (MSW)

[...] “But I think that is very difficult to prevent, because the moment you sit with that man, you sit with the drink and someone secretly puts a pill in your glass or something.. So I can’t one hundred percent stop someone from just putting something in my drink or something, no.”

Independently of drug use, most participants emphasised that they feel in control (for instance being able to say no to unwanted sex acts or condomless sex) by internal factors such as “high self-esteem”, “for not being submissive to the clients demands”, “being able to set boundaries”, or “negotiating power”. Participants reported also external and environmental factors which gave them the feeling of being powerful or in control such as the fact of having a lot of clients, getting paid and working in a sex club.

Interviewer *"And if you have a day like Saturday where you really have about thirty clients or something, how is that for you to do to have so many customers?"*

Interviewee#21 (TSW)

"Yes, I wake up the next day and realize I actually have a lot of power. It's very... just gets positive... it gets positive after that. I don't get negative thoughts."

Interviewee#7 (MSW)

"Because there [the sex club] the main rule is that there is no obligation. So we don't have to go with everyone. We always have the right to say no."

Drug use and risk of contracting STIs/HIV

The most often reported behaviour that heightens the risk of an STI/HIV infection was forgetting/stopping/skipping condom use during oral or anal sex or gloves during fisting under the influence of drugs. Due to drug use, boundaries seem to become blurred and inhibitions are lost.

Interviewee#4 (TSW)

"I had the client this new year's, it was chem sex. And after a while, after doing coke, I was like what the fuck, just keep it for tonight, we skip condoms."

Interviewee#7 (MSW)

"I am not that responsible when I take drugs. Like...the condom use sometimes I don't pay attention that much as when I'm sober."

Participants reported to use less or no drugs after regretting having had sex without condoms. A self-applied prevention strategy was to stay away from actual sex acts such as anal sex when using drugs because of its negative effect on condom use.

Interviewee#5 (MSW)

"If it is that you've been drinking, then you're more likely to... not use a condom in those situations. Overall." [...] Because you kinda get a little bit more relaxed." [...]

"It's not more difficult, your judgement kinda gets delayed. In that sorta way. That's why for me I think it's always better not to drink or take stuff when it is that."

Interviewer *"Ok, but still with anal sex or penetration you use condoms always you said?"*

Interviewee#5

"Yeah, because like the thing is, if it is that I've been drinking or I've used other stuff, then I try to stay away from actual like... sex acts. [...] Anal. Like penetration."

Participants in our study who worked in a sex club reported that clubs have a strict “safe sex rule” and a no drug use policy.

Interviewer *“Can you tell me why you are not using these drugs during your work and you do use it in your private life?”*

Interviewee#5 (MSW)

“I think because at the club everything needs to be like under control. So I don’t think it would be a good idea to use something in the club.”

Interviewer *“Can you explain what should be in control?”*

Interviewee#5 (MSW)

“Like watch the time, watch the clients and within that hour, we are spending in the room has to follow the rules like the safe sex rule. So those things are really important.”

DISCUSSION

In the present study we identified self-reported motives for using or not using drugs during sex work among MSW and TSW in Amsterdam. Most participants reported illicit drug use during sex work. We identified two main categories of motives for drug use and no drug use during work; 1) Self-oriented motives and 2) Client-oriented motives.

Looking at motives for sex workers to use drugs with clients, the self-oriented motive “money” plays an important role, indicating that this especially applies for those who depend solely on the income of sex work. Getting paid more, facilitates drug use. Sex workers reported that usually the clients initiate the drug use. Withstanding this potentially perceived pressure is contrary to the client-oriented motive to make customers happy.

Work facilitation and pleasure are motives reported for using drugs during work and also as motives for NOT using drugs during work. Whereas using drugs makes it for some easier to work (more energy, ability to have same-gender sex), for others not using drugs makes work easier (clear mind and control the situation). Opposite roles for the same motives have even been reported by the same individuals emphasising how the context co-determines the use of drugs and relating consequences. For example, when using strong stimulated drugs such as crystal methamphetamine, participants reported only using such drugs with either regular clients only, or during long work sessions and when spending the whole night with a client.

When comparing the self-oriented motives to use drugs among sex workers with the motives of men who have sex with men (MSM) who engage in sexualised drug use in private settings, pleasure is the only motive which is in accordance [16]. This indicates the strong connection of drug use and sex work among our participants as all other self-oriented motives for drug use are only to persist working or earning more money.

Sex workers in our study self-reported numerous different types of mental health-related issues, including many who labelled themselves as depressive. Even though these mental health-related issues are not necessarily diagnosed by a professional, they suggest that drug using sex workers often face different mental health challenges. These findings are in accordance with earlier studies reporting a high prevalence of mental health-related issues among MSW and TSW [5, 17, 18], potentially indicating that the syndemic concept and the elevated sexual risk behaviour could partly explain the overall high STI and HIV incidence among MSW and TSW [3, 6, 8]. So far, most studies describing associations between mental health-related issues and sexual risk behaviour are assessed among MSM [12, 19,

20]. However, Mimiaga and colleagues showed that also among young transgender women, the syndemicity might predict behaviour that heightens HIV risk [21].

Among TSW, the present study suggests that going into gender transitioning cannot only influence ones drug using behaviour but also mental health issues such as depression. This could also indicate that when facing the barriers of accessing gender-related healthcare different issues can get tackled. This finding is described in previous literature who emphasize a unique combination of risk factors that contribute to the risk for of TSW and the need for multicomponent interventions to work with different interacting syndemic factors [11, 22]. Moreover, Nemoto and colleagues describe that TSW accept certain health risks as they believe that drug use and sex work go hand in hand and are often part of the deal as was confirmed in our study [23].

In the present study the feeling of being in control with regard to drugs use but also with regard to being able to say no to situations such as unwanted sex acts or unsolicited condomless sex, seems to play an important role in buffering or mitigating the negative consequences affecting someone's health. This feeling of being in control might be linked to empowerment when considering the definition of empowerment by the World Health Organization: "A process through which people gain greater control over decisions and actions affecting their health" seems to influence that decision [24]. Not only one's own feeling of control indicates a greater feeling of empowerment but also environmental factors such as working in a sex club where there is a no drug use policy and sex workers have the right to refuse unwanted clients. Additionally, empowerment is also thought to play an important role in sexual risk behaviour [5]. Mimiaga et al. described that empowerment might be a motivation to initially start with sex work for MSW, while on the other hand a reduced feeling of empowerment can lead to sexual risk behaviour through sexual negotiation difficulties [5]. In our study, even though participants reported the intention of using condoms during sex, it seems that their drugs use interfere with those intentions. This is in line with earlier research showing that drug use is a relevant contributing factor to sexual risk behaviour [4, 25]. Moreover, our study showed that the type of drugs and former experiences with the use of certain drugs influences one's motivations to use drugs in specific situations with certain clients. Additionally, participants reported two strategies of coping with drug use. First, an overall rejection of one's own and clients drug use. And second, applying harm reduction strategies such as only using drugs one is familiar with, tried before or bought by themselves, drug negotiation in advance to sex, and only using drugs with known/regular clients. Also, negative effects of drug use during sex, such as sexual dysfunction or lost inhibitions, actually disturb a professional performance and has therefore been used as motives to refrain from its use.

Some limitations should be noted. First, our sample consisted predominantly of middle or high-educated sex workers and therefore we might not have identified some topics which in a more diverse study population would have come up. Second, we only included Dutch or English speaking participants. Lastly, all participants were recruited in a healthcare setting, indicating already some kind of help-seeking behaviour.

Overall, in the present study participants did express a relationship between drug use and lack of condom use or gloves use during fisting. Still, the advantages of drug use during work such as more money or better work facilitation (able to work more, being able to have same-gender sex), seem to outweigh the negative effects such as sexual dysfunction or lost inhibitions. Yet, some sex workers who engage in drug use during work, apply harm reduction strategies to minimize those negative effects. Future research could consider looking into the question how to incorporate those outcomes into specific prevention tools to reduce chances of possible STI/HIV acquisition during sex work. Furthermore, future prevention should take into account that the initiative of drug use during pay dates most often comes from the clients. Considering the specific work-related circumstances of drug use behaviour and the desire to comply to the wishes of the clients, assertiveness training for sex workers could be incorporated in such prevention programs.

The results of the present study may be considered when developing interventions targeting MSW and TSW to reduce drug use, apply harm reduction strategies or help to decrease the chances of STI/HIV acquisition during sex work. The strategies of only using drugs one is familiar with, tried before or bought by themselves, drug negotiation in advance to sex dates, and only using with known/regular clients, as well as the described problem of not feeling in control or money problems can be of use by developing interventions or preventive programs. For example, the PHS of Amsterdam has implemented a low threshold community-led counselling service for MSM who want to discuss sexualised drug use and underlying motivations during regular visits at the centre for sexual health. If desired, referral to professional substance use and psychological care is possible. We are now exploring how to translate this initiative into a possible similar service for sex workers and their specific needs. It would give sex workers a first opportunity to talk about work-related drug use and the wishes or expectations they have to either maintain using drugs (harm reduction tools or gaining a greater sense of control), to reduce or stop completely. Lastly, since there are also transgender specific circumstances with regard to drug use during work, it remains important to train health service providers on transgender sensitivity and health issues.

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TABLES

Table 1. Socio-demographics, sex work characteristics, drug use characteristics and mental health issues among 23 male and transgender sex workers interviewed in Amsterdam, The Netherlands 2018.

	Total
N participants	23
Median age of years	32 (range 24-49)
Assigned male at birth	23
Gender identity	
Man	15
Transgender woman	6
Gender fluid	1
Woman	1
Country of birth	
The Netherlands	8
Europe ¹	9
Latin America or the Caribbean ²	6
Education level³	
High	9
Middle	13
Low	1
Gender of clients	
Men only	17
Women only	1
Men and women	5
Gender of private sex partners	
Men only	19
Women only	2
Both	2
HIV status	
HIV positive	5
HIV negative	18
Of whom pre-exposure prophylaxis users	4
Sex work location (more answers possible)	
Window prostitution	2
Sex club (brothel)	7
Porn industry	1
Home (own, client)/hotel via internet and apps	17
Sexualized drug use overall	
Any drug use during work & private	21
No drugs at all	2
No illicit drugs during work ⁴	7

Table 1. *Continued.*

	Total
Sexualized illicit drugs during work only [during work & private]	
Cocaine	12 [14]
Gamma-hydroxybutyrate/gamma-butyrolacton (GHB/GBL)	8
MDMA/XTC	7 [10]
Crystal methamphetamine	4 [5]
Amphetamine/speed	3 [4]
LSD/psychedelics	2
Ketamine	1
Mephedrone	1
Tolerated⁵ drugs during work only [during work & private]	
Alcohol	19 [21]
Poppers	5 [6]
Marihuana	2 [4]

¹Belgium n=1, Spain n=2, Greece n=1, Hungary n=2, Romania n=2, Poland n=1. ²Brazil n=1, Argentina n=1, Suriname n=1, South America (not specified) n=1, Bonaire n=1, Jamaica n=1. ³High education level: University/College degree; Middle education level: Highschool degree, Practical education; Low education level: primary education. ⁴n=3 of them reported the use of illicit drugs during private sex. ⁵In The Netherlands the possession of a soft drug (Marihuana, Poppers) for personal use is tolerated, meaning the sale of the drug in coffee shops is a criminal offence but the Public Prosecution Service does not prosecute coffee shops for this offence.

Table 2. Motives for using or not using drugs during sex work among 23 male and transgender sex workers interviewed in Amsterdam, The Netherlands 2018.

Motives for using drugs during sex work		Motives for not using drugs during sex work	
Self-oriented motives	Quotes	Self-oriented motives	Quotes
Work facilitation			
o Makes work easier	<ul style="list-style-type: none"> • Interviewee #1 "But yeah, it was just easier for me to do sex work back then. In combination with drugs." 	o Clear mind	<ul style="list-style-type: none"> • Interviewee #20 "I don't use drugs, I don't drink alcohol either. Well, in my private life. I just drink alcohol then. But when I'm at work, I have to keep my mind clear."
o Work more	<ul style="list-style-type: none"> • Interviewee #1 "Yes I used often. Mostly during night dates when you have to work the whole night." 	o Control situation	<ul style="list-style-type: none"> • Interviewee #24 "If you have used something yourself, things become blurry. Likewise you should not participate in traffic while on drugs. And it's also the same during work. So it makes it more difficult to control the situation."
o Have enough energy	<ul style="list-style-type: none"> • Interviewee #22 "I had some cocaine but with the other guy...with the other escorts. So it happened with the client, it was just because I was really, really exhausted." 	o Keep track of time	<ul style="list-style-type: none"> • Interviewee #24 "It only makes it more difficult to keep track on time."
o Be able to have same gender sex	<ul style="list-style-type: none"> • Interviewee #18 "Because I'm not bisexual. But with that drug, it was like, I liked everything." 	o Control safe sex	<ul style="list-style-type: none"> • Interviewee #14 "Well, yes of course. When you use drugs, you are not even thinking of the condom."

	Professional distance	Quotes
Money	<ul style="list-style-type: none"> • Interviewee #12 "Once I had a customer who wanted to smoke coke, and I had never done it, so I said well, it is an experience, but then I want 750 euros for it - for those three hours. So 250 euros more than usual. I say because you want to use drugs, I have to do that to my body. After that I can no longer work." 	<ul style="list-style-type: none"> • Interviewee #2 "I would like to do coke with you sometime. No, twice, but then I turn it down. It's also easy because I'm not gay. The idea of free drugs and money is attractive, but, I don't want to connect to anyone sitting across from me."
Pleasure	<ul style="list-style-type: none"> • Interviewee #9 "He had drugs. Then I thought: well, I want that too. And I notice that uh with G (GHB) you have a bit more fun than without drugs." 	<ul style="list-style-type: none"> • Interviewee #12 "When I have sex, I have - I'd rather just be sober. I like it the best when I am there, I can feel everything."
Client-oriented motives	Quotes	Quotes
Compliance	Professional performance	
<ul style="list-style-type: none"> o Clients asks for it o Makes client happy 	<ul style="list-style-type: none"> o Preserve sexual functioning 	<ul style="list-style-type: none"> • Interviewee #21 "I don't use it while working because otherwise I don't get an erection." • Interviewee #24 "I have to perform. Must deliver something. And... if you are on drugs, it becomes more difficult."

Chapter 7

HIV and STI positivity rates among transgender people attending two large STI clinics in the Netherlands



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ABSTRACT

Background

Global data show that transgender people (TGP) are disproportionately affected by HIV and sexually transmitted infections (STIs); however, data are scarce for Western European countries. We assessed gender-identities, sexual behaviour, HIV prevalence and STI positivity rates, and compared these outcomes between TGP who reported sex work and those who did not.

Methods

We retrospectively retrieved data from all TGP who were tested at the STI clinics of Amsterdam and The Hague, the Netherlands in 2017 and 2018. To identify one's gender-identity a "two-step" methodology was used assessing, first, the assigned gender at birth (male at birth (AMAB)) or female at birth (AFAB)) and second, clients were asked to select one gender-identities that currently applies: 1) transgender man/transgender woman, 2) man and woman, 3) neither man nor woman, 4) other and 5) not known yet. HIV prevalence, bacterial STI (chlamydia, gonorrhoea and/or infectious syphilis) positivity rates and sexual behaviour were studied using descriptive statistics.

Results

TGP reported all five categories of gender-identities. In total 273 TGP-AMAB (83.0%) and 56 TGP-AFAB (17.0%) attended the STI clinics. Of TGP-AMAB, 39/267 (14.6%; 95% CI, 10.6-19.4%) were HIV-positive, including two new diagnoses and bacterial STI positivity was 15.0% (40/267, 95% CI, 10.9-19.8%). Among TGP-AFAB, bacterial STI positivity was 5.6% (3/54, 95% CI, 1.2-15.4) and none were HIV-positive. Sex work in the past 6 months was reported by 53.3% (137/257, 95% CI, 47.0-59.5%) of TGP-AMAB and 6.1% (3/49, 95% CI, 1.3-16.9%) of TGP-AFAB. HIV prevalence did not differ between sex workers and non-sex workers.

Conclusion

Of all TGPs attending the STI clinics, the majority were AMAB of whom more than half engaged in sex work. HIV prevalence and STI positivity rates were substantial among TGP-AMAB, and much lower among TGP-AFAB. Studies should be performed to provide insight into whether the larger population of TGP-AMAB and TGP-AFAB are at risk for HIV and STI.

INTRODUCTION

The epidemiology of HIV and bacterial STIs among transgender women (TGW) (i.e. individuals whose sex assigned at birth was male and currently self-identify as female) varies widely across different populations and settings (1). Results have shown that TGW are disproportionately affected by HIV and may be similarly susceptible to other STIs (1). In a meta-analysis, the pooled HIV prevalence in TGW worldwide was estimated at 19.1% (95% CI 17.4–20.7)(1). Studies on HIV and STI in transgender men (TGM) (i.e. individuals whose sex assigned at birth was female and now identify as male) are scarce and often relatively small (2-4). A study from Australia found an HIV prevalence of 3.5 % (14/404) in TGM (5). The same study reported an STI positivity of 15.0% in TGW and 8.4% in TGM (5). Previous studies showed that sex work is prevalent among TGW due to, among other reasons, the experience of stigmatization and institutional discrimination, and for economic survival(6, 7) . In addition, sex work contributes to the HIV and STI risk. Two studies among TGW sex workers (SW) in the Netherlands found high HIV prevalence and STI positivity rates of 18.8%-20.0% and 26.0%-26.7%, respectively (8, 9). However, these outcomes are not generalizable to the broader TGW population due to selection of sub-populations (i.e., sex workers). A better understanding of the sexual behaviour of Western European TGP is required to improve healthcare policy and intervention programs. Moreover, most studies focus only on TGW and TGM, omitting other gender-identities. However, there is a spectrum of gender-identities outside the gender binary conformity, also called gender non-binary(10). High-quality epidemiological data of TGP (including non-binary TGP) is needed to better assess the sexual health needs of this population(11). To address the broader spectrum of gender-identities, we primarily use in this manuscript – instead of TGW and TGM - the terms TGP assigned male at birth (TGP-AMAB) and TGP assigned female at birth (TGP-AFAB) followed by their current gender-identity.

We assessed sexual behaviour, HIV prevalence and STI positivity rates among TGP with various gender-identities attending the STI clinics of Amsterdam and The Hague and compared these outcomes between TGP who reported engaging in sex work and those who did not.

MATERIALS AND METHODS

Study sites and population

The Centre for Sexual Health/STI clinic of Amsterdam and the Centre for Sexual Health of The Hague are two of the largest STI outpatient clinics of the Netherlands, performing around 51,000 and 12,000 STI consultations annually (respectively) (12, 13) which amounts around 41% of the total number of STI consultation performed at all Dutch STI clinics (14). They provide anonymous and free-of-charge STI testing

and treatment to key groups including TGP. In this analysis, we used data from TGP who had at least one consultation at one of the clinics, between 1 January 2017 and 31 December 2018.

Data collection

Routinely collected data retrieved from the electronic patient files were age, ethnicity (defined according to the Statistics Netherlands on the basis of country of birth and maternal and paternal country of birth (15)), education, HIV status, gender of sexual partner(s), the number of sex partners and engaging in sex work in the preceding 6 months.

Additionally, we routinely collected the following sexual behaviour characteristics: 1) giving condomless fellatio (only data from Amsterdam), 2) condomless anal sex (CAS); receptive: if reported sex with men; insertive: if currently having a penis) and 3) condomless vaginal sex (CVS) (if currently having a vagina and reported sex with men or if currently having a penis and reporting sex with women), all in the preceding 6 months.

Educational level was divided into low (i.e., primary school or lower secondary vocational education), medium (i.e., intermediate secondary general education, higher secondary general education, senior secondary vocational education or pre-university secondary education), high (i.e., higher professional or university education) and other (not fitting in one of the other categories).

Gender-identity was determined by using the “two-step” methodology (16). Individuals were first asked about their assigned gender at birth (AMAB or AFAB), and second about their current gender-identity using the following options: 1) TGM/TGW, 2) Man and woman, 3) Neither man nor woman, 4) Other or 5) Not known yet.

Positivity rate of bacterial STI (chlamydia, gonorrhoea, and/or infectious syphilis), and prevalence of HIV were analysed for each gender-identity separately.

Obtaining ethical approval for the study was not deemed necessary according to Dutch law, as the study used routinely collected, de-identified surveillance data.

STI testing procedure

Urethral (in case of having a (neo) penis), pharyngeal (in case of giving fellatio), rectal (in case of receptive anal sex), and vaginal (in case of having a (neo)vagina) specimens were tested for *Chlamydia trachomatis* (Ct) and *Neisseria gonorrhoeae* (Ng) with the Aptima Combo 2 assay (Hologic, Marlborough, MA, USA). In asymptomatic individuals, urine, rectal, and vaginal specimens were self-collected, while in Amsterdam medical staff collected rectal and/or vaginal specimens in

symptomatic individuals. Medical staff collected pharyngeal specimens in all individuals. Those who had not previously tested HIV-positive were tested for HIV unless they actively opted out. HIV antibodies were tested with the HIV Ab/Ag test (LIAISON® XL, Diasorin, Saluggia, Italy) or Advia HIV Ab/Ag combo assay (Advia Centaur, Siemens Healthcare Diagnostics, Erlangen, Germany), and a treponemal test for syphilis serology was performed with the Treponema Screen (LIAISON® XL, Diasorin, Saluggia, Italy) or Advia Syphilis Assay (Advia Centaur, Siemens Healthcare Diagnostics, Erlangen, Germany).

Statistical analysis

We used data from the first consultation of each individual in the study period. Characteristics were compared between 1) the different gender-identities (stratified for AMAB and AFAB) and 2) SW vs. non-sex workers (NSW) using χ^2 -tests, Fisher's exact tests and Monte Carlo approximation of an Exact test for categorical variables and Kruskal Wallis tests for continuous variables. To calculate the 95% (or in case of no events 97.5%) confidence interval (CI) for proportions, the exact method was used.

Data analyses were performed with SPSS package v21.0 (SPSS, Chicago, Illinois, USA) and STATA v15.1 (StataCorp, College Station, Texas, USA). A *p* value of <0.05 was considered statistically significant.

RESULTS

Gender-identities of study population

Between 1 January 2017 and 31 December 2018, 329 unique TGP attended the STI clinics with a total of 656 consultations. Of those 329 unique TGP, 273 (83%) were AMAB and 56 (17%) were AFAB (Figure 1).

Among all TGP-AMAB, 76.2% (208/273) self-identified as TGW, 12.8% (35/273) as both man and woman 3.7% (10/273) as neither man nor woman 4.0% (11/273) as other than previous options and 3.3% (9/237) did not know how to identify themselves (Table 1). Among TGP-AFAB, 57.1% (32/56) identified as TGM, 10.7% (6/56) as male and female, 25.0% (14/56) as neither man nor woman 3.6% (2/56) as other than previous options and 3.6% (2/56) did not know how to self-identify.

Table 1. Baseline data of sociodemographic characteristics, sexual behaviour, STI diagnosis, and HIV status, according to self-identified gender of transgender people assigned male at birth (TGP-AMAB) visiting the public health services of Amsterdam and The Hague, the Netherlands, January 2017 - December 2018.

	Transgender woman n=208 (76.2%) n (%)	Man and woman n=35 (12.8%) n (%)	Neither man nor woman n=10 (3.7%) n (%)	Other n=11 (4.0%) n (%)	Not known yet n (%)	P value	Total n=273 n (%)
Demographics							
Median age in years [IQR]	34 [27-44]	35 [27-39]	22 [19-27]	35 [28-47]	27 [24-34]	<0.001	33 [27-43]
Education (n=23 missing)							
Low	20 (10.5)	0	0	2 (20.0)	3 (33.3)		25 (10.0)
Middle	35 (18.3)	9 (30.0)	9 (90.0)	1 (10.0)	1 (11.1)		55 (22.0)
High	32 (16.8)	15 (50.0)	1 (10.0)	5 (50.0)	4 (44.4)		57 (22.8)
Other	104 (54.5)	9 (20.0)	0	2 (20.0)	1 (11.1)		113 (45.2)
Ethnic origin^a						.002	
The Netherlands	32 (15.4)	9 (25.7)	6 (60.0)	3 (27.3)	2 (22.2)		25 (19.0)
Asia	41 (19.7)	7 (20.0)	0	0	1 (11.1)		49 (17.9)
Africa	5 (2.4)	5 (14.3)	0	0	0		10 (3.07)
Latin America or the Caribbean	104 (50.0)	7 (20.0)	3 (30.0)	4 (36.4)	5 (55.6)		132 (45.1)
Europe	25 (12.0)	6 (17.1)	1 (10.0)	4 (36.4)	1 (11.1)		37 (13.6)
Unknown	1 (0.5)	1 (2.9)	0	0	0		2 (0.7)
Gender affirming surgery							
Vagina construction	51 (24.5)	0	0	0	0	<0.001	51 (18.7)

Sexual behaviour in past 6 months						
Median number of sex partners [IQR] ^b (missing n=26)	40 [5-275]	5 [3-35]	5 [3-17]	5 [3-13]	9 [3-31]	15 [4-200]
Sex work (missing n=16)	125/197 (63.5)	5/31 (16.1)	1/10 (10.0)	5/10 (50.0)	1/9 (11.1)	137/257 (53.3)
Sex with (missing n=6)						
Men	185 (91.1)	22 (62.9)	8 (80.0)	7 (70.0)	7 (77.8)	229 (85.8)
Women	1 (0.5)	2 (5.7)	1 (10.0)	0	0	4 (1.5)
Both	17 (8.4)	11 (31.4)	1 (10.0)	3 (30.0)	2 (22.2)	34 (12.7)
Partner type (missing n=27)						
Steady only	8 (4.1)	1 (3.3)	1 (11.1)	0	0	10 (4.1)
Casual only	111 (58.7)	19 (63.3)	6 (66.7)	9 (90.0)	7 (87.5)	152 (61.8)
Steady & casual	69 (36.5)	9 (30.0)	2 (22.2)	1 (10.0)	1 (12.5)	82 (33.3)
No sex	1 (0.5)	1 (3.3)	0	0	0	2 (0.8)
Giving fellatio^c						
Giving condomless fellatio (n=26 missing)	106/136 (77.9)	16/16 (100)	5/5 (100)	7/7 (100)	7/7 (100)	141/171 (82.5)
Anal sex						
Condomless receptive anal sex ^d (n=29 missing)	92/155 (59.4)	12/18 (66.7)	5/6 (83.3)	5/9 (55.6)	6/6 (100)	120/194 (61.9)

Table 1. Continued.

	Transgender woman n=208 (76.2%) n (%)	Man and woman n=35 (12.8%) n (%)	Neither man nor woman n=10 (3.7%) n (%)	Other n=11 (4.0%) n (%)	Not known yet n (%)	P value	Total n=273 n (%)
Condomless insertive anal sex ^e (n=31 missing)	46/88 (52.3)	12/16 (75.0)	3/4 (75.0)	4/8 (50.0)	4/4 (100)	.163	69/120 (57.5)
Vaginal sex (n=14 missing)							
Condomless vaginal sex ^f	32/48 (66.7)	6/9 (66.7)	2/2 (100)	3/3 (100)	2/2 (100)	.784	45/64 (70.3)
Bacterial STI							
Any bacterial STI ^g (n=6 missing)	28/203 (13.8)	8/35 (22.9)	2/10 (20.0)	0/10	2/9 (22.2)	.294	40/267 (15.0) ^h
Chlamydia (1 or more locations)	15/203 (7.2)	6/35 (17.1)	2/10 (20.0)	0/10	1/9 (11.1)	.318	24/267 (9.0)
Pharyngeal	2/189 (1.0)	1/33 (3.0)	0/8	0/10	0/9	.550	3/258 (1.2)
Rectal	10/197 (5.1)	5/34 (14.7)	2/9 (22.2)	0/10	1/9 (11.1)	.052	18/259 (6.9)
Urethral (penis)	2/154 (1.3)	2/35 (5.7)	0/10	0/10	1/9 (11.1)	.159	5/218 (2.3)
Urethral (neo vagina) (n=2 missing)	2/49 (4.1)	NA	NA	NA	NA		2/49 (4.1)
Gonorrhea (1 or more locations)	13/203 (6.4)	2/35 (5.7)	0/10	0/10	1/9 (11.1)	.826	16/267 (6.0)
Pharyngeal	5/199 (2.5)	2/33 (6.1)	0/9	0/10	1/9 (11.1)	.290	8/260 (3.1)
Rectal	10/197 (5.1)	1/34 (2.9)	0/9	0/10	0/9	.563	11/259 (4.2)
Urethral (penis)	0/154	0/35	0/10	0/10	0/9		0/218
Urethral (neo vagina) (n=2 missing)	0/49	NA	NA	NA	NA		0/49
Infectious syphilis (n=9 missing)	3/201 (1.5)	1/35 (2.9)	0/9	0/10	0/9	.666	4/264 (1.5)
HIV (n=6 missing)						.164	
Optout	4/203 (2.0)	1/35 (2.9)	1/10 (10.0)	0/10	0/9		6/267 (2.2)
Known positive	31/203 (15.3)	3/35 (8.6)	0	1/10 (10.0)	2/9 (22.2)		37/267 (13.9)
Negative tested	168/203 (82.8)	29/35 (82.9)	9/10 (90.0)	9/10 (90.0)	7/9 (77.8)		222/267 (83.1)
Positive tested	0	2/35 (5.7)	0	0	0		2/267 (0.7) ^h

List of used abbreviations: STI=sexually transmitted infections; IQR=interquartile range;

^eEthnicity was defined according to Statistics Netherlands (CBS) on the basis of country of birth, maternal and paternal country of birth(17). ^fGiving fellatio, vaginal and/or anal sex. ^gAmong those who reported giving fellatio (only data from Amsterdam). ^hAmong those who reported receptive anal sex with men. ⁱAmong those who reported insertive anal sex and currently have a penis. ^jAmong those who reported vaginal sex and currently having a vagina and having sex with men or if currently having a penis and having sex with women. ^kBacterial STI: Chlamydia, gonorrhoea, and/or infectious syphilis. ^lNew diagnoses among TGP AMAB who have been tested for HIV 0.9% (2/224).

Transgender persons assigned male at birth (TGP-AMAB)

Demographics and sexual behaviour

The median age of TGP-AMAB was 33 years (IQR, 27-43) and differed significantly between the gender-identities ($p < .001$) (Table 1). A high proportion of TGP-AMAB originated from Latin America or the Caribbean (132/273, 45.1%).

Genital gender-affirming surgery (gGAS) (vagina construction) was reported by 51/208 TGW (24.5%). The median number of sex partners in the past 6 months was 15 (IQR, 4-200), ranging from 5 among TGP who identify as “other” (IQR, 3-13) to 40 among TGW (IQR, 5-275) ($p < .001$).

The majority of TGP-AMAB (229/273, 85.8%) had sex with men only, whereas 1.5% had sex only with women and 12.7% with both men and women.

Receptive CAS (120/194, 61.9%), insertive CAS (69/120, 57.5%) and CVS (45/64, 70.3%) was reported often and did not differ between gender-identities.

STI and HIV diagnosis

Bacterial STI positivity was 13.8% (28/203, 95% CI, 9.4-19.3%) among TGW, 22.9% (8/35, 95% CI, 10.4-40.1%) among TGP-AMAB who self-identify as man and woman, 20.0% (2/10, 95% CI, 2.5-55.6%) among TGP-AMAB who self-identify as neither man nor woman, zero (1-sided, 97.5% CI, 0.0-30.8%) among those who identify as other than previous options, and 22.2% (2/9, 95% CI, 0.3-48.2%) among persons who do not know their gender-identity ($p = 0.294$). The association between gender-identities and a positive diagnosis of rectal chlamydia was borderline significant ($p = 0.052$) with the highest positivity rate among TGP-AMAB who self-identify as neither man nor woman (2/9, 22.2%; 95% CI, 2.8-60.0%).

Among TGP-AMAB who have been tested for HIV during their consultation, two new HIV infections were diagnosed (2/224, 0.9%; 95% CI, 0.1-3.2%). Of all TGP-AMAB, 39/267 (14.6%; 95% CI, 10.6-19.4%) were HIV-positive (37 known positive and 2 newly diagnosed).

Sex workers vs. non-sex workers (TGP-AMAB)

More than half (137/257, 53.3%; 95% CI, 47.0-59.5%) of all TGP-AMAB reported sex work in the past 6 months, with the highest proportion among TGW (125/197, 63.5%). TGP-AMAB who engaged in sex work in the past 6 months were significantly older (median 38 vs. 29; $p < 0.001$) more often originated from Latin America or the Caribbean (84/137, 61.3% vs. 37/120, 30.8%; $p < 0.001$) and more often underwent gender-affirming surgery (34/137, 24.8%) than NSW (12/120, 10.0%, $p = 0.002$) (Table 2).

Table 2. Baseline data of sociodemographic characteristics, sexual behaviour, STI diagnosis, and new HIV diagnosis, according to self-identified gender of transgender people assigned male at birth (TGP-AMAB) visiting the public health service of Amsterdam and The Hague, the Netherlands, January 2017 - December 2018, comparing sex workers versus non-sex workers.

Sex work in past 6 months (n=16 missing)^a	Sex workers n=137 (53.3%) n (%)	Non-sex workers n=120 (46.7%) n (%)	P value	Total n=257 n (%)
Demographics				
Median age in years [IQR]	38 [31-47]	29 [24-36]	<0.001	33 [27-44]
Education (n=11 missing)			<0.001	
Low	12 (9.2)	13 (11.2)		25 (10.2)
Middle	15 (11.5)	38 (32.8)		53 (21.5)
High	16 (12.3)	39 (33.6)		55 (22.4)
Other	87 (66.9)	26 (22.4)		113 (45.9)
Ethnic origin^b			<0.001	
The Netherlands	16 (11.7)	33 (27.5)		49 (19.1)
Asia	16 (11.7)	25 (20.8)		41 (16.0)
Africa	4 (2.9)	5 (4.2)		9 (3.5)
Latin America and the Caribbean	84 (61.3)	37 (30.8)		121 (47.1)
Europe	17 (12.4)	19 (15.8)		36 (14.0)
Unknown	0	1 (0.8)		1 (0.4)
Gender affirming surgery				
Vagina construction	34 (24.8)	12 (10.0)	.002	46 (17.9)
Sexual behaviour in past 6 months				
Median number of sex partners [IQR] ^c (n=26 missing)	155 [3-400]	4 [2-10]	<0.001	15 [4-200]
Sex with			.029	
Men	123 (89.8)	97 (80.8)		220 (85.6)
Women	0	4 (3.3)		4 (1.6)
Both	14 (10.2)	19 (15.8)		33 (12.8)
Partner type (n=27 missing)			.002	
Steady only	1 (0.7)	9 (8.3)		10 (4.1)
Casual only	83 (60.6)	69 (63.3)		152 (61.8)
Steady & casual	53 (38.7)	29 (26.6)		82 (33.3)
No sex	0	2 (1.8)		2 (0.8)
Giving fellatio^d			<0.001	
Giving condomless fellatio (n=26 missing)	70/98 (71.4)	71/73 (97.3)		141/171 (82.5)
Anal sex				
Condomless receptive anal sex ^e (n=31 missing)	62/111 (55.9)	58/83 (69.9)	.053	120/194 (61.9)
Condomless insertive anal sex ^f (n=31 missing)	42/80 (52.5)	27/40 (67.5)	.170	69/120 (57.5)

Table 2. *Continued.*

Sex work in past 6 months (n=16 missing)^a	Sex workers n=137 (53.3%) n (%)	Non-sex workers n=120 (46.7%) n (%)	P value	Total n=257 n (%)
Vaginal sex^g (n=14 missing)				
Condomless vaginal sex	29/41 (70.7)	16/23 (69.6)	.999	45/64 (70.3)
Bacterial STI				
Any bacterial STI^h (n=1 missing)	16/137 (11.7)	23/119 (19.3)	.116	39/256 (15.2)
Chlamydia	11/137 (8.0)	12/119 (10.1)	.663	23/256 (9.0)
Pharyngeal	1/137 (0.7)	2/110 (1.8)	.587	3/247 (1.2)
Rectal	8/136 (5.9)	9/113 (8.0)	.616	17/249 (6.8)
Urethral (penis)	1/103 (1.0)	4/107 (3.7)	.369	5/210 (2.4)
Urethral (vagina)	1/34 (2.9)	1/12 (8.3)	.999	2/46 (4.3)
Gonorrhea	7/137 (5.1)	9/119 (7.6)	.291	16/256 (6.2)
Pharyngeal	3/137 (2.2)	5/112 (4.5)	.473	8/249 (3.2)
Rectal	5/136 (3.7)	6/113 (5.3)	.553	11/249 (4.4)
Urethral (penis)	0/103	0/107		0/210
Urethral (vagina)	0/34	0/12		0/46
Infectious syphilis	1/136 (0.7)	3/117 (2.6)	.338	4/253 (1.6)
HIV (n=1 missing)			.204	
Optout	1/137 (0.7)	4/119 (3.4)		5/256 (2.0)
Known positive	20/137 (14.6)	16/119 (13.4)		36/256 (14.1)
Negative tested	116/137 (84.7)	97/119 (81.5)		213/256 (83.2)
Positive tested	0	2/119 (1.7) ⁱ		2/256 (0.8)

List of used abbreviations: STI=sexually transmitted infections; IQR=interquartile range;

^an=16 excluded of analysis. ^bEthnicity was defined according to Statistics Netherlands (CBS) on the basis of country of birth, maternal and paternal country of birth(17). ^cGiving fellatio, vaginal and/or anal sex. ^dAmong those who reported giving fellatio (only data from Amsterdam). ^eAmong those who reported receptive anal sex with men. ^fAmong those who reported insertive anal sex and currently having a penis. ^gAmong those who reported vaginal sex and currently having a vagina and having sex with men or if currently having a penis and having sex with women. ^hBacterial STI: Chlamydia, gonorrhea, and/or infectious syphilis. ⁱNew diagnoses among non-sex workers TGP-AMAB who have been tested for HIV 2.0% (2/99).

SWs had significantly more sex partners in the past 6 months, compared to NSW (median: 155 vs. 4; $p < 0.001$). SW reported borderline significantly less receptive CAS than NSW (62/111, 55.9% vs. 58/86, 69.9%; $p = 0.053$).

The bacterial STI positivity rate was 11.7% (13/137, 95% CI, 6.8-18.3%) among SW and 19.3% (23/119, 95% CI, 12.7-27.6%) among NSW ($p = 0.116$). The HIV prevalence was 20/137 (14.6%; 95% CI, 9.2-21.6%) among SW and 18/119 (15.1%; 95% CI, 9.2-22.8%) among NSW ($p = 0.204$). Among SW, no new HIV infections were diagnosed, compared to two new HIV diagnoses (2/99; 2.0%; 95% CI, 0.2-7.1%) among NSW.

Transgender persons assigned female at birth (TGP-AFAB)

Demographics and sexual behaviour

The median age of TGP-AFAB was 24 years (IQR, 21-31) and did not differ across the gender-identities ($p = 0.938$) (Table 3). Most TGP-AFAB were of Dutch origin (25/56, 44.6%) and ethnic origin did not differ between gender-identities ($p = 0.918$).

gGas (penis construction) was only reported among TGM (3/37, 9.7%). Receptive CAS (8/12, 66.7%; $p = 0.774$) and CVS (21/30, 70.0%; $p = 0.157$) was reported often and did not differ between gender-identities.

The median number of sex partners in the previous 6 months among TGP-AFAB was 3 (IQR, 1-6) and did not differ between gender-identities ($p = 0.920$). Only three individuals (3/49, 6.1%; 95% CI, 1.3-16.9%) reported sex work in the previous 6 months.

STI and HIV diagnosis

Chlamydia was diagnosed among TGM (2/31, 6.5%; 95% CI, 0.8-21.4%) and individuals who self-identify as neither man nor woman (1/13, 7.7%; 95% CI, 0.2-36.0%) ($p = 0.999$). No other bacterial STI or HIV infections were found among TGP-AFAB. Likewise, no one was known to be HIV-positive.

Table 3. Baseline data of sociodemographic characteristics, sexual behaviour, STI diagnosis, and HIV status, according to self-identified gender of transgender people assigned female at birth (TGP-AFAB) visiting the public health service of Amsterdam and The Hague, the Netherlands, January 2017 - December 2018.

	Transgender men n=32 (57.1%) n (%)	Man and woman n=6 (10.7%) n (%)	Neither man nor woman n=14 (25.0%) n (%)	Other n=2(3.6%) n (%)	Not known yet n=2 (3.6%) n (%)	P value	Total n=56 n (%)
Demographics							
Median age in years [IQR]	26 [21-32]	23 [20-30]	23 [20-31]	-*	-*	.938	24 [21-31]
Education (n=9 missing)						.258	
Low	2 (8.0)	2 (40.0)	0	0	0		4 (8.5)
Middle	8 (32.0)	0	1 (7.7)	0	0		9 (19.1)
High	13 (52.0)	2 (40.0)	9 (69.2)	2 (100)	2 (100)		28 (59.6)
Other	2 (8.0)	1 (20.0)	3 (23.1)	0	0		6 (12.8)
Ethnic origin^a							
The Netherlands	14 (43.8)	2 (33.3)	6 (42.9)	2 (100)	1 (50.0)	.918	25 (44.6)
Asia	4 (12.5)	0	1 (7.1)	0	0		5 (8.9)
Africa	2 (6.2)	2 (33.3)	3 (21.4)	0	0		7 (12.5)
Latin America and the Caribbean	3 (9.4)	1 (16.7)	1 (7.1)	0	1 (50.0)		6 (10.7)
Europe	5 (15.6)	1 (16.7)	1 (7.1)	0	0		7 (12.5)
Unknown	4 (12.5)	0	2 (14.3)	0	0		6 (10.7)
Gender affirming surgery							
Penis construction (n=1 missing)	3/31 (9.7)	0	0	0	0	.752	3/55 (5.5)
Sexual behaviour in past 6 months							
Median number of sex partners [IQR] ^b (n=9 missing)	4 [1-8]	3 [1-8]	3 [1-6]	-*	-*	.920	3 [1-6]
Sex work (n=7 missing)	1/26 (3.8)	1 (16.7)	1/13 (7.7)	0	0	.999	3/49 (6.1)
Sex with (n=2 missing)							
Men	16 (51.6)	1 (16.7)	3 (23.1)	1 (50)	0	.201	21 (38.9)
Women	7 (22.6)	1 (16.7)	2 (15.4)	0	0		10 (18.5)
Both	8 (25.8)	4 (66.7)	8 (61.5)	1 (50)	2 (100)		23 (42.6)

Table 3. Continued.

	Transgender men n=32 (57.1%) n (%)	Man and woman n=6 (10.7%) n (%)	Neither man nor woman n=14 (25.0%) n (%)	Other n=2(3.6%) n (%)	Not known yet n=2 (3.6%) n (%)	P value	Total n=56 n (%)
Partner type (n=22 missing)	18/32	4/6	8/14			.200	34/56
Steady only	2 (11.1)	0	0	0	0		2 (5.9)
Casual only	13 (72.2)	2 (50.0)	2 (25.0)	2 (100)	1 (50.0)		20 (58.8)
Steady & casual	3 (16.7)	2 (50.0)	5 (62.5)	0	1 (50.0)		11 (32.4)
No sex	0	0	1 (12.5)	0	0		1 (2.9)
Giving fellatio^c							
Giving condomless fellatio (n=18 missing)	13/13 (100)	3/3 (100)	5/5 (100)	0	2/2 (100)		23/23 (100)
Anal sex							
Condomless receptive anal sex ^d (n=9 missing)	4/8 (50.0)	1/1 (100)	1/1 (100)	0	2/2 (100)	.774	8/12 (66.7)
Condomless insertive anal sex ^e (n=1 missing)	0/2	NA	NA	NA	NA		0/2
Vaginal sex^f (n=8 missing)							
Condomless vaginal sex	11/13 (84.6)	3/5 (60.0)	3/8 (37.5)	2/2 (100)	2/2 (100)	.157	21/30 (70.0)
Bacterial STI							
Any bacterial STI^g (n=2 missing)	2/31 (6.5)	0/6	1/13 (7.7)	0/2	0/2	.999	3/54 (5.6)
Chlamydia (1 or more locations)	2/31 (6.5)	0/6	1/13 (7.7)	0/2	0/2	.999	3/54 (5.6)
Pharyngeal	1/23 (4.3)	0/6	0/11	0/1	0/2	.999	1/43 (2.3)
Rectal	1/24 (4.2)	0/6	0/11	0/1	0/2	.999	1/44 (2.3)
Urethral (vagina)	1/26 (3.8)	0/6	1/13 (7.7)	0/2	0/2	.999	2/49 (4.1)
Urethral (neo penis)	0/3	NA	NA	NA	NA		0/3

Gonorrhea (1 or more locations)	0/31	0/6	0/13	0/2	0/2	0/54
Pharyngeal	0/23	0/6	0/11	0/1	0/2	0/43
Rectal	0/24	0/6	0/11	0/1	0/2	0/44
Urethral (vagina)	0/25	0/6	0/13	0/2	0/2	0/48
Urethral (neo penis)	0/3	NA	NA	NA	NA	0/3
Infectious syphilis	0/29	0/6	0/11	0/2	0/2	0/50
HIV (n=2 missing)						.727
Optout	2/31 (6.5)	0	2/13 (15.4)	0	0	4/54 (7.4)
Known positive	0	0	0	0	0	0
Negative tested	29/31 (93.5)	6 (100)	11/13 (84.6)	2 (100)	2 (100)	50/54 (92.6)
Positive tested	0	0	0	0	0	0

List of used abbreviations: STI=sexually transmitted infections; IQR=interquartile range; NA=not applicable

*Too small sample size to calculate median and IQR (n=2). ^aEthnicity was defined according to Statistics Netherlands (CBS) on the basis of country of birth, maternal and paternal country of birth(17). ^bGiving fellatio, vaginal and/or anal sex. ^cAmong those who reported giving fellatio (only data from Amsterdam). ^dAmong those who reported receptive anal sex with men. ^eAmong those who reported insertive anal sex and currently having a penis. ^fAmong those who reported vaginal sex and currently having a vagina and having sex with men or if currently having a penis and having sex with women. ^gBacterial STI: Chlamydia, gonorrhea, and/or infectious syphilis.

DISCUSSION

In this study, we found that the majority of TGP-AMAB identified as transwomen (76.2%). In contrast, 57.1% of the TGP-AFAB identified as transmen, yet a considerable proportion reported other identities, for example 25% identified as neither man nor woman. This indicates that non-binary gender-identities are important characteristics of the TGP population, especially for TGP-AFAB. A larger number of TGP-AMAB than TGP-AFAB attended the STI clinics. Compared to TGP-AFAB, the positivity rate for bacterial STI was high among TGP-AMAB. The HIV prevalence among TGP-AMAB was 14.6%. Among all TGP-AMAB who have been tested for HIV, 0.9% were newly diagnosed, whereas none of the TGP-AFAB were HIV-positive. In contrast to TGP-AFAB, a substantial part of TGP-AMAB engaged in sex work. The HIV prevalence among TGP-AMAB sex workers was comparable to TGP-AMAB non-sex workers, whereas the STI positivity rate among TGP-AMAB sex workers was lower than that of TGP-AMAB non-sex workers.

The implementation of a “two-step gender-identity question method” led to an almost 5-times increase in identifying the gender-identity of TGP at STI clinics in the USA (16, 18). Since 2017, the STI clinics of Amsterdam and The Hague use a comparable two-step method by first asking all clients their assigned gender at birth, and second about their current gender-identity with five subcategories. Although no comparison can be made with the period before 2017 (gender-identity was not assessed), the number of TGP visiting the STI clinics seems relatively low. In the study period, TGP constitute merely 0.5% of the total population attending the STI clinics of Amsterdam and The Hague (data not shown), matching the estimated 0.6% of TGP in the total Dutch population (12, 13, 19). However, the attending rate might still be low as there is a likely higher proportion of TGP living in big cities like Amsterdam and The Hague. Studies from the United States demonstrate that factors which may discourage TGP from entering sexual health care include shame of being associated with STI or HIV, fear of stigma and discrimination and experiencing non-gender-affirming sexual health care (20, 21).

In our study, we found that among TGP-AMAB 0.9% were newly diagnosed with HIV. Compared to this group, the proportion of new HIV diagnoses among cisgender MSM, heterosexual men and women visiting the STI clinic of Amsterdam and The Hague in 2017-2018 were 0.5% vs. 0.1% vs. 0.1%, respectively. Furthermore, none of the TGP-AFAB were diagnosed with HIV. The latter is in line with the rates found in the few existing studies among transgender men in global literature limited by small sample sizes (ranging from 0% to 4%) (3, 4, 22).

Similar to the difference in HIV, TGP-AFAB (5.6%) show a substantially lower positivity rate of bacterial STI than TGP-AMAB (15.0%). Moreover, the positivity rate of STI in cisgender MSM, heterosexual men and women (19.1% vs. 15.9% vs. 13.1%, respectively) attending the STI clinic of Amsterdam and The Hague in 2017-2018, seems to correspond with that of TGP-

AMAB, suggesting that STI attendees from these groups are equally affected by STI (Personal communication with data-manager of the STI clinic Amsterdam and The Hague, Kroone M). Consequently, in the Dutch setting, TGP-AFAB might be seen as a group within the TGP that is less at risk to contract an STI.

In our study, a significant proportion (53.5%) of TGP-AMAB visiting the STI clinics engaged in sex work, which mirrors the reported 44% of TGW engaging in sex work in the USA (23). Compared to NSWs, SWs in our study showed characteristics which likely increased HIV prevalence, namely: older age (with accumulating numbers of lifetime partners) and having a higher median number of sex partners in the past 6 months(24). We found that the HIV prevalence between SW and NSW was comparable (14.6% vs. 15.1%). Although not statistically significant, bacterial STI positivity rates were lower among SW compared to NSW (11.7% vs. 19.3%) and no new HIV diagnoses were found among SW compared to two (2.0%) among NSW. In previous studies, the likelihood of STI was also lower in transgender SW than NSW(5). An explanation might be that SW are more aware of their risk and have taken safety precautions to reduce the risk of acquiring STI. As reported in this study, SW more often used condoms during anal sex.

Another HIV risk-enhancing factor might be CVS. Irrespective of gender-identity, a majority (70%) of TGP engaged in CVS. In TGP-AFAB who have not undergone gGAS, CVS might increase the risk of contracting HIV, since testosterone use can cause vaginal dryness and atrophy (3). This also applies for TGP-AMAB who underwent gGAS and have more risk of neovaginal lesions due to dryer and atrophic mucosa (4).

Our study has some limitations. First, our findings are not generalizable to all TGP, as in general the HIV and STI positivity rates of clients of sexual health clinics are higher than among the general population. Secondly, only the gender – male or female – of sexual partners of the participants was asked, resulting in uncertainty about whether these partners are TGP. Thirdly, the subgroups of gender-identities have small sample sizes. Therefore, our results must be interpreted with caution. Fourthly, data on educational level was categorized as ‘other’ for more than 50%, mainly among TGP born outside the Netherlands. It may be possible that those educated in other countries have difficulty equating their education level to one of the levels in the Dutch system. Lastly, we did not consult the TGP community members to discuss the validity of the self-identified gender assignment.

Despite these limitations, we explored the epidemiology of HIV and STI among gender-diverse people (five different sub-categories) attending two large STI clinics in the Netherlands. Moreover, we reported current genital anatomy, surgical history and anatomic sites of sexual exposure, leading to a broader picture of the sexual health of the TGP included in the study.

Physicians and other health providers taking care of TGP should take into account the different gender-identities among TGP, as they vary in sexual behaviour, and involve TGP community members in the care provided. In our study, a larger proportion of TGP-AMAB than TGP-AFAB attended the STI clinics and no new or known HIV infection was found among TGP-AFAB. It is unknown if they experience barriers or if they are truly not at risk of HIV or STI. To address this issue, we will conduct a prospective study among TGP in care at a TGP clinic with larger unbiased sample sizes and we will include detailed information on the gender of their sexual partners. This could help STI clinics and other services meet specific sexual health needs of gender-diverse communities. Moreover, with in-depth interviews with TGP and focus-group sessions, we will seek community involvement to provide insight into barriers to attending STI clinics experienced by TGP, and how these can be eliminated.

We advise health care providers working with TGP to offer routine HIV testing at a low threshold to TGP with an increased risk of HIV infection and STI. Moreover, TGP are included as a key group for HIV pre-exposure prophylaxis (PrEP) in most guidelines, but uptake is low(25, 26). The commitment of gender-affirming health care facilities, and community involvement are needed to increase PrEP uptake.

In conclusion, we report the first study in the Netherlands assessing sexual behaviour, HIV prevalence and STI positivity rates among TGP with five different gender-identities visiting the STI clinics of Amsterdam and The Hague and compared these outcomes between TGP who reported sex work and those who did not. STI clinics serve more TGP-AMAB than TGP-AFAB and the majority of TGP-AMAB seen in these clinics are engaged in sex work. HIV prevalence and STI positivity rates were substantial among TGP-AMAB and lower among TGP-AFAB, but sample sizes were small and testing uptake might be low. Studies should be performed to provide insight into whether the larger population of TGP-AMAB and TGP-AFAB are at risk for HIV infection and STI.

Key messages

- Non-binary gender-identities are important characteristics of transgender STI clinic visitors, especially those assigned female at birth.
- Given the differences in demographics and sexual behaviour, transgender people (TGP) should not be categorised and served as one single group.
- HIV and STI are more prevalent in TGP assigned male at birth (TGP-AMAB) than in TGP assigned female at birth (TGP-AFAB) attending STI clinics in the Netherlands.
- Future research into the sexual health needs of gender-diverse communities and community engagement are necessary to improve sexual health care.

Competing interest

None declared.

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Patient consent / Ethics approval

Obtaining ethical approval for the study was not deemed necessary according to Dutch law, as the study used routinely collected, de-identified surveillance data.

Contributors

SD, CD, MvR, EH and HdV designed the study protocol. SD performed the statistical analysis. Results were thoroughly discussed by SD, CD, EH and MvR. SD and CD drafted the paper, all authors commented on draft versions, and all approved the final version.

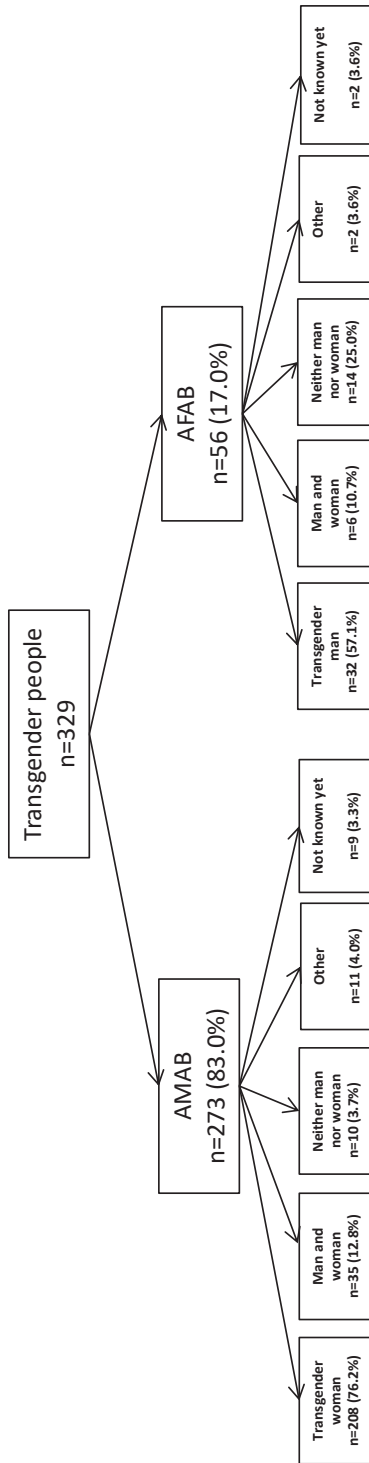


Figure 1. Gender-identities of transgender people assigned male at birth (AMAB) and female at birth (AFAB) visiting the public health service of Amsterdam and The Hague, the Netherlands, January 2017 - December 2018.

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Chapter 8

General discussion



In this thesis, we aimed to get insight in sexualised drug use and the possibly arising consequences therefrom, such as non-consensual sex and STI/HIV infections among men who have sex with men (MSM), sex workers and transgender and gender diverse people in the Netherlands. More insight could assist with the development of intervention strategies or preventative programs in general, as well as to form recommendations for our healthcare policy at the centre for sexual health (CSH) of Amsterdam. To get those insights, we started with the investigation of sexualised drug use (chemsex; **chapter 2**) and its associations with non-consensual sex (**chapter 3**). In **chapter 4**, we studied patterns in sexualised drug use and identified latent classes based on specific drugs and the associations with sexual behaviour and STI positivity. Next to the MSM population, we quantified sexualised drug use (**chapter 5**), and described the motives of sexualised drug use during sex work (**chapter 6**) among cisgender male and transgender women sex workers. Lastly, in **chapter 7**, we investigated sexual behaviour of the total group of transgender and gender diverse visitors at the CSH, differentiating between multiple gender identities.

In response to the findings of this thesis, the general discussion aims to provide implications for sexual health research and sexual health prevention.

8.1 SEXUALISED SUBSTANCE USE

For an impression of how peer-to-peer support works at the centre of sexual health of Amsterdam, here, I present a report of a peer counsellor after a chemsex counselling session.

Client returned after agreeing on some goals together with the peer counsellor. Person explained how the last meeting had been really helpful when traveling back to his home country for a month. Managed to stay sober the entire time there and was able to enjoy the time with his family, avoided using Grindr and just had a recharge making connections stronger with family members. Once arriving back in the Netherlands, he found it hard to be once again confronted with recreational drug use. Until one specific party, he had stayed sober. During this event, he had used some drugs but no Tina (Crystal Methamphetamine).

After this, he went to another European capital for a couple of weeks and was confronted more regularly by Tina and the chemsex scene. He was with a friend who had opened up about his use and ended up smoking a bit. After doing a couple of puffs he decided this is not what he wanted and stopped. He explained that he found it really confusing, how he could open up to someone and that they would then bring him into an environment where it was being used. We discussed how he was worried about his friend, and I kindly reminded him who is caring and looking

after you? He very much agreed. We then discussed the harsh reality that sometimes during the process of kicking addiction we may have to avoid certain people and not put ourselves in certain scenarios that make us have to work extra hard to say no. Also to keep asking yourself the question “why am I stopping?” What is my reason and to hold onto that. He then said that this had helped him several times in the last 6-8 weeks and kept his focus on it.

Even though he had made some huge improvements he was still not sure if he wanted to be completely sober, but wanted to be more aware of the decisions he was making when using. He wanted to focus on another month sober and see how it goes from then, but got a lot out of the last month.

He thanked us and said that he had gotten a lot out of the honest conversations.

A really beautiful and honest conversation is the reason I wanted to partake in this chemsex counselling project.

8.1.1 Implications for sexual health research

In the past years, sexualised drug use among MSM has gained more attention in research. A large number of studies, including **chapter 2** and **chapter 4** of this thesis, have demonstrated associations between sexualised drug use and higher risk of contracting STI/HIV [1-4]. Fewer studies, however, focus on the impact sexualised drug use has on one's sexual and psychological well-being or on the question, “When is sexualised drug use perceived as an actual problem by the user?” [2, 5-7]. A starting point to understand the transition among MSM from recreational users to problematic users is made by Platteau and colleagues (2019), who differentiated in their theoretical framework six stages: loneliness and emptiness, search for connection, sexual connection, chemsex connection, problematic chemsex, and severe health impact [5]. The authors also emphasize that not all users go through all stages or experience severe health impact, and that a set of other facilitating factors (such as social media or sex work) could play a role in those stages. To develop effective prevention tools for problematic use, further research should investigate predictors and determinants for problematic sexualised drug use. Moreover, future research should investigate facilitators and barriers for help-seeking behaviour among MSM who experience (or who do not experience, but actually show) problematic sexualised substance use [2]. Everts et al. (2020) showed in their study that 23% of MSM engaging in sexualised drug use reported a need for professional counselling, preferably by sexual health experts [8]. However, an earlier RCT study at the CSH of Amsterdam showed that motivating MSM for help-seeking behaviour through screening for, and providing feedback on, problematic drug use did not lead to more referrals to addiction care providers [9].

8.1.2 Implications for sexual health prevention

As discussed in **chapter 2**, having a high prevalence of MSM visitors to the CSH who engage in chemsex, we implemented a community-led counselling service for MSM who want to talk about their chemsex experiences. This counselling service — intended to provide low-threshold help — is run by volunteers who are peers, know the chemsex scene, are open minded and are educated by professionals in motivational interviewing and basic drug knowledge. The peers are a first point of contact for many men who otherwise do not dare to talk about their chemsex behaviour. The peers also refer men to other organizations who offer professional help for those who use substances (in combination with sex).

Overall, sexual health prevention, support and treatment options should take into account that sexualised drug use is not always experienced as a problem, and that it is a socially sensitive problem as men worry about being judged by health professionals providers [7]. However, MSM express a higher need of support when engaging in sexualised drug use on a regular basis, or if they haven't had sober sex in the past three months, or if they don't have any intentions to change behaviour [8].

A holistic approach to tackle the diverse needs of MSM engaging in potentially problematic sexualised drug use could help men in need. For example, harm reduction techniques can be crucially important for men who eventually express a need for support or who do not want to focus on abstinence [10, 11]. Platteau and colleagues (2020) present just-in-time adaptive interventions as a viable option for an evidence-based intervention strategy in the context of chemsex engagement [11]. Within the Chemified project, the research group developed a digital intervention for people engaging in chemsex with a mobile application that consists of the provision of information (safe drug use practices, sexual health advice, healthcare support) and dynamic support through tailored advice. The app can be used when planning to attend/actually attending or after a chemsex party [11]. Chemified intends to support users in an early stage before sexualised substance use might become problematic, and the app is considered as an addition to in-person support.

Pre-exposure prophylaxis (PrEP) and its benefits of preventing HIV is another important harm reduction approach in the context of sexualised substance use. This is especially so, since that MSM who engage in sexualised substance use show a high intention of using PrEP [12]. However, it should be noted that earlier studies indicate that substance use might interfere with adherence [13, 14].

8.2 Non-consensual sex and sexualised substance use

Menaswell has become the leading voice of sexual violence against men in the Netherlands. I present excerpts from an interview with Thomas Garrod-Pullar, the Co-Founder of Menaswell, in order to raise attention to the cause of their organisation, as they try to improve the support and visibility of men facing sexual consent issues.

What is your organization about?

“Menaswell is an organisation and campaign against sexual violence against men. Our aim is to improve the visibility of male, trans and non-binary victims of sexual violence, and also improve the support for them, as well as for the legal frameworks that protect them. We do this by working with different Sexual and Reproductive Health and Rights, LGBTQIA+ and government organisations, to ensure they’re working in a way that is gender mainstreamed and considers that men as well, can be victims of sexual violence.”

Why do you think it is important to especially focus on men, trans and non-binary people in the Netherlands who experienced sexual violence?

“[...]Menaswell is the first organisation to do this in the Netherlands. It’s important we begin to catch up on making sure sexual violence isn’t allowed to become part of a subculture, and keep marginalised members of the LGBTQIA+ community safe.”

Are there differences between countries regarding sexualised substance use on sexual violence among men, trans and non-binary people?

“On a broad level, it’s important to note that the Dutch substance control laws are much more liberal than in most other countries, so the approach towards controlling behaviours related to substances, and the implications they have on society, is in many ways more relaxed. In short, the focus in the Netherlands is more on public health, and less on criminality. This means that behaviours related to substance use in general are approached with the aim of harm reduction instead of criminality reduction.”

What is the role of the government concerning sexual violence among men, trans and non-binary people in the Netherlands? (Sexual harassment bill)

“At present, the governance around sexual violence against men is weak. It’s an issue that appears to have been overlooked in the past, which we see, as the current laws contain large oversights.”

“Data at present are not available to demonstrate to us how the law is protecting men, as the gender of the victim is not recorded in the case of successful prosecution. [...] Menaswell has underlined to the Ministry of Justice the importance of gender mainstreaming laws, so that men are also protected under the new proposals.”

“The burden of evidence in sexual violence convictions must also be adapted to consider the nuances of male sexual violence. [...]”

“On a municipal level, the role of government must be to ensure that policies that aim to mitigate risk to vulnerable groups, do not lead to other vulnerable groups being harmed, such as in the case of sexualised substance use. It’s therefore important that they improve support and awareness of issues including sexually transgressive behaviours, that arise from substance use.”

8.2.1 Implications for sexual health research

The #MeToo movement is an example of how awareness, empathy and solidarity regarding survivors of sexual assault resulted in starting a broad social discussion [15]. Here in Amsterdam, activists have recently spread graffiti with comparable statements in public spaces creating awareness about sexual consent (Artists unknown, Amsterdam East, 2022).



(Translation: *NEE IS NEE* = NO IS NO)



The considerable proportion of MSM who have experienced any form of non-consensual sex (NCS) (regardless of chemsex engagement) in **chapter 3** of this thesis, requires more elucidation as well as future research. To better anticipate preventive measures in the future, a first step for researchers is to pay more attention to NCS experiences among men, and especially men in the LGBTQI+ community, as

earlier studies showed that the prevalence of such an experience is higher among MSM compared to heterosexual men and even higher among MSM engaging in sexualised substance use [10, 16-18]. It should not only start with surveillance data of the experiences of NCS among visitors at the CSH of Amsterdam — and preferably all CSH in the Netherlands — but also among visitors at other healthcare providers. As there is no clear definition of NCS and it can be experienced in many different ways, surveillance should include different terminologies of NCS. Future research should focus on these different forms of NCS to create awareness among healthcare workers and the community itself [19-21]. Tolerating sexual acts while being unconscious due to GHB overdoses or accepting the myth that male rape victims are responsible for being raped [22, 23] should not be norms or values in the MSM scene. For example, Santoro et al. (2020) briefly mention in their paper that participants described that in gay saunas older MSM were “taking advantage” of younger MSM who were “too unconscious enough to notice” [24]. Unfortunately, the authors only indirectly highlight sexual violence in the community by using “advantage taking” as the terminology to describe NCS, and no further clarification on that topic was made. I would argue that describing sexual encounters where someone is not conscious enough due to drug use to notice as “taking advantage of” is, first of all, downplaying the situation, as well as normalizing transgressive behaviour in the community. Knowing more about the factors associated with NCS experiences — also in combination with sexualised substance use — among MSM can help understanding and turning towards the question of how can NCS be prevented. In addition, qualitative research should focus on (sexual) consent communication, social manners within a peer group and its involved social norms within the community (considering different settings such as chemsex environment). McKie and colleagues (2020) highlighted the uniqueness of issues among MSM when attempting to navigate consent during sexual encounters [20]. The authors emphasised the normative pressure underlying stereotypes such as gay men’s hypersexuality and therefore not being able to set boundaries or feeling obligated to give consent to unwanted sexual interactions [20].

In **chapter 3**, we showed that while a high proportion of MSM experienced NCS in the past, only a small group indicated emotional distress afterwards. A next step should involve the exploration of the actual impact of NCS on the overall well-being of the victim. In the same context, it should be researched whether NCS experiences increases psychological problems such as a higher chance to be at risk for depression [25, 26].

8.2.2 Implications for sexual health prevention and care

In the Netherlands, the Sexual Assault Center (SAC) is an organization for everyone who has been sexually assaulted or raped [27]. Victims can call 24/7 for immediate help and are connected with a centre nearby. Even if no immediate help is needed,

anyone who wants advice or wants to talk about a NCS experience can call during office hours. The SAC offers special attention to the LGBTQI+ community, and emphasizes that it might be especially difficult for queer persons to seek help after sexual violence due to possible earlier experiences with homophobia, transphobia, discrimination or sexism [27]. However, the SAC has to be actively approached by victims. Thus, only on initiative of the victim, is help sought and actions are taken. Therefore, future prevention tools need to create awareness of NCS within the community as well as among healthcare workers from all disciplines, policy makers and community leaders working with people from the LGBTQI+ community. Additionally, recognition of the issue of NCS among the community as well as sharing individual experiences with peers could lead to a more empowered community where social norms are created to prevent sexual violence [20].

Creating awareness could start by sexual resilience and consent training in high school, regardless of gender or sexual orientation. Additionally, more knowledge about the existence of organisations providing support after an NCS experience — especially for members of the LGBTQI + community — is needed. The high proportion of MSM who have experienced any form of NCS (**chapter 3**) provided an opening for conversations among healthcare workers from different disciplines at the CSH of Amsterdam, which led to changes in the digital history taking of online appointment requests. Now, all visitors of the CSH are made aware that they can contact the SAC when any form of NCS has happened in the past. Additionally, all doctor assistants will get trained by staff of the SAC as they are the first point of contact for NCS victims calling for an appointment.

Club Church, a gay cruise club in Amsterdam is an example of a community-led initiative that actively invests in creating a tolerant and respectful space where people can have anonymous sex in a safe atmosphere. They stipulate a sexual consent policy including rules for visitors to respect others' boundaries, consensual sex and that condom use has to be respected [28]. Another illustration of how sexual consent is gaining increased attention is "Spielraum", a queer techno rave party series in Amsterdam where having sex is a possibility, not a necessity. Spielraum formed an "AWARENESS TEAM," organized by volunteers who can help with any unwanted attention, harassment or uncomfortable behaviour [29].

8.3 TRANSGENDER AND GENDER DIVERSE PEOPLE

8.3.1 Transgender and gender diverse people surveillance data in the Netherlands

To lower access barriers and improve the quality of sexual healthcare (as well as other healthcare services such as mental healthcare), a person's gender identity needs to be taken seriously. Considering previous research by Tordorff and colleagues (2019) who described that a two-step gender-identity method (sex assigned at birth **and** gender identity) instead of one-step gender identity intake question ("Are you transgender?") at an STI clinic in the USA, identified almost five-times more persons as transgender or non-binary/genderqueer [30]. In addition to the better identification of transgender and gender diverse people (TGDP), using the two-step method results in a lower missing data rate compared to the one-question method [31].

In the Netherlands, two different electronic patient file systems are being used within the CSH, and each patient file system uses different intake questions about one's gender identity. For surveillance, a pseudonymized selection of the data from the CSH (without name, address and contact details), is shared with the National Institute for Public Health and the Environment (RIVM) and stored in a database: the Sexually Transmitted Infection Monitoring Station (SOAP). In **chapter 7**, we initially had the intention to investigate this national SOAP surveillance data among TGDP of all CSH in the Netherlands. However, up to 2020, SOAP only registered binary gender identities (transgender man or transgender woman) among TGDP, and as we wanted to elaborate on different gender identities among TGDP, we were not able to use the complete collection of data [32, 33]. Since 2020, the SOAP dataset was adjusted by adding a single non-binary option ("*doesn't feel fully man or woman*"). However since 2017, six CSH in the Netherlands, including Amsterdam and The Hague, implemented the two-step gender identity method. First, we ask someone's assigned sex at birth followed by the question whether the person feels different from that sex. If one's assigned sex at birth does not correspond with one's own gender identity, we ask individuals whether they 1) identify as transgender man or transgender woman, 2) identify as both man and woman, 3) identify as neither man nor woman, 4) identify as other than options 1-3 or 5) not knowing yet how to identify.

According to the SOAP registration, the CSH of Amsterdam and of The Hague accounted for 71% of TGDP tested at all CSH in the Netherlands between 2017 and 2018. The two-step method might partly have contributed to this high percentage and advocates for national implementation of the two-step gender identity method and surveillance data collection of different gender identities among TGDP. Nonetheless, the total number of TGDP is still small and the differences between the gender identities have to be interpreted with caution. The inclusion of

different gender identities in all Dutch surveillance systems of the CSH can not only increase the identification of transgender and non-binary individuals but also help researchers, policy makers, and healthcare workers to understand the transgender community and to provide the needed sexual healthcare.

Additionally, Thomson and Katikireddi (2019) strongly argued that high-quality epidemiological data of binary and non-binary TGDP are needed to improve the sexual health needs of this population. Also, different UN human rights experts call for improvements in data collection on gender identity as they argue that accurate data is the basis to create visibility and provide evidence for the challenges this population faces [34, 35]. Furthermore, next to the nationwide implementation of the two-step gender identity method to all Dutch patient files of the CSH, I recommend to expand the question about the gender of someone's sexual partner. Currently, the question about the gender of someone's sexual partner(s) has only two binary options (man or woman), while transgender and gender diverse contacts should be of interest too. Extending the answer options with transgender man, transgender women and non-binary persons could improve the Dutch epidemiological data about the TGDP community and their sexual partners. It would prevent the misclassification of sexual partners into the binary/cisgender groups which could lead to false risk assessments, such as missing data/information of a person having passive anal sex with a transgender woman, as the sex partner then would be wrongly accounted for cisgender woman (a person with a vagina). Moreover, someone should also be able to give a correct answer about who they have had sex with.

Finally, to create an inclusive space at CSH of Amsterdam and to correctly address all individuals, I suggest to inquire after the desired pronouns of visitors.

8.3.2 Transgender and gender divers people - healthcare in the Netherlands

In the Netherlands, the number of hospitals and clinics offering gender-affirming services are limited, resulting in waiting lists of 2-3 years. Additionally, the procedure to be referred to these hospitals can be complicated or not accessible for TGDP persons who are undocumented, uninsured, refugee or in an asylum/migration procedure. The lack of access to formal healthcare may put these individuals at further risk for mental health problems and medical, social and financial complications related to obtaining hormones and surgical interventions through informal routes (i.e. dark web, underground communities, unlicensed providers). A recent study of Ross et al. (2021) evaluated barriers for treatment-seeking transgender individuals and concluded that healthcare protocols and individual characteristics (such as lack of family support) influence the access to gender-affirming care [36].

At the beginning of 2021, the trans clinic in Amsterdam was founded in collaboration between the CSH of Amsterdam and Trans United Europe (TUE). TUE is a community-led transgender organisation that works on the visibility of the multicultural transgender community in (among other countries) the Netherlands. The trans clinic is intended for marginalized people from the TGDP community, who face additional barriers to access gender-affirming care due to migration background, who are undocumented or uninsured or who face discrimination or exclusion because of skin colour, religion, (bi)cultural background or as a sex worker. Considering Kimberlé Crenshaw analytical framework of intersectionality, the above mentioned people from the TGDP community are the most oppressed and are in urgent need to be recognized [37-39]. Intersectionality implies additional marginalization enforced by multiple factors such as gender, ethnicity, religion and/or physical appearance.

The trans-clinic provides multidisciplinary services, including social support, patient empowerment, safe and monitored access to Hormone Replacement Therapy (HRT), reducing complications of informal and uncontrolled hormone use, while simultaneously offering all services of the CSH of Amsterdam such as STI/HIV testing and provision of post-exposure prophylaxis (PEP) and pre-exposure prophylaxis (PrEP) for HIV. The collaboration between the CSH and TUE is an example of a key population-led initiative and unique in the Netherlands [40, 41]. The strong community involvement and visibility, creates a safe environment for visitors, includes the TGDP community in decision-making on all levels, lowers the threshold to get into care and identifies the desired services of its consumers.

8.4 CONCLUDING REMARKS

Lastly, I would like to discuss this thesis's goal to dive deeper into the matter of sexual health instead of focusing on STI/HIV "only". My former colleague Dr. Roel Achterbergh stated in his general discussion of his PhD thesis that: "It would require a paradigm shift among researchers, healthcare providers, patients and policy makers to rearrange the focus of sexual health clinics working towards a positive and respectful approach to sexuality and sexual relationships, as well as the possibility of having pleasurable and safe sexual experiences, free of coercion, discrimination and violence" [42]. I agree with this statement and hope that the studies presented in this thesis, the changes which were made after considering the results, conversations that were started due to the outcomes and policies we adjusted or invented, furthered this crucially needed paradigm shift. I can see that colleagues from all different disciplines: researchers, sexual health nurses, doctors, prevention workers and policy makers start to find each other and work together in that exact direction. Additionally, I recommend all centres for sexual health in the Netherlands to focus on quality guidelines for good healthcare within a holistic approach of sexual health. All different gender identities should be recognized

and besides STI/HIV care, additional care should be offered, such as support and attention for people engaging in (problematic) sexualised drug use, care to victims of sexual assault or general discussions during sexual health consultations about consent, with the aim of getting all visitors of the CSH to reflect on their behaviours regarding consent. Furthermore, it is important that researchers from the LGBTQI+ community themselves get opportunities to influence or conduct research on their own community to incorporate their knowledge and community resources [43-45]. Lastly, to improve prevention tools and policy strategies, the ministry of health should impose more inclusive and comprehensive sexual health surveillance. Efforts should change the binary narrative and contribute to a more sex positive generation.

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Appendices

Summary

Nederlandse samenvatting

PhD portfolio

List of publications

List of contributing authors

Author's contributions

About the author

Dankwoord



SUMMARY

The studies described in this thesis focus on the understanding of sexual behaviour as well as on health care needs among men who have sex with men (MSM), sex workers (SW) and transgender and gender diverse people (TGDP). We studied the emerging trend of sexualised substance use and looked at the association with non-consensual sexual behaviour in order to start with a broader perspective of sexual health than only focussing on sexually transmitted infections (STIs) or human immunodeficiency virus (HIV).

Chapter 1 (general introduction) starts with a definition of sexual health and explains that sexual health is more than just the presence or absence of STIs or HIV. Then behaviours of most interest (sexualised substance use and non-consensual sex (NCS)) and different study populations of this thesis are described and put in context. Finally, we outline the context and aims in which this thesis was written.

The use of the substances GHB, Crystal Methamphetamine and/or Mephedrone during sex (chemsex) is highly associated with (unintentional) sexual risk-taking behaviour, physical and mental health consequences and possible addiction. As there were signals of a perceived increase in chemsex among MSM all over the world, and also in the Netherlands, we aimed in **chapter 2** to quantify the proportion of MSM engaging in chemsex among visitors of the centre of sexual health (CSH) of Amsterdam and users of a gay dating app. Among CSH visitors, we hypothesized whether chemsex was a risk factor for a bacterial STI diagnosis. Chemsex in the past 6 months was practiced by 17.6% of MSM visitors. Among gay dating app users, the proportion that reported chemsex engagement was significantly higher than among MSM visiting the CSH (29.3% vs. 17.6%). Moreover, chemsex was a significant risk factor for bacterial STI in HIV-negative MSM visiting the CSH but not in HIV-positive MSM. The majority practiced chemsex once a month or less, and 87.0% reported sex without drug use in the past month. We concluded that in Amsterdam, chemsex is frequently practiced by MSM and significantly associated with bacterial STIs in HIV-negative MSM at the CSH and that future prevention strategies to reduce STI incidence should especially target HIV-negative MSM engaging in chemsex.

In **chapter 3** we studied chemsex engagement in relation to non-consensual sex (NCS). We invited users of two online gay dating platforms (Grindr and Gayromeo) to participate in our study. We found that 30.6% of all participants engaged in chemsex in the past 6 months. NCS experiences in the past 5 years were reported by 18.1%. We did not find a significant difference between MSM who reported chemsex engagement and who did not (21.2% vs. 16.7%). However, we found that among MSM who reported any NCS experiences, chemsex engagers reported being touched against one's will less often compared with non-engagers (22.4% vs

39.8%). Yet, chemsex engagers reported passing out and not remembering what happened during drug use significantly more often (41.4% vs 8.7%). Irrespectively of chemsex engagement, the vast majority of MSM rated the level of suffering from NCS experiences with low or no suffering at all. In the multivariate logistic regression analysis, we found that chemsex engagement was associated with an NCS experiences. We concluded that NCS frequently occurs among MSM and that NCS and chemsex were associated. Although participants did not often reported a high level of suffering, still 3.8% rated their suffering from NCS experiences with the highest possible option. In order to offer MSM more than just STI/HIV care, we advised sexual healthcare professionals to address not only chemsex but also NCS during consultations.

In **chapter 4** we did a latent class analysis in order to identify classes of sexualised substance use among MSM visiting the CSH of Amsterdam compared to MSM visiting four other CSH (Flevoland, Utrecht, Den Haag and Hollands Noorden) in the Netherlands. We identified 4 classes based on sexualised drug use in Amsterdam (no drug, alcohol, few and various drugs, and polydrug) and 3 classes in the other CSH (no drug, alcohol and soft drugs, and polydrug). MSM in Amsterdam reported significantly higher proportion of drug use compared to MSM visiting the other CSH. In the CSH of Amsterdam and the other CSH, polydrug use classes (compared to the other classes) showed a higher number of sex partners in the past 6 months as well as a higher STI prevalence. We pointed out that CSH could benefit from collaborating with drug (mis)use services to help MSM who engage in polydrug use to manage their drug use behaviour or apply harm reduction strategies.

In **chapter 5** we described sexual risk behaviour and substance use behaviour (tolerated and/or illicit use during work and/or free time) among sex workers at the prostitution and health centre of Amsterdam (P&G292) from 2014 until 2015. We differentiated between transgender women sex workers (TSW), male sex workers who have sex with men only or also with females (MSW-M) and male sex workers who have sex with females only (MSW-F). We found that bacterial STI positivity was 29.0% in MSW-M, 26.7% in TSW and 13.3% in MSW-F. Only among MSW-M three new HIV infections were found in the study period. The 3 groups differed significantly with regard to substance use during work, meaning MSW-M reported 40.5%, TSW 40.0% , and MSW-F 20.0% sex work-related substance use . The most often reported reason for work-related substance use of all sex workers was that “sex work becomes physically easier”. Another often reported reason was that “the client asked for it”. We concluded that bacterial STI positivity and substance use during sex work was high among all 3 groups of sex workers, especially MSW-M and MSW-T, and emphasized the importance of combined and targeted interventions.

In order to better understand the reasons of sex work-related drug use, in **chapter 6** we investigated motives for using and/or not using drugs during sex work among MSW and TSW and its possible effect on the risk of contracting STIs and HIV. We interviewed 15 MSW and 8 TSW and categorized their motives into self-oriented and client-oriented motives. Self-oriented motives for using drugs entailed work facilitation (makes work easier, be able to work more, have enough energy and being able to have same gender sex), money and pleasure. For some, the same motives actually were motives for NOT using drugs during work; work facilitation (clear mind, control situation, keep track of time, control safe sex), professional distance and pleasure. A client-oriented motive for using drugs was compliance, such as clients asks for it and wanting to make clients happy. A client-oriented motive for NOT using drugs was the wish of professional performance. Sex workers also reported harm reduction strategies concerning drug use during work and self-applied means to reduce the risk of an STI/HIV infection. We concluded that our results could be considered when developing interventions targeting MSW and TSW to reduce drug use, apply harm reduction strategies or help to decrease the chances of STI/HIV acquisition during sex work.

In **chapter 7** we assessed sexual behaviour, HIV prevalence and STI positivity rates among TGDP with various gender-identities visiting the CSH of Amsterdam and The Hague and compared these outcomes between TGDP who reported sex work and those who did not. We found that HIV prevalence and STI positivity rates were substantial among transgender people who were assigned male at birth (AMAB) and lower among transgender people who were assigned female at birth (AFAB). Of notice were the non-binary TGDP-AMAB, since two new cases of HIV were found in this group. Although the majority of TGDP-AMAB engaged in sex work, their HIV prevalence was comparable to TGDP-AMAB non-sex workers, whereas the STI positivity rate among TGDP-AMAB sex workers was lower than of TGDP-AMAB non-sex workers. We argued why health providers who are working with TGDP should take into account the different gender-identities among TGDP as they may vary in sexual behaviour. The findings of our study could have implications for future HIV and STI health promotion efforts, disease control, and prevention strategies.

In **chapter 8** we discussed the main results of the thesis, linked with other studies, provide implications for sexual health research and prevention and end with our concluding remarks. The discussion contains three main topics; sexualised substance use, non-consensual sex and sexualised substance use, and transgender and gender diverse people.

In **section 8.1.1** we point out that future sexual health research should to focus on the understanding of the transition among MSM from recreational users to problematic users. Furthermore, it would be of interest to investigate facilitators

and barriers for help-seeking behaviour among MSM who experience (or who do not experience, but actually show) problematic sexualised substance use. In **section 8.1.2** we argue that sexual health prevention, support and treatment options should take into account that sexualised drug use is not always experienced as a problem. Therefore harm reduction techniques and community-led counselling service might benefit MSM who want to change their sexualised substance.

In **section 8.2.1** we reason that researchers should pay more attention to non-consensual sexual behaviour among men in the LHBTQI+ community. We pointed out that future prevention tools need to create awareness of NCS within the community as well as among healthcare workers from all disciplines, policy makers and community leaders working with people from the LHBTQI+ community.

In **section 8.3.1** we discuss the need of high-quality epidemiological data of binary and non-binary TGDP, the advantages of implementing the two-step gender identity method (meaning first asking the assigned gender at birth, and second about the current gender-identity) to the patient files of all CSH nationwide as well as adding answer options - transgender and gender diverse contacts - the question about the gender of someone's sexual partner. In **section 8.3.2** we provide an example of a key population-led initiative, the trans-clinic in Amsterdam which is intended for marginalized people from the TGDP community, who face additional barriers to access gender-affirming care.

In the final **section 8.4**, we describe that we have started to look at the bigger picture in sexual health and not focus on STIs and HIV only. We recommend all centres for sexual health in the Netherlands to focus on quality guidelines for good sexual healthcare within a holistic approach.

NEDERLANDSE SAMENVATTING

De in dit proefschrift beschreven studies richten zich op het inzichtelijk maken van seksueel gedrag en op de behoeften voor seksuele gezondheidszorg bij mannen die seks hebben met mannen (MSM), sekswerkers (SW) en transgenders en genderdiverse mensen (TGDP). We bestudeerden de opkomende trend van middelengebruik in combinatie met seks en keken ook naar de associatie met grensoverschrijdende seksuele ervaringen. Dit deden wij om met een breder perspectief van seksuele gezondheid te kijken en niet alleen te focussen op seksueel overdraagbare aandoeningen (soa's) of humaan immunodeficiëntievirus (HIV).

Hoofdstuk 1 (algemene inleiding) begint met een definitie van seksuele gezondheid en beschrijft dat dit meer is dan alleen de aan- of afwezigheid van soa's of hiv. Daarna worden de gedragingen die het meest onder de aandacht zijn in dit proefschrift (middelengebruik in combinatie met seks/chemsex en grensoverschrijdende seksuele ervaringen) en de verschillende onderzoekspopulaties beschreven en in hun context geplaatst. Tenslotte schetsen we de algehele context en doelstellingen waarin dit proefschrift is geschreven.

Het gebruik van de middelen GHB, Crystal Methamphetamine en/of Mephedrone tijdens seks (chemseks) is sterk geassocieerd met (onbedoeld) seksueel risicogedrag, lichamelijke en geestelijke gezondheidsgevolgen en mogelijke verslaving. Omdat er over de hele wereld signalen waren van een toename van chemseks bij MSM, en ook bij Nederlandse MSM, hebben we ons in **hoofdstuk 2** gericht op het kwantificeren van het aandeel MSM dat aan chemseks heeft gedaan bij MSM die het centrum voor seksuele gezondheid (CSG) van Amsterdam bezoeken en gebruikers van een gay dating app. We hadden de hypothese dat chemseks een risicofactor was voor een bacteriële soa-diagnose bij MSM bezoekers van het CSG. Van de MSM-bezoekers gaven 17,6%aan in de afgelopen 6 maanden aan chemseks gedaan te hebben. Onder gebruikers van de gay dating apps was het aandeel dat chemsex rapporteerde significant hoger dan bij MSM die het CSG bezochten (29,3% vs. 17,6%). Bovendien bleek chemseks een significante risicofactor voor een bacteriële soa bij hiv-negatieve MSM die de CSG bezochten, maar niet bij hiv-positieve MSM. De meerderheid deed één keer per maand of minder vaak aan chemseks, en 87,0% rapporteerde seks zonder enige drugsgebruik in de afgelopen maand. We concluderen dat MSM in Amsterdam frequent aan chemseks doen en dat chemseks significant samenhangt met het verkrijgen van bacteriële soa's bij hiv-negatieve MSM op het CSG. Toekomstige preventiestrategieën voor het verminderen van de soa incidentie, moeten zich vooral richten op chemseks gedrag hiv-negatieve MSM.

In **hoofdstuk 3** hebben we gekeken naar chemseks gedrag in relatie tot grensoverschrijdende seksuele ervaringen. We vroegen aan gebruikers van twee

online gay dating platforms (Grindr en Gayromeo) om deel te nemen aan ons onderzoek. We vonden dat 30,6% van alle deelnemers in de afgelopen 6 maanden aan chemseks deed. Grensoverschrijdende seksuele ervaringen in de afgelopen 5 jaar werden gerapporteerd door 18,1%. We vonden geen significant verschil tussen MSM die aan chemseks deden en MSM die dit niet deden (21,2% vs. 16,7%). Wel vonden we dat binnen de groep MSM die niet-vrijwillige seksuele ervaringen rapporteerden, chemseksers minder vaak tegen hun wil werden aangeraakt dan niet chemseksers (22,4% vs. 39,8%). Toch meldden chemseksers significant vaker dat ze flauwvielen/outgaan en zich niet herinnerden wat er tijdens het drugsgebruik was gebeurd (41,4% vs. 8,7%). Los van chemseks gedrag gaven MSM aan geen of nauwelijks last te hebben van een niet-vrijwillige seksuele ervaring in het verleden. In de multivariate logistische regressieanalyse vonden we dat chemseks geassocieerd was met een niet-vrijwillige seksuele ervaring. We concludeerden dat ongeacht chemseks gedrag, een niet-vrijwillige seksuele ervaring frequent voorkomt bij MSM en dat niet-vrijwillige seksuele ervaringen en chemseks geassocieerd zijn. Hoewel de meeste deelnemers aangaven geen of weinig last meer te ondervinden van een niet-vrijwillige seksuele ervaring, beoordeelde alsnog 3,8% hun lijden met de hoogst mogelijke optie. Om MSM meer te bieden dan alleen soa en hiv-zorg, adviseerden we professionals in de seksuele gezondheidszorg om tijdens consulten ook chemseks en grensoverschrijdends seksueel gedrag aan de orde te stellen.

In **hoofdstuk 4** hebben we een latente klassen analyse gedaan bij MSM die het CSG van Amsterdam bezochten en dit vergeleken met MSM die vier andere CSG (Flevoland, Utrecht, Den Haag en Hollands Noorden) in Nederland bezochten. We wilden hiermee klassen met vergelijkbare patronen in druggebruik in seksuele context identificeren. We vonden 4 klassen in Amsterdam (geen druggebruikers, alcohol gebruikers, weinig en diverse drugs gebruikers, en polydrug gebruikers) en 3 klassen in de andere CSG (geen drug gebruikers, alcohol en softdrugs gebruikers, en polydrug gebruikers). MSM in Amsterdam rapporteerden een significante hogere percentage drugsgebruik in vergelijking met MSM die de andere CSG bezochten. In het CSG van Amsterdam en de andere CSG lieten de klassen met polydrugsgebruik (in vergelijking met de andere klassen) een hoger aantal sekspartners in de afgelopen 6 maanden en een hogere soa-prevalentie (het percentage met een infectie) zien. We concludeerden dat CSG in Nederland baat hebben bij een samenwerking met organisaties die MSM, met name polydrug gebruikers, kunnen helpen hun drugsgebruik te beheersen, verminderen of strategieën voor harm-reductie toe te passen.

In **hoofdstuk 5** beschreven we seksueel risicogedrag en middelengebruik (getolereerd en/of illegaal gebruik tijdens werk en/of vrije tijd) bij mannelijke en transgedender sekswerkers die het prostitutie- en gezondheidscentrum van Amsterdam (P&G292) bezochten. We maakten onderscheid tussen transgender

vrouw sekswerkers (TSW), mannelijke sekswerkers die alleen seks hebben met mannen of ook met vrouwen (MSW-M) en mannelijke sekswerkers die alleen seks hebben met vrouwen (MSW-V). Een soa werd gevonden bij 29,0% van de MSW-M, 26,7% van de TSW en 13,3% van de MSW-V. Tijdens het onderzoek vonden we alleen bij MSW-M drie nieuwe hiv-infecties. De 3 groepen verschilden significant wat betreft middelengebruik tijdens het werk: 40,5% van de MSW-M en 40,0% van de TSW rapporteerden middelengebruik gerelateerd aan sekswerk, terwijl 20,0% van de MSW-V dit rapporteerden. De meest genoemde reden van alle sekswerkers voor werk gerelateerd middelengebruik was dat "sekswerk lichamelijk gemakkelijker wordt". Een ander vaak genoemde reden was dat "de klant erom vraagt". We concludeerden dat in de onderzochte groep mannelijke en transgender sekswerkers bacteriële soa's en middelengebruik tijdens het sekswerk vaak voorkomt bij alle 3 de groepen. Daarnaast benadrukten we het belang van gecombineerde en gerichte interventies bij mannelijke en transgender sekswerkers.

Om de redenen van sekswerk gerelateerd middelengebruik beter te begrijpen, onderzochten we in **hoofdstuk 6** bij MSW en TSW de motieven voor het wel of niet gebruiken van drugs tijdens sekswerk en het mogelijke effect daarvan op het risico op soa's en hiv. We hebben 15 MSW en 8 TSW geïnterviewd en hun motieven ingedeeld in 2 categorieën: zelfgerichte en klantengerichte motieven. Zelfgerichte motieven om drugs te gebruiken waren werkbevordering (het werk makkelijker maken, meer kunnen werken, genoeg energie hebben en seks te kunnen hebben met hetzelfde geslacht), geld en plezier. Voor sommigen waren dezelfde motieven juist motieven om geen drugs te gebruiken tijdens het sekswerk; werkbevordering (geest helder houden, situatie onder controle houden, tijd in de gaten houden, veilig vrijen), professionele afstand en plezier. Een klantengericht motief voor het gebruik van drugs was compliance, zoals klanten die erom vragen om drugs samen te gebruiken en het hun klanten naar hun zin te willen maken. Een klantengericht motief om geen drugs te gebruiken was de wens om professioneel te presteren. Sekswerkers rapporteerden ook strategieën met betrekking tot druggebruik tijdens het werk om het risico op een soa/hiv-infectie te verminderen. We concludeerden dat onze resultaten in overweging genomen kunnen worden bij het ontwikkelen van interventies gericht op MSW en TSW. Deze interventies zouden dan toegepast worden om drugsgebruik te verminderen, harm-reductie (risico vermindering) strategieën toe te passen en de kans op het oplopen van een soa/hiv-infecties tijdens het sekswerk te verminderen.

In **hoofdstuk 7** hebben we gekeken naar seksueel gedrag, het voorkomen van hiv en soa diagnoses bij TGDP met verschillende genderidentiteiten die het CSG van Amsterdam en Den Haag bezochten. We hebben deze uitkomsten vergeleken tussen TGDP die aangeven sekswerk te doen en degenen die geen sekswerk deden. We vonden dat de hiv-prevalentie en het aantal soa infecties substantieel waren bij

TGDP de bij geboorte een mannelijk geslacht toegewezen hadden gekregen (AMAB) en minder bij TGDP de bij geboorte een vrouwelijk geslacht toegewezen hadden gekregen (AVAB). Opvallend waren de non-binaire TGDP-AMAB, aangezien in deze groep twee nieuwe gevallen van hiv werden gevonden. Hoewel de meerderheid van de TGDP-AMAB sekswerk verrichte, was hun hiv-prevalentie vergelijkbaar met die van niet-sekswerker TGDP-AMAB. Het percentage soa's bij TGDP-AMAB sekswerkers was lager dan bij niet-sekswerker TGDP-AMAB. We lieten zien waarom zorgverleners die met TGDP werken rekening moeten houden met de verschillende genderidentiteiten omdat deze kunnen verschillen in seksueel gedrag. De bevindingen van onze studie kunnen implicaties hebben voor toekomstige gezondheidsbevordering, preventiestrategieën en bestrijding van hiv en soa.

In **hoofdstuk 8** bespreken we de belangrijkste resultaten van het proefschrift, leggen we verbanden met andere studies, geven implicaties voor verder onderzoek naar seksuele gezondheid en preventie en sluiten we af met onze slotopmerking. De discussie bevat drie hoofdonderwerpen; chemseks, niet-vrijwillige seks in combinatie met chemseks en TGDP.

In **paragraaf 8.1.1** wijzen we erop dat toekomstig onderzoek op het gebied van seksuele gezondheid zich zou moeten richten op het begrijpen van de overgang van recreatief druggebruik naar problematisch gebruik. Bovendien zou het interessant zijn om na te gaan welke factoren helpen of belemmeren bij het zoeken naar hulp van MSM die problematisch chemseks gedrag ervaren (en als ze dat niet ervaren, maar wel vertonen). In **paragraaf 8.1.2** geven we aan we dat voor preventie, ondersteuning en behandelingsopties voor seksuele gezondheid rekening gehouden moet worden met het feit dat chemseks niet altijd als een probleem wordt ervaren. Daarbij is het een sociaal gevoelig probleem omdat mannen zich zorgen maken om door zorgverleners veroordeeld te worden. Daarom kunnen harm-reduction technieken en services zoals peer-to-peer counseling nuttig zijn voor MSM die aan chemseks doen, hun gedrag willen veranderen of alleen maar meer informatie erover willen hebben.

In **paragraaf 8.2.1** beschrijven we dat onderzoekers meer aandacht zouden moeten besteden aan niet-vrijwillig seksuele ervaringen bij mannen in de LHBTQI+-gemeenschap. We adviseren dat toekomstige preventie zich zowel vanuit de gemeenschap zelf en ook vanuit gezondheidsmedewerkers uit alle disciplines, beleidsmakers en professionals die werken met mensen in de LGBTQI+ gemeenschap, moet richten op het creëren van bewustzijn dat niet-vrijwillige seks en grensoverschrijdends seksueel gedrag voorkomt.

In **paragraaf 8.3.1** bespreken we de behoefte aan kwalitatief hoogwaardige epidemiologische data van binaire en non-binaire TGDP, de voordelen van het

implementeren van de twee-stappen genderidentiteitsmethode (dat wil zeggen, eerst vragen naar het toegewezen geslacht bij de geboorte, en vervolgens naar de huidige genderidentiteit) in de patiëntendossiers van alle CSG in het hele land, alsmede de uitbreiding hiervan met de vraag naar het geslacht van iemands seksuele partner(s). In **paragraaf 8.3.2** geven we een voorbeeld van een belangrijk, door de gemeenschap zelf geleid initiatief, de transkliniek in Amsterdam, welke bedoeld is voor gemarginaliseerde mensen uit de TGDP-gemeenschap die extra barrières ondervinden bij de toegang tot genderbevestigende zorg.

In de laatste **paragraaf 8.4** leggen we uit dat we naar het grotere plaatje van de seksuele gezondheid hebben gekeken en ons niet alleen hebben gericht op het voorkomen van soa's en hiv. We bevelen aan dat alle centra voor seksuele gezondheid in Nederland zich richten op kwaliteitsrichtlijnen voor goede zorg binnen een holistische benadering van seksuele gezondheid.

PHD PORTFOLIO

PhD training

Courses	Year
Psychisch welbevinden en zelfacceptatie van LHBT jongeren, RINO groep, Utrecht, the Netherlands	2016
Introduction to Data-analysis, NIHES, University of Rotterdam, the Netherlands	2015
Psychisch welbevinden en zelfacceptatie van LHBT jongeren, RINO groep, Utrecht, the Netherlands	2016
Qualitative Research Methods, AMC Graduate School, Amsterdam, the Netherlands	2017
Oral Presentation in English, AMC Graduate School, Amsterdam, the Netherlands	2018
PhD educational hour (Seminars, Journal Club, Peer education), Department of Infectious Diseases, Public Health Service Amsterdam, the Netherlands	2015-2020

Seminars, workshops and master classes

Expert meeting STI and HIV, RIVM, Bilthoven, the Netherlands	2014, 2015, 2017
Expert meeting Chemseks, Amsterdam, the Netherlands	2015
Psychisch welbevinden en zelfacceptatie van LHBT jongeren, RINO groep, Utrecht, the Netherlands	2016
Training sexual health, GGD Amsterdam, the Netherlands	2014, 2015, 2016, 2017
Meet & Greet Chemsex, Soa Aids Nederland, Amsterdam, the Netherlands	2020
Project Management, GGD Amsterdam, Amsterdam, the Netherlands	2020

Oral presentations

Outreach STI and HIV testing for MSM in Amsterdam: Is it a valuable addition to standard screening at the STI clinic? AIDS Impact, Amsterdam, the Netherlands (oral poster)	2015
Chemsex Among Men Who Have Sex With Men: a Sexualized Drug Use Survey Among Clients of the Sexually Transmitted Infection Outpatient Clinic and Users of a Gay Dating App in Amsterdam, the Netherlands. AIDS Impact 2017, Cape Town, South Africa	2017
Male sex workers and sexualised drug use, Vlaams-Nederlandse Netwerk, P&G292, Amsterdam, the Netherlands	2017
Sexual consent and chemsex: a quantitative study on sexualised drug use and non-consensual sex among men who have sex with men in Amsterdam, the Netherlands. IUSTI, Dublin, Ireland (presented by Martijn van Rooijen)	2018

	Year
Sexually transmitted infections in Amsterdam, Guest lecture course Sexual Health, VU University, Amsterdam, the Netherlands (presented by Mark van den Elshout)	2020, 2021
Poster presentations	
Chemsex Among Men Who Have Sex With Men: a Sexualized Drug Use Survey Among Clients of the Sexually Transmitted Infection Outpatient Clinic and Users of a Gay Dating App in Amsterdam, the Netherlands. IUSTI, Dublin, Ireland	2018
HIV and STI positivity rates among transgender people attending two large STI clinics in the Netherlands. Netherlands conference on HIV pathogenesis, epidemiology, prevention and treatment (NCHIV), Amsterdam, the Netherlands (presented by Ceranza Daans)	2019
HIV and STI positivity rates among transgender people attending two large STI clinics in the Netherlands. AIDS 2020 (virtual due to COVID-19), San Francisco, United States	2020
A qualitative study on sexualised drug use among male & transgender women sex workers in Amsterdam, the Netherlands. STI and HIV World Congress 2021 (virtual due to COVID-19), Amsterdam, the Netherlands	2021
Motives and barriers for complying with 'sexual distancing' among MSM during the first COVID-19 pandemic lockdown: a qualitative study. STI and HIV World Congress 2021 (virtual due to COVID-19), Amsterdam, the Netherlands (presented by Dominique de Vries).	2021
(Inter)national conferences visited	
Dutch National Conference STI*HIV*Sex, Soa Aids Nederland, Amsterdam, the Netherlands	2014- 2020
Het Internationale Aids conferentie symposium, Amsterdam, the Netherlands	2014
KWALON conferentie, Rotterdam, the Netherlands	2014
Conference of the European Health Psychology Society, Innsbruck, Austria	2015
AIDS Impact 2015, Amsterdam, the Netherlands	2015
Netherlands conference on HIV pathogenesis, epidemiology, prevention and treatment (NCHIV), Amsterdam, the Netherlands	2015, 2019
Addressing Gay and Bisexual Men's Mental Health: Time to Act, Amsterdam, the Netherlands	2016
AIDS Impact 2017, Cape Town, South Africa	2017
AIDS 2020, Virtual Conference	2020
STI and HIV World Congress, Virtual Conference	2021

LIST OF PUBLICATIONS

Publications included in this thesis

Drückler S, van Rooijen MS, de Vries HJC. Chemsex Among Men Who Have Sex With Men: a Sexualized Drug Use Survey Among Clients of the Sexually Transmitted Infection Outpatient Clinic and Users of a Gay Dating App in Amsterdam, the Netherlands.

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Submitted

Other publications

De Vries DC, Zimmermann HML, **Drückler S**, Davidovich U, Hoornenborg E, de Vries HJC. Barriers and motives for complying with 'sexual distancing' among men who have sex with men during the first COVID-19 pandemic lockdown in Amsterdam, a qualitative study.

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AUTHORS' CONTRIBUTIONS PER CHAPTER

Chapter 2 Chemsex Among Men Who Have Sex With Men: a Sexualized Drug Use Survey Among Clients of the Sexually Transmitted Infection Outpatient Clinic and Users of a Gay Dating App in Amsterdam, the Netherlands

S. Drückler, M. van Rooijen, and H.J.C. de Vries designed the study protocol. S. Drückler performed the statistical analysis. Results were thoroughly discussed by S. Drückler, M. van Rooijen, and H.J.C. de Vries. S. Drückler drafted the manuscript, all authors commented on draft versions, and all approved the final version.

Chapter 3 Sexual consent & Chemsex: A quantitative study on sexualised drug use and non-consensual sex among men who have sex with men in Amsterdam, the Netherlands

S Drückler and J Speulman attributed equally to the article. J Speulman, S Drückler, M van Rooijen and H de Vries designed the study protocol. S Drückler and J Speulman performed the statistical analyses. Results were thoroughly discussed by J Speulman, S Drückler, M van Rooijen and H de Vries. J Speulman and S Drückler drafted the paper, all authors commented on draft versions, and all approved the final version.

Chapter 4 Sex, drugs, and sexually transmitted infections: a latent class analysis among men who have sex with men in Amsterdam and surrounding urban regions, the Netherlands

Conceived and designed study: RCA Achterbergh, S Drückler, MS van Rooijen, HJC de Vries. Contributed to data collection: MS van Rooijen, F van Aar. Conducted statistical analysis: RCA Achterbergh, A Boyd. Drafted the manuscript: RCA Achterbergh, A Boyd. All authors participated in review of the manuscript, and read and approved the final version.

Chapter 5 Substance use and sexual risk behavior among male and transgender women sex workers at the prostitution outreach center P&G292 in Amsterdam, the Netherlands

S Drückler, M van Rooijen and H de Vries designed the study protocol. S.D. performed the statistical analysis. Results were thoroughly discussed by S Drückler, M van Rooijen and H de Vries. S Drückler drafted the article, all authors commented on draft versions, and all approved the final version.

Chapter 6 A qualitative study on sexualised drug use among male and transgender women sex workers in Amsterdam, the Netherlands

S Drückler, M van Rooijen and H de Vries designed the study protocol. S Drückler and S Eekman conducted the in-depth interviews and performed study analysis. Results were thoroughly discussed by S Eekman, S Drückler, H Zimmermann, U Davidovich, and T Heijman. S Drückler drafted the first version of the manuscript under supervision of T Heijman, all authors commented on further draft versions, and all approved the final version.

Chapter 7 HIV and STI positivity rates among transgender people attending two large STI clinics in the Netherlands

S Drückler and C Daans attributed equally to the article. S Drückler, C Daans, M van Rooijen, E Hoornenborg and H de Vries designed the study protocol. S Drückler performed the statistical analysis. Results were thoroughly discussed by S Drückler, C Daans, E Hoornenborg and M van Rooijen. S Drückler and C Daans drafted the paper, all authors commented on draft versions, and all approved the final version.

ABOUT THE AUTHOUR

Susanne Drückler was born on 7th of July 1985 in Essen, Germany. During her high school period in 2003 she spent a year abroad in Cádiz, Spain. Here she obtained the diploma “Bachillerato de Humanidades y Ciencias Sociales”. In 2006, after finishing high school (Abitur) at the Helmholtz Gymnasium in Essen, Germany, Susanne enrolled in a bachelor’s degree program in German and Spanish studies at the University of Bochum, Germany. After one year, she changed to a bachelor’s degree in Cognitive Psychology at Maastricht University. During her Bachelor study, she also worked as a teacher’s assistant teaching the course “Personality” to first year students. In 2010 Susanne graduated with a Bachelor’s degree in Cognitive Psychology after doing a semester abroad at the James Cook University in Australia while writing her Bachelor thesis.

In 2011 Susanne graduated Cum Laude with a master’s degree in Health and Social Psychology at Maastricht University. In her thesis she investigated the effectiveness of an 8-week Mindfulness Intervention on subjective well-being and self-regulation.

After completing her master’s degree, Susanne moved to Amsterdam and started working at the Schorer Stichting as a health promotor at the department of Prevention of STIs and HIV in national context.

In 2013 Susanne started a new position as health scientist in the Prevention Team of the Centre for Sexual Health of the Public Health Service of Amsterdam. Besides operational activities, such as setting up STI and HIV prevention campaigns and working with volunteers, Susanne started researching questions which arose from the operational work in order to adjust or change the healthcare policy of the Centre for Sexual Health.

In 2017 Susanne officially started working part-time as a PhD student at the Public Health Service of Amsterdam under supervision of prof. dr. Henry de Vries and dr. Martijn van Rooijen. The results of her PhD are presented in this thesis. Besides her work for the prevention team at the Centre for Sexual Health, Susanne also currently works as a project manager for the equity in sexual health and resilience for young people in Amsterdam.

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