Chemsex among men who have sex with men

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Chemsex among men who have sex with men

A public health and user perspective

Ymke Joline Evers

Academische Werkplaats Publieke Gezondheid Limburg

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This thesis was prepared at the Department of Sexual Health, Infectious Diseases and Environmental Health at the Public Health Service South Limburg (GGD Zuid-Limburg), the Care and Public Health Research Institute (CAPHRI) and the Department of Medical Microbiology at the Maastricht University Medical Centre.

Chemsex among men who have sex with men

A public health and user perspective

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“Look at situations from all angles, and you will become more open”

Dalai Lama

Chapter 1

1

General Introduction

The Netherlands is one of the countries where the use of stimulant drugs is one of the highest compared to other European countries. In 2018, around one million Dutch people have ever used ecstasy (XTC)/ methylenedioxymethamphetamine (MDMA), representing 8% in the general Dutch adult population [1]. Other popular stimulants, such as cocaine and speed, are used by around 5% of the general Dutch adult population. A slight increase has been observed in the use of these stimulants over the past few years [1]. The use of stimulants is especially high among certain population groups, such as young people in the night life circuit and men who have sex with men (MSM) in a sexual context ('chemsex scene'). This thesis focuses on drug use in the chemsex scene.

Sjef Pelsser wrote the following story in 2017, nearly two years after leaving the chemsex scene. He is now a fieldworker on Mainline's chemsex team.

In the dark

There I lie, in the dark. But is it me? Or is it one of the many who have passed through here in the days and nights just past? If it is me, then at least I'm still alive.

Where am I actually? Or perhaps more importantly, who am I? And why do I do this? What do I get from it? All these questions are making me ill. But that may also have to do with not eating or drinking anything for so long.

Calmness and restlessness blur together, the way the boys and men blur into one another. How did they end up here, anyway, and who invited them? As if that matters. I'd lose myself all over again anyhow. In unrestrained uninhibition, in more and yet more. In confusion and moments of clarity. In all the languages, colours and ages. There's no discrimination here.

And no admission fee required. Actually, there is. In the form of white crystals. This gets you through the door to darkness. And to the light. And to becoming God who dances with the devil. Invincible and beyond redemption. Good luck leaving that behind. I certainly don't know how.

If only I knew how.

I hear a ringing. Or a knocking. Someone else yet again. Or is it a wake-up call? Who can say? In the darkness are many questions but few answers. I can't even tell if my eyes are open. Or whether it's night-time or the middle of the afternoon. The noise is the sound of the power and

strength of the white crystals calling out, and it's getting louder and louder. Would it help if I were deaf? Or blind? Or dead? The last of these gets me all three for the price of one.

In the dark, I make my choices. And in the dark, I condemn myself. It's about time I made the right choices, sought the light. I spot the glint of a needle.

Tomorrow will remain dark.

Chemsex

Historically, the use of stimulants, including XTC/MDMA, speed and cocaine, has been more commonplace among MSM than the non-MSM population [2-6]. A common theory for the higher prevalence of drug use among MSM is minority stress. This theory stresses that MSM, due to their minority status in society, are more often confronted with stress related to internalized homophobia, perceived stigma and negative life events, such as violence and rejection. Minority stress might lead to reduced psychological well-being and increased drug use [7].

In the past decade, several reports from healthcare professionals [8-11] and media articles [12-14] suggest increasing use of four newer drugs in a sexual context by MSM: crystal meth, gamma-Hydroxybutyric acid (GHB), gamma-Butyrolactone (GBL) and mephedrone. The European MSM Internet Survey (EMIS) from 2010 showed that use of these four newer drugs was highest in MSM in the UK, London, the Netherlands, Amsterdam and Spain, Barcelona [15]. These four drugs are known for their sexual enabling and stimulating abilities. Intentionally using drugs before or during sex to enable, enhance and prolong sexual interactions has been described as 'chemsex' by healthcare professionals and researchers [9]. It is difficult to construct a universal definition of chemsex, as the drugs used during sex might vary per place and time area. The relatively new stimulants crystal meth, GHB/GBL and mephedrone have been described as the four typical chemsex drugs in the United Kingdom (UK) [16,17]. However, existing stimulants, such as XTC/MDMA, ketamine, cocaine and speed are also still commonly used by MSM in a sexual context [18,19]. Effects and risks of these drugs are described in Table 1. Some evidence on chemsex was arising in the UK, London, and these studies showed that MSM have reported to use drugs during sex to enhance sexual pleasure, by facilitating sexual confidence, increasing sexual desire and libido, sexual longevity and partner turnover and sexual adventure [9,20]. Chemsex typically takes place in private homes, facilitated by online dating applications, but also in public sex parties at bars and clubs, and gay saunas [9]. Chemsex is a behaviour, influenced by psychological factors (e.g. overcoming

anxieties during sex), social environments (e.g. perceived normalization to use drugs during sex) and cultural developments (e.g. online dating apps used to facilitate sex) [9].

Estimates of the prevalence of chemsex among MSM vary depending on definition, measurement and recruitment methods used. A systematic review from 2019 that included studies on chemsex in Europe, United States of America, Canada and Australia showed that the prevalence of chemsex, including various drugs, ranged from 3% to 29% among MSM [21]. The EMIS from 2017 showed that the Netherlands was the country where chemsex was most prevalent (Figure 1), followed by Belgium and the UK [22]. This prompts for more research on chemsex in the Netherlands. The EMIS and studies from the UK and the Netherlands have suggested that chemsex is particularly prevalent among MSM in large cities in the UK and the Netherlands, such as London and Amsterdam [9,15,22,23]. However, limited data on chemsex is available outside these large cities and it is unclear whether chemsex is also common among MSM outside these large cities in the Netherlands. Local monitoring of chemsex and the specific drugs used is important to tailor prevention and care to the local needs of a population.

Table 1. Intake methods, effects and risks of drugs commonly used during sex

Name of drug	Intake methods	Effects	Risks
XTC/MDMA	Swallowed in tablet form	Euphoria, increased energy, enhanced appreciation for music, elevated mood, love feeling	Overheating, water intoxication, serotonin syndrome, fatigue, anxiety and paranoia, depression
GHB/GBL	Swallowed in liquid doses, injected	Euphoria, relaxant, lowered inhibitions, talkative, increased sex drive	Memory lapses, clumsiness, drowsiness, tremors, agitation, overdose, unconsciousness, physical addiction
Ketamine	Swallowed in tablet form, snorted as powder, injected	Dissociative, detachment of one's physical body and the external world, out-of-body experience, hallucinations	K-hole (near-death experience), confusion, panic attacks, impairment in long short and long term memory, depression, bladder and urinating problems

continue

Table 1. Intake methods, effects and risks of drugs commonly used during sex

Name of drug	Intake methods	Effects	Risks
Cocaine	Snorted as powder, smoked, injecting	Increased energy, confidence, talkative, exhilaration	Overheating, increased heart rate, damage to cartilage separating nostrils, fatigue, depression, physical addiction
Speed	Snorted as powder, swallowed in tablet form or package	Increased energy, confidence, talkative, exhilaration	Overheating, increased heart rate, aggressive, restlessness, anxiety, depression, physical addiction
Crystal meth	Smoked in a glass pipe, snorted as powder, injected, administered rectally	Euphoria, increased energy, confidence, intense sexual stimulation, lowered inhibitions, impulsivity	Sleep disruption, loss of appetite, tremors, irregular heartbeat, exhaustion, paranoia, anxiety, depression, physical addiction
Mephedrone	Swallowed in tablet form, injected, administered rectally	Euphoria, enhanced appreciation for music, elevated mood, love feeling, sexual stimulation	Increased heart rate, fatigue, anxiety and paranoia, depression
4-FA	Swallowed in tablet form or powder	Euphoria, increased energy, enhanced appreciation for music, elevated mood, love feeling	Overheating, water intoxication, fatigue, anxiety and paranoia, depression
2-CB	Swallowed in tablet form or powder	Euphoria, increased energy, enhanced sensory awareness, feelings of spirituality	Overheating, nausea, dizziness, anxiety and paranoia
3 MMC	Swallowed in tablet form, injected, administered rectally	Euphoria, enhanced appreciation for music, elevated mood, love feeling, sexual stimulation	Increased heart rate, fatigue, anxiety and paranoia, depression
4-MEC	Swallowed in tablet form, injected, administered rectally	Euphoria, enhanced appreciation for music, elevated mood, love feeling, sexual stimulation	Increased heart rate, fatigue, anxiety and paranoia, depression

Source for information on drugs: Netherlands Institute of Mental Health and Addiction (www.drugsinfo.nl)

Figure 1. Percentage MSM who used drugs to enhance sexual pleasure in the past four weeks. From European MSM Internet Survey 2017.

Sexual health harms associated with chemsex

MSM are an important risk group for the on-going transmission of sexually transmitted infections (STIs), including human immunodeficiency virus (HIV), in many industrialized countries [24-26]. Of all Dutch STI clinic clients diagnosed with an STI, MSM represented 96% of all syphilis, 90% of new HIV and 76% of gonorrhea infection cases in 2018 [27]. Gonorrhea and syphilis are caused by bacteria and can be treated by antibiotics. HIV is a viral infection that can cause acquired immune deficiency syndrome (AIDS) and can be suppressed by antiretroviral drugs. Recently, chemsex has been suggested to contribute to the burden of STIs in MSM. Drug use can have an impact on decision-making processes whereby an individual may engage in certain risk behaviours that were not intended prior to the consumption of drugs. Chemsex has indeed been associated with sexual risk behaviour, such as condomless sex [21]. Chemsex has also been associated with a higher likelihood of esoteric sex acts, including group sex, prolonged sex sessions and fisting causing mucosal damage [16,28]. Further, a few chemsex drugs, such as crystal meth and mephedrone, are sometimes injected ('slamming') and this brings additional risks if needles are shared [16]. Indeed, chemsex has been associated with an increased risk for sexually transmitted infections (STIs) [16,23,29]. Another sexual health harm that might occur among MSM practicing chemsex include un-

wanted sexual experiences [30]. Negotiation of sex, especially in group sex environments, might be complicated by the effects of drugs.

Other health harms associated with chemsex

Aside from the sexual health risks, MSM practicing chemsex might be prone to general risks of drug use. Media articles wrote about a ‘life-endangering scene’ [12-14]. Case reports have shown acute physical health harms, such as drug overdosing, hospitalization and serotonin syndrome, associated with chemsex [31-33]. In the long term, MSM practicing chemsex might be at risk of becoming drug dependent and not being able to return to enjoying sober sex [34]. Furthermore, drug use in MSM has been associated with poor mental health, such as anxiety and depression [35,36], especially among MSM who considered their drug use to be problematic or dependent [37]. Several studies have indicated that chemsex should be addressed as a public health priority. Considering that chemsex is common among MSM, influenced by a complex set of factors and associated with sexual, physical and mental health harms, holistic health promotion and care strategies aimed at minimizing these harms are considered important in this group from a public health perspective. Health promotion strategies aimed at minimizing the harms of drug use are also called harm reduction in a drug policy context. Harm reduction assumes that a drug-free world is an unobtainable fantasy and that efforts should be made in developing strategies aimed at minimising the adverse public health and social consequences of drug use. The World Health Organisation (WHO) acknowledges the importance of harm reduction in people who use drugs [38]. To inform tailored harm reduction, more insight in the characteristics and beliefs of MSM practicing chemsex is needed.

Healthcare needs of MSM practicing chemsex

From a user perspective, not all chemsex has to be automatically framed as harmful or problematic [39]. A study among MSM visiting STI clinics in Ireland has suggested that a majority of MSM practicing chemsex managed their drug use and found it enjoyable [40]. More information on the perceived impact of chemsex on clients’ daily life and healthcare needs of clients practicing chemsex is needed to meet the interests and needs of this population. A user perspective research approach is necessary to understand the local reality and healthcare needs of MSM practicing chemsex and hereby adequately prepare healthcare services for possible increasing needs of their clients.

Organisation of healthcare services for MSM practicing chemsex

Given that chemsex is influenced by a complex set of factors and associated with a variety of health harms, it easily falls between the cracks of healthcare service provision [41]. It has been suggested that MSM practicing chemsex might not see themselves as ‘traditional’ drug misusers and might be averse to the social stigma that using addiction organisations entails [9]. Nevertheless, several drug use related healthcare services in the Netherlands have specifically studied chemsex and developed tailored information for this group related to harm reduction and psychosocial support online at their websites and in peer-support groups [42,43].

Aside from specialised drug use related healthcare services, MSM indicated to feel comfortable and safe discussing chemsex at the STI clinic they were already attending [40]. STI clinics already play an important role in the prevention and care of STIs among MSM. STI clinics in the Netherlands offer free-of-charge, low-threshold and anonymous STI testing, hepatitis B vaccinations and sexual health counselling for risk groups, such as MSM. MSM are advised to visit the clinic two to four times per year. An internet survey among Dutch MSM found that more than half of MSM had been tested for STIs at least once and that the most common healthcare facility for STI testing was the STI clinic [44]. MSM are routinely universally tested at STI clinics for common STIs, such as chlamydia, gonorrhea, syphilis and HIV. Recently, STI clinics offer pre-exposure prophylaxis (PrEP) to prevent HIV to high-risk MSM. PrEP are antiretroviral drugs that can be taken daily or around sex by HIV-uninfected people HIV-uninfected people before the potential exposure to block the acquisition of HIV. As STI clinics are a trusted and frequently visited healthcare facility by MSM, these clinics might play an important role in reaching MSM practicing chemsex for screening and counselling on chemsex-related issues. Knowledge-sharing and referral between STI clinics and drug use related healthcare services might be necessary to address chemsex adequately. In the UK, a specialised chemsex service was developed (56 Dean Street), combining expertise from STI and drug use related healthcare professionals, as a response to the upcoming chemsex scene [45]. No data exists on the availability and feasibility of such healthcare services for MSM practicing chemsex within STI clinics in the Netherlands.

Chemsex in other population groups

The term chemsex is predominantly used to describe drug use during sex among MSM. However, other population groups, such as swingers, also commonly use drugs in a sexual context. Swingers are heterosexual men and women who as a couple have sex with others. They are a generally older sexually-active group that show high rates of STIs and sexual risk behaviour, such as condomless sex with multiple sex partners and group sex [46-48]. Swingers can play a role in the transmission of STIs, both within their own network and to other populations [47,49]. One study from our research group showed that approximately forty percent of swingers visiting the STI clinic reported using drugs during swinging in the past six months [46]. This percentage is four times higher than in the general adult population in the Netherlands [50]. Drug use during sex has also been associated with sexual risk behaviour in swingers [46,51]. Only two studies have assessed drug use during sex among swingers and no information is available on swingers' positive and negative experiences with drug use during sex. This information is relevant to identify specific beliefs and healthcare needs of swingers.

Participatory approach

Three key features of participatory research include collaboration, mutual education, and acting on results developed from research questions that are relevant to the community [52]. We used a participatory approach and aimed to understand chemsex from different angles. Firstly, we looked at chemsex from a public health perspective. Public health aims to improve the quality of life through prevention and treatment of disease. This is done through the surveillance of cases and determinants, and through the promotion of healthy behaviours. We assessed the prevalence of chemsex and its associated risk for STIs. We also assessed the determinants of chemsex using behaviour-oriented theories [53] to inform health promotion strategies. Secondly, we looked at it from a user perspective by assessing experiences and healthcare needs of MSM practicing chemsex. Lastly, we looked at chemsex from a healthcare provider perspective by assessing the frequency and extent to which chemsex is addressed by STI nurses in consultations. To study chemsex from these different perspectives, we consulted clients and healthcare providers during different stages of our research. Questionnaires in this thesis were based on findings from qualitative studies [9,11,20] and a co-creation of researchers, healthcare providers and the target group. Public health researchers, STI nurses and doctors, drug use related healthcare professionals and MSM participated in the development of the questionnaires in this thesis. This group of stakeholders was also involved in formulating research questions, ensuring that study results are useful for possible action

on policy and practice. Moreover, this group was involved in the interpretation of results and the development of practical recommendations for healthcare. Preliminary results were presented and discussed, leading to new research questions and practical recommendations for health care. In a participatory approach, respect for local knowledge and experience is paramount and results in studies that reflect local realities more and often leads to better accepted and longer lasting changes in policy and practice [52].

Aim and outline of this thesis

The aim of this thesis was to understand an emerging behaviour among MSM, chemsex or drug use during sex, from both a public health perspective and a user perspective, and to formulate evidence-based recommendations for healthcare practice. Limited data was available on the prevalence of chemsex outside the UK, especially in less urban areas. Therefore, this thesis assessed the prevalence of chemsex in urban and non-urban areas in the Netherlands and associations between chemsex and STIs to understand the local reality in the Netherlands and associated public health harms. No data existed on the healthcare needs of MSM practicing chemsex from a user perspective and healthcare responses within STI clinics. This thesis measured characteristics of MSM practicing chemsex, the perceived impact of chemsex on their daily life and healthcare needs to inform targeting and tailoring health promotion strategies. The availability and feasibility of chemsex support services within STI clinics were assessed to optimize sexual health care for MSM. Behaviour-oriented theories, including concepts as attitude and self-efficacy, implementation theories, including concepts as facilitators and barriers, input from a multidisciplinary team of public health researchers, STI clinical practitioners, drug use related healthcare professionals and target group members and first evidence on chemsex from the UK were used as a basis for developing and interpreting the studies in this thesis. This thesis hereby contributes to both an international understanding of chemsex and locally tailored healthcare responses.

Most evidence on chemsex among MSM stems from large cities in the UK and the Netherlands. Following signals from STI clinic practice, we were interested whether chemsex was also prevalent outside major cities among MSM to enable STI clinics in both urban and non-urban areas to plan for possible increasing needs of MSM clients. **Chapter 2** assesses the prevalence of chemsex outside major cities in the Netherlands and chemsex behaviours associated with an increased risk for STIs.

Chapter 3 examines whether having sex abroad was associated with chemsex, sexual risk behaviour and STIs. International mobility is increasing and sex abroad is facilitated by ease

of travel and online dating applications. Inhibitions might be decreased when being abroad away from everyday social life's constraints possibly leading to increased drug use and sexual risk behaviour.

In a decade where condom use is historically low and pre-exposure prophylaxis (PrEP) for HIV prevention is implemented in most Western countries, alternatives to prevent other STIs than HIV might be increasing in popularity among MSM. A clinical trial showed efficacy of postexposure prophylaxis with doxycycline in reducing chlamydia and syphilis. However, the use of doxycycline-prophylaxis is not recommended in UK guidelines because of risk for selection and dissemination of doxycycline-resistant strains. **Chapter 4** assesses the informal use of an alternative prevention method for STIs, that is pre-exposure antibiotic use.

Chapter 5 describes the characteristics of MSM practicing chemsex in terms of sociodemographic characteristics, sexual behaviour and psychosocial beliefs. Considering that chemsex is common among MSM and associated with health harms, health promotion strategies aimed at minimizing these harms, such as STI control strategies and safer drug use strategies (harm reduction) are important in this group. An understanding of the characteristics and beliefs associated with chemsex is needed to identify MSM practicing chemsex in health care and tailor health promotion strategies to their beliefs. Tailoring strategies increases acceptance of the target group and hereby efficacy.

From a public health perspective, MSM practicing chemsex are considered to be a risk group for STIs, drug use related accidents and mental health harms. However, little was known about the healthcare needs from a user perspective. **Chapter 6** describes the sexual, addiction and mental healthcare needs of MSM practicing chemsex.

MSM prefer to discuss chemsex-related issues at the STI clinic they were already attending. Furthermore, STI clinics are frequently visited and trusted by MSM. STI clinics are therefore considered to be an appropriate place to provide counselling on chemsex-related issues, provide health promotion strategies, signal problematic chemsex and refer MSM to other healthcare organisations when needed. However, it is unclear how this is currently organised at STI clinics and which barriers and facilitators STI nurses encounter when addressing chemsex. **Chapter 7** describes the availability and feasibility of healthcare services for MSM practicing chemsex within Dutch STI clinics and experienced barriers and facilitators by STI nurses to provide counselling on chemsex during regular consultations with MSM clients.

Although the term chemsex is predominantly used for drug use during sex among MSM, it is likely that this behaviour is also prevalent in other population groups. **Chapter 8** assesses the prevalence of chemsex among another group than MSM, namely swingers, and their positive and negative experiences with chemsex.

In **chapter 9**, the main findings of this thesis are discussed and placed in perspective by comparing the findings to other studies on chemsex and the international context. Based on this discussion, recommendations for practice and future research are provided.

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Chapter 2

2

Chemsex among men who have sex with men living outside major cities and associations with sexually transmitted infections: a cross-sectional study in the Netherlands

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Abstract

Background

The intentional use of drugs to have sex – chemsex – among men who have sex with men (MSM) might contribute to the high sexually transmitted infections (STI) prevalence in this group. Limited data is available on chemsex outside major cities. The current study investigated the use of a wide variety of drugs during sex among MSM living outside major cities in the Netherlands and their associations with STI.

Methods

In 2018, 350 MSM were recruited at STI clinics and 250 MSM completed an online questionnaire. Questionnaire data were linked to clients' most recent STI laboratory test results. Chemsex was defined as using cocaine, crystal meth, designer drugs, GHB/GBL, ketamine, speed, or XTC/MDMA during sex in the preceding six months. The use of other drugs was also assessed. Determinants (chemsex, specific drugs, number of drugs, combining, and frequency) potentially associated with STI were assessed using multivariable logistic regression analyses adjusting for sociodemographic characteristics and sexual history.

Results

Chemsex was reported by 35% (95%CI: 29–41) of the 250 participants. XTC/MDMA (27%; 68/250) and GHB/GBL (26%; 64/250) were the most used drugs. STI positivity was 33% (29/87) in MSM engaging in chemsex and 12% (12/163) in MSM not engaging in chemsex ($p < 0.001$). Half of MSM engaging in chemsex (45/87) used three or more different chemsex drugs; STI positivity in this group was 44% (20/45). The only factor independently associated with STI was the use of three or more chemsex drugs (aOR: 4.13, 95%CI: 1.77–9.62).

Discussion

This study shows that chemsex is prevalent among MSM visiting the STI clinic outside major cities in the Netherlands, suggesting that health services in both urban and nonurban areas should be aware of and informed on chemsex. MSM who used multiple drugs are at particular risk for STI, indicating a special need for STI prevention and care in this group.

Introduction

Men who have sex with men (MSM) are an important risk group for the on-going transmission of sexually transmitted infections (STI), including human immunodeficiency virus (HIV), in many industrialized countries [1–3]. In the Netherlands, more than half of new *Neisseria gonorrhoeae* and HIV infections and almost all syphilis infections occur among MSM [4]. Studies have showed that drug use during sex, or ‘chemsex’, is prevalent among MSM [5–9] and this might contribute to the burden of STI in this group. Chemsex has been described as the practice of intentionally using drugs before or during sex to enable, enhance and prolong sexual interactions. Crystal methamphetamine (crystal meth), gamma-hydroxybutyric acid (GHB)/gamma-butyrolactone (GBL), and mephedrone have been described as typical ‘chemsex drugs’ by research in the United Kingdom (UK) [10]. Drug use can have an impact on decision-making processes whereby an individual may engage in certain risk behaviours that were not intended prior to the consumption of drugs [11]. A recent systematic review [12] identified seventeen studies from Europe, Australia and the United States of America (USA) that showed an increased risk of condomless anal sex in MSM using the chemsex drugs. Several studies identified that chemsex was also associated with a higher likelihood of esoteric sex acts (e.g. group sex, prolonged sex sessions, and fisting) [8,13–15]. Aside from sexual risk behaviour, chemsex has been associated with risky drug administration methods, such as injecting drugs and sharing injecting equipment [8]. These risk behaviours make MSM engaging in chemsex more prone to STI transmission. Indeed, use of the chemsex drugs has been associated with an increased risk for STI in several studies [8,16,17].

Recent studies in the UK indicated that chemsex should be addressed as a public health priority [16, 18, 19]. The European MSM Internet Survey (EMIS) in major cities in 44 European countries showed that the use of chemsex drugs was also high in Amsterdam [20], suggesting that chemsex might also be a public health issue in the Netherlands [21]. A recent study confirms that chemsex drugs are frequently used by MSM in Amsterdam [17]. It is likely that chemsex might also be prevalent outside major cities [22]. However, limited epidemiological data on chemsex and the specific drugs used during sex is available outside major cities. Knowledge on this issue outside major cities is needed to enable STI services in non-urban areas to plan for possible increasing needs of their MSM clients. Moreover, most studies are currently focused on the use of the three chemsex drugs and its association with STI [8,16, 17,20]. By using this narrow definition of chemsex, STI risks related to the use of other stimulants and depressants during sex might be missed in research and be insufficiently addressed in STI prevention strategies and clinical practice. Rapidly changing drug trends and the current rise in newly reported psychoactive substances in Europe [23] indicate a need to

broaden the assessment of drugs used during sex and their association with STI. To address these knowledge gaps, the aim of this study was twofold: assessing (1) the prevalence of chemsex and a wide variety of drugs used during sex outside major cities, and (2) its associations with STI.

Methods and materials

Ethics statement

This study was approved by the Medical Ethical Committee of the University of Maastricht (METC 2018–0485). STI client registry data was collected within standard care. During recruitment, STI nurses provided information on the study and participants gave oral informed consent. Data from questionnaires and linkage to data from medical records were retrieved in a coded de-identified manner which was untraceable to participants by the researchers.

Data collection

The outpatient Public Health Service STI clinics Limburg in the Netherlands (9000 consultations annually) offer free and anonymous STI and HIV testing, hepatitis B vaccinations, and sexual health counselling to risk groups, among which are MSM. Limburg, a southern area in the Netherlands, consists of both urban (≥ 1500 addresses/m²) and non-urban areas (< 1500 addresses/m²), according to the definition of Statistics Netherlands (www.cbs.nl). For this study, MSM aged 16 years or older who attended one of the STI clinics in Limburg were asked to fill in an online questionnaire on drug use. MSM were defined as men who had sex with men in the past six months. Convenience sampling was used for the recruitment. Questionnaires were available in both Dutch and English. The recruitment period was from September, 2017, till June, 2018. After the consultation, the questionnaire was sent by email or text message to all MSM who had agreed to receive the questionnaire. Duplicate survey entries were not possible, as we used an online survey program that remembered the questions a participant already completed. Forwarding was possible but highly unlikely as participants were invited personally and consented for participation.

Client registry data

All MSM were routinely universally tested for urogenital, anorectal, and oropharyngeal Chlamydia trachomatis (CT) and Neisseria gonorrhoeae (NG), HIV, hepatitis B and syphilis. Specimens tested for CT and NG consisted of urine, self-collected anorectal swabs and nurse-collected oropharyngeal swabs. Specimens were processed at the regional medical microbiology laboratory of Maastricht University Medical Centre using polymerase chain reaction (PCR) (Cobas 4800, Roche, California). Serum was tested for HIV (anti-HIV[1/2]) Hepatitis B (HBsAg II and Anti-HBs), and syphilis (Treponema pallidum, Biokit 3.0). Each consultation further included a standardized nurse-taken medical and sexual history, including sociodemographic characteristics, symptoms, previous STI diagnosis, and number of sex partners in the preceding six months. All data were registered in an electronic client registry using a consultation code. Electronic client registry data of the most recent consultation during the research period was linked to the online questionnaire data using the consultation code.

Questionnaire

All participants were asked if they had used drugs before or during sex in the preceding six months and if so which ones (list of drugs asked can be found in online Supplementary File I) and how frequent they used these drugs (≥ 4 times per week, 2–4 times per week, ≤ 1 time per month, not in preceding six months). Slang names of all drugs were included in the questionnaire. In those reporting any drug use during sex, additional questions were asked on sober sex (sex without the use of any drug), combining drugs during sex, combining alcohol and drugs during sex, sexual risk behaviours while under the influence of drugs, injection of drugs ('slamming'), anal insertion of drugs with syringes ('booty bumping'), sharing needles, syringes or snort tubes (questions can be found in online Supplementary File II).

Definitions

The outcome measure was an STI diagnosis, this was defined as being diagnosed with CT, NG, infectious syphilis (Lues I, Lues II, Lues latens recens), acute hepatitis B and/or a newly diagnosed HIV infection at the most recent consultation of the client during the research period. The main determinant of interest was drug use during sex, and three different definitions were used. Any drug use during sex was defined as the use of any of the drugs listed in online Supplementary File I during sex in the preceding six months. We defined chemsex as the use of crystal meth, cocaine, designer drugs (2-CB, 3 MMC, 4-FA, 4-MEC), GHB/GBL, ketamine, mephedrone, speed, or ecstasy/3,4-Methylenedioxy methamphetamine (XTC/MDMA) during sex in the preceding six months (referred to as broad definition chemsex). Cannabis, poppers, laughing gas and magic mushrooms are generally excluded from the chemsex de-

inition because of their use in a broader context [19]. We also constructed the UK definition of chemsex [10] and this included the typical chemsex drugs: the use of crystal meth, GHB/GBL and/or mephedrone during sex in the preceding six months. The drugs of the broad definition of chemsex were used to construct the following measures. Frequency of chemsex was calculated from the drug that was most frequently used and categorized into never, ≤ 1 time per month, 2–4 times per month, ≥ 2 times per month. The number of different drugs used was calculated as the sum of drugs used, and categorized into 0 drugs, 1–2 drugs, ≥ 3 drugs. Combining drugs was defined as the use of at least two different drugs and combining drugs and alcohol was defined as the use of drugs and at least four units of alcohol during sex.

Statistical analysis

A non-participation analysis was performed, in which sociodemographic characteristics and STI positivity were compared between participants and non-participants using chi-square tests. Participants were defined as all MSM who fully completed the questionnaire, and non-participants were defined as all MSM who visited the STI clinic in the study period and were not asked, did not agree to participate, or did not complete the questionnaire.

Descriptive statistics were used to describe proportion of MSM engaging in chemsex, the specific drugs used, number of drugs used, frequency of chemsex, and combining different drugs. For the measures of any drug use, chemsex and use of the typical chemsex drugs, 95% confidence intervals (CI) were calculated. Sociodemographic characteristics and STI risk factors were compared between MSM who tested STI negative and MSM who tested STI positive, using chi-square tests and Fisher exact tests. STI positivity was presented for all categories of the characteristics. The characteristics that showed statistically significant differences were included as possible confounders in further analyses. We assessed associations between a range of chemsex-related behaviours and STI using univariable logistic regression analyses. Factors included any drug use, broad definition of chemsex, UK definition of chemsex, use of specific drugs during sex, frequency of chemsex, number of drugs used, combining drugs, combining alcohol and drugs, use of erectile dysfunction drugs and use of tranquilizers. Associations between STI and all factors were adjusted for significant confounders in separate multivariable models. All factors with a p-value < 0.05 after adjustment for confounders were included in one multivariable model. The model was adjusted for significant confounders. We used a forward regression model, because of multicollinearity between several determinants (Spearman's correlation coefficient ≥ 0.8), such as frequency of chemsex and number of drugs used. Additional analyses were restricted to participants engaging in chemsex. Descriptive analyses were used to assess the proportion of MSM engaging in risky drug admi-

nistration and sexual risk behaviour. All analyses were performed using SPSS V21 (IBM SPSS Statistics for Windows, IBM Cooperation, Armonk, New York, USA).

Results

2

Study population

Of the 1015 unique MSM attending the STI clinics during the study period, 350 (34.5%) were recruited to participate, and 250 (72.9%) fully completed the questionnaire (Figure 1). Age (median age 33 years versus median age 34 years, $p = 0.75$), educational level (higher educated: 64% versus 60%, $p = 0.30$), ethnicity (western: 91% versus 88%, $p = 0.12$), and STI positivity (19% versus 18%, $p = 0.53$) were comparable between MSM who were recruited and MSM who were not recruited. Age (median age 35 years versus median age 31 years, $p = 0.07$), ethnicity (western: 93% versus 86%, $p = 0.08$), and STI positivity (19% versus 19%, $p = 0.97$) were comparable between who completed the questionnaire and MSM who were recruited but not completed the questionnaire. MSM who completed the questionnaire were more often higher educated (67% versus 54%, $p = 0.05$) than MSM who were recruited but not completed the questionnaire. In total, age (median age 35 years versus median age 33 years, $p = 0.50$), educational level (higher educated: 67% versus 60%, $p = 0.06$), and STI positivity (19% versus 18%, $p = 0.57$) were comparable between participants ($N = 250$) and non-participants ($N = 765$). Participants more often had a western nationality compared to non-participants (93% versus 88%, $p = 0.03$).

Figure 1. Flow chart of the study population.

Drug use during sex

Any drug use during sex was reported by 54% (95%CI: 48–61) of the 250 participants. Poppers (42%; 105/250), XTC/MDMA (27%; 68/250) and GHB/GBL (26%; 64/250) were the most used drugs during sex. Of MSM using at least one drug during sex, 29% (40/136) used four or more different drugs in the preceding six months. Of MSM using poppers, 40% used only this drug. Of MSM using XTC/MDMA, GHB/GBL, ketamine, speed, cocaine, crystal meth or mephedrone, 93–100% used at least one other drug (Figure 2). One of four participants combined different drugs during one chemsex session (60/250), with XTC/MDMA and GHB/GBL (78%; 47/60) being the most used combination. Among MSM using ≥ 4 drugs, 98% (39/40) combined different drugs at one sex session. Chemsex (cocaine, crystal meth, designer drugs, GHB/GBL, ketamine, mephedrone, speed, XTC/MDMA) was reported by 35% (87/250) (95%CI: 29–41);

the proportion of chemsex was comparable between MSM living in a urban-area and MSM living in a non-urban area (36% vs. 33%; $p = 0.68$). Of MSM engaging in chemsex, 49% (43/87) engaged in chemsex in the past week. Sober sex in the past month was reported by 72% (63/87). The use of at least one of the typical chemsex drugs was reported by 26% (65/250) (95%CI: 21–32), of which GHB/GBL was the most used drug (99%; 64/65). Crystal meth (2%; 5/250) and mephedrone (2%; 4/250) were rarely reported.

Figure 2. Drug use in the preceding six months in all participants (N=250).

STI positivity

In total, 19% (48/250) of all participants were tested positive for an STI. Positivity was 10% (24/250) for CT, 9% (23/250) for NG, 2% (4/250) for infectious syphilis, 1% (2/250) for HIV. STI positive and STI negative tested men differed regarding age, HIV status, and number of sex partners. In other words, STI positivity was higher in older MSM, known HIV positive MSM, and MSM who had seven or more sex partners in the preceding six months (Table 1).

Table 1. Characteristics of study population and STI positivity within groups.

	All participants (N=250)		STI positive (N=48)	STI negative (N=202)	
	% of total (N)		% within groups (N)	% within groups (N)	P (χ^2-test)
Sociodemographic characteristics					
Age^a					0.007
16-28 years	27.6 (69)		17.4 (12)	82.6 (57)	
29-43 years	36.8 (92)		10.9 (10)	89.1 (82)	
44-71 years	35.6 (89)		29.2 (26)	70.8 (63)	
Educational level^b					0.963
Lower educated	33.0 (76)		19.7 (15)	80.3 (61)	
Higher educated	67.0 (154)		19.5 (30)	80.5 (124)	
SES^{a,c}					0.507
Low	30.8 (77)		22.1 (17)	77.9 (60)	
Medium	33.8 (79)		15.2 (12)	84.8 (67)	
High	31.2 (78)		16.7 (13)	83.3 (65)	
Urbanization^c					0.854
Non-urban	45.6 (114)		18.4 (21)	81.6 (93)	
Urban	48.0 (120)		17.5 (21)	82.5 (99)	
Ethnicity^b					0.740
Western	92.8 (232)		19.0 (44)	81.0 (188)	
Non-western	7.2 (18)		22.2 (4)	77.8 (14)	
Sexual identity					0.636
Homosexual	87.6 (219)		19.6 (43)	80.4 (176)	
Bisexual	12.4 (31)		16.1 (5)	83.9 (26)	
Sexual history					
Commercial sex work					0.576 ^d
Yes	1.6 (4)		25.0 (1)	75.0 (3)	
No	98.4 (246)		19.1 (47)	80.9 (199)	
HIV status^e					0.011
Aware positive	19.6 (49)		32.7 (16)	67.3 (33)	
Negative or unknown	80.4 (201)		15.9 (32)	84.1 (169)	
Previous STI diagnosis					0.123
Yes	24.8 (62)		18.4 (21)	81.6 (41)	
No	45.6 (114)		27.4 (17)	72.6 (97)	
Unknown	29.6 (74)		13.5 (10)	86.5 (64)	

continue

Table 1. Characteristics of study population and STI positivity within groups.

	All participants (N=250)	STI positive (N=48)	STI negative (N=202)	
	% of total (N)	% within groups (N)	% within groups (N)	P (χ^2 -test)
Notified for STI				0.262
Yes	16.8 (42)	26.2 (11)	73.8 (31)	
No	83.2 (208)	18.0 (37)	82.0 (166)	
Number of sex partners <6 months^a				0.014
1-3	32.4 (81)	11.1 (9)	88.9 (72)	
4-7	30.8 (77)	16.9 (13)	83.1 (64)	
≥7	36.8 (92)	28.3 (26)	71.7 (66)	

Row percentages are presented.

^a Based on tertile distributions.

^b Educational level and ethnicity were based on the definitions used by the Statistics Netherlands (www.cbs.nl). Western: person who was born in Europe (excluding Turkey), North-America, Oceania, Indonesia or Japan. Non-Western: person who was born or of whom at least parent was born in Africa, Latin America, Asia (excluding Indonesia or Japan) or Turkey.

^c Postal codes were used to calculate socioeconomic status (SES) (www.scp.nl) and urbanization (www.cbs.nl). Urbanization was categorized into urban (≥1500 addresses/m²) and non-urban (<1500 addresses/m²). Data of 16 MSM were missing as postal code was not recorded.

^d Fisher-exact test

^e HIV status included prior HIV diagnoses only and excluded newly diagnosed HIV diagnoses.

STI and associated determinants

MSM engaging in chemsex more often were STI positive than MSM not engaging in chemsex (33% vs. 12%; $p < 0.001$). The association between chemsex and STI was similar for MSM living in urban areas and MSM living in non-urban areas (data not shown). The association between chemsex and STI remained significant after adjustment for age, HIV status and number of sex partners in the preceding six months (aOR: 2.92, 96%CI: 1.42–6.01). Likewise, the use of XTC/MDMA, GHB/GBL, and cocaine were significantly associated with STI after adjustment for confounders (Table 2). However, the only variable associated with STI in the adjusted multivariable model was the use of three or more chemsex drugs in the preceding six months (aOR: 4.13; 95%CI: 1.77–9.62). STI positivity was 44% (20/45) in MSM who used three or more drugs, compared to 21% (9/42) in MSM who used one or two drugs, and 12% (19/163) in MSM who did not use any drug.

Table 2. Percentages of chemsex and drugs used during sex and associations with STI positivity in MSM attending an STI clinic.

	All participants (N=250)	STI positive (N=48)	STI negative (N=202)	Outcome: STI positivity	
	% of total (N)	% within groups (N)	% within groups (N)	Unadjusted OR (95% CI)	Adjusted OR (95% CI) ^a
Main behaviours					
Any drug use during sex					
Yes	54.4 (136)	23.5 (32)	76.5 (104)	1.89 (0.97-3.65)	1.36 (0.67-2.79)
No	45.6 (114)	14.0 (16)	86.0 (98)	1 ^b	1
Broad definition chemsex^c					
Yes	34.8 (87)	33.3 (29)	66.7 (58)	3.79 (1.97-7.29)***	2.92 (1.42-6.01)***
No	65.2 (163)	11.7 (19)	88.3 (144)	1	1
UK definition chemsex					
Yes	26.0 (65)	36.9 (24)	63.1 (41)	3.93 (2.03-7.61)***	2.87 (1.39-5.97)**
No	74.0 (185)	13.0 (24)	87.0 (161)	1	
Chemsex-related behaviour based on broad definition of chemsex					
Number of different chemsex drugs used <6 months					
≥3	18.0 (45)	44.4 (20)	55.6 (25)	6.06 (2.84-12.94)***	4.13 (1.77-9.62)**
1-2	16.8 (42)	21.4 (9)	78.6 (33)	2.07 (0.86-4.98)	1.92 (0.76-4.87)
0	65.2 (163)	11.7 (19)	88.3 (114)	1	1
Combining chemsex drugs in one sex session					
Yes	24.0 (60)	31.7 (19)	68.3 (41)	2.57 (1.31-5.04)*	1.70 (0.81-3.58)
No	76.0 (190)	15.3 (29)	84.7 (161)	1	1
Combining drugs and alcohol (≥4 units) during one sex session					
Yes	20.4 (51)	15.7 (8)	84.3 (43)	0.74 (0.32-1.70)	0.47 (0.18-1.21)
No	79.1 (199)	20.1 (40)	79.1 (159)	1	1

continue

Table 2. Percentages of chemsex and drugs used during sex and associations with STI positivity in MSM attending an STI clinic.

	All participants (N=250)	STI positive (N=48)	STI negative (N=202)	Outcome: STI positivity	
	% of total (N)	% within groups (N)	% within groups (N)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)^a
Frequency chemsex <6 months					
Twice per month or more	16.0 (40)	45.0 (18)	55.0 (22)	6.20 (2.83-13.60)***	4.23 (1.78-10.05)
Once per month or less	18.8 (47)	23.4 (11)	76.6 (36)	2.32 (1.01-5.30)*	1.99 (0.81-4.91)
Never	65.2 (163)	11.7 (19)	88.3 (144)	1	1
Specific drugs used during sex					
Poppers					
Yes	42.0 (105)	26.7 (28)	73.3 (77)	2.27 (1.20-4.31)*	1.71 (0.86-3.40)
No	58.0 (145)	13.8 (20)	86.2 (125)	1	1
XTC/MDMA					
Yes	27.2 (68)	35.3 (24)	64.7 (44)	3.59 (1.86-6.93)***	2.67 (1.29-5.56)**
No	72.8 (182)	13.2 (24)	86.8 (158)	1	1
GHB/GBL					
Yes	25.6 (64)	35.9 (23)	64.1 (41)	3.61 (1.81-7.00)***	2.59 (1.24-5.24)*
No	74.4 (186)	13.4 (25)	86.6 (161)	1	1
Cannabis					
Yes	22.8 (57)	22.8 (13)	77.2 (44)	1.33 (0.65-2.74)	1.03 (0.47-2.22)
No	77.2 (193)	18.1 (35)	81.9 (158)	1	1
Ketamine					
Yes	12.4 (31)	35.5 (11)	64.5 (20)	2.71 (1.20-6.12)*	1.78 (0.74-4.25)
No	87.6 (219)	16.9 (37)	83.1 (182)	1	
Speed					
Yes	10.8 (27)	25.9 (7)	74.1 (20)	1.55 (0.62-3.92)	1.17 (0.44-3.11)
No	89.2 (223)	18.4 (41)	81.6 (182)	1	1
Cocaine					
Yes	9.2 (23)	47.8 (11)	52.2 (12)	4.71 (1.93-11.47)**	3.01 (1.12-8.05)*
No	90.8 (227)	16.3 (37)	83.7 (190)	1	1
Designer drugs					
Yes	3.2 (8)	37.5 (3)	62.5 (5)	NA ^d	NA
No	96.8 (242)	18.6 (45)	81.4 (197)		

continue

Table 2. Percentages of chemsex and drugs used during sex and associations with STI positivity in MSM attending an STI clinic.

		All participants (N=250)	STI positive (N=48)	STI negative (N=202)	Outcome: STI positivity	
		% of total (N)	% within groups (N)	% within groups (N)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)^a
Crystal meth						
	Yes	2.0 (5)	20.0 (1)	80.0 (4)	NA	NA
	No	98.0 (245)	19.2 (47)	80.2 (198)		
Mephedrone						
	Yes	1.6 (4)	50.0 (2)	50.0 (20)	NA	NA
	No	98.4 (246)	18.7 (46)	81.3 (200)		
Nitrous oxide						
	Yes	0.8 (2)	0.0 (0)	100.0 (2)	NA	NA
	No	99.2 (248)	19.4 (48)	80.6 (200)		
LSD						
	Yes	0.4 (1)	100.0 (1)	0.0 (0)	NA	NA
	No	99.6 (249)	18.9 (47)	91.1 (202)		
Magic mushrooms						
	Yes	0.4 (1)	100.0 (1)	0.0 (0)	NA	NA
	No	99.6 (249)	18.9 (47)	91.1 (102)		
Substance use during sex						
Erection dysfunction drugs						
	Yes	41.6 (104)	30.8 (32)	69.2 (72)	3.61 (1.86-7.03)***	2.63 (1.26-5.47)*
	No	58.4 (146)	11.0 (16)	89.0 (130)	1	1
Tranquilizers						
	Yes	8.8 (22)	18.2 (4)	81.8 (13)	0.93 (0.30-2.88)	0.83 (0.25-2.73)
	No	91.2 (228)	19.3 (44)	80.7 (184)	1	1

*** <0.001, ** <0.01, * <0.05

Row percentages are presented.

The use of basecokes, heroin and ritalin during sex in the preceding six months was reported by none of the participants.

^aAdjusted for age, HIV status, and number of sex partners in the preceding six months (based on Table 1).^bThe reference category is indicated with value '1'.^cDrugs included in the broad definition of chemsex: cocaine, crystal meth, designer drugs, GHB/GBL, ketamine, mephedrone, speed, XTC/MDMA.^dNA: groups were too small to calculate odds ratios.

Sexual risk behaviour and risky drug administration among MSM engaging in chemsex

Condomless receptive anal sex was reported by 64% (56/87) and 40% (34/87) engaged in one chemsex session that lasted for at least 12 hours. Slamming was reported by 6% (5/87) and none of the participants reported to have shared needles. Other percentages of sexual risk behaviours and risky drug administration methods can be found in Table 3.

Table 3. Sexual risk behaviour and risky drug administration in the preceding six months among MSM engaging in chemsex (N=87).

	% (N)
Sexual risk behaviour	
Condomless receptive anal sex	64.4 (56)
Condomless insertive anal sex	59.8 (52)
Condomless receptive anal sex with play toys	35.6 (31)
Chemsex session lasting ≥12 hours	39.1 (34)
Being fisted	20.7 (18)
Multiple sex partners at one chemsex session	36.8 (32)
Casual sex partner(s) (name unknown)	21.8 (19)
Risky drug administration	
Slamming	5.7 (5)
Sharing needles	0.0 (0)
Booty bumping	12.6 (11)
Sharing syringes	4.6 (4)
Sharing snorting tubes	37.9 (33)

Discussion

Our study shows that more than half of MSM who visited the STI clinic in outside major cities in the Netherlands used any drug during sex in the preceding six months. Poppers, XTC/MDMA, and GHB/GBL were the most used drugs. When using the broad definition of chemsex (the use of crystal meth, cocaine, designer drugs, GHB, ketamine, mephedrone, speed and/or XTC/MDMA during sex), chemsex was reported by 35% (95%CI: 29–41). The proportion of MSM engaging in chemsex was comparable between men who lived in urban areas and men who lived in non-urban areas. More than ninety percent of men using XTC/MDMA, GHB/GBL,

ketamine, speed, cocaine, designer drugs, crystal meth, or mephedrone engaged in polydrug use (using other drugs as well). We demonstrated a strong and consistent association between the use of three or more of these drugs and an increased risk for STI. This study informs sexual health clinics outside major cities in the Netherlands on emerging drug trends and their association with STI and hereby helps them to anticipate the needs of their clients.

With regard to the prevalence of chemsex outside the major cities, our data shows that the three typical chemsex drugs—crystal meth, mephedrone, GHB/GBL—are used by 26% of MSM visiting the STI clinic outside the major cities in the Netherlands. It should be noted that this percentage mainly reflects the use of GHB/GBL. When comparing our results on the use of these drugs in the preceding six months to data in MSM from the STI clinic in Amsterdam [17], we demonstrated higher use of GHB in our study (26% vs. 16%), but similar use of crystal meth (2% vs. 4%) and mephedrone (2% vs. 3%). The prevalence of slamming was comparable low in both studies (2% vs. 1%). Our results show that the use of other drugs, especially XTC/MDMA, ketamine, speed and cocaine, during sex was also prevalent and combining different drugs was common. Almost all men using one of the drugs of the broad definition of chemsex (crystal meth, cocaine, designer drugs, GHB/GBL, ketamine, mephedrone, speed, XTC/MDMA) used more than one drug in the preceding six months. Our study suggests that drug use during sex is prevalent among MSM visiting the STI clinic outside major cities in the Netherlands and that health services in non-urban areas should be aware of this phenomenon. Specifically, the high prevalence of polydrug use indicates that drug prevention and harm reduction strategies targeted at MSM engaging in chemsex should include the risks of other drugs next to the typical chemsex drugs and interactions between different drugs (such as the increased risk of an overdose and coma when combining for example GHB/GBL with ketamine). In line with the study of Daskapoulou [9] almost three-quarter of MSM engaging in chemsex reported sober sex in the past month, indicating that dependency might be only an issue for a minority. As Holt [24] stated, not all drug use has to be automatically framed as problematic. Findings from other studies showed that many men who engaged in chemsex successfully managed their drug use and found it enjoyable. Nevertheless, the risk of addiction related to the use of a cheap depressant such as GHB/GBL [25] needs awareness among health services and emphasizes the need of identifying those who need help.

Concerning the STI risk related to the specific drugs used during sex, our study shows that XTC/MDMA, GHB/GBL, and cocaine were associated with STI after adjustment for sociodemographic characteristics and non-drug use sexual history. However, the widespread pattern of polydrug use among MSM makes it difficult to relate findings to one specific drug. Our study shows that the use of at least three drugs included in the broad definition of chemsex

was the only independently associated determinant for STI in the final model. This finding confirms results from other studies in both HIV-positive [9,26] and HIV-negative MSM [27,28], in which strong associations were found between polydrug use and sexual risk behaviour. We looked further into the concept of polydrug use and noted that among MSM using three or more drugs, 91% used XTC/MDMA and GHB/GBL. We found no predominant combinations of three or four specific drugs. It is noteworthy that 98% of men using one of the typical chemsex drugs (crystal meth, GHB/GBL or mephedrone) also used other drugs. Because the use of other drugs than the typical chemsex drugs was associated with STI and men using the typical chemsex drugs always used other drugs as well, we would recommend STI prevention and care strategies to broaden their definition of chemsex. As recommended in the British Association for Sexual Health and HIV (BASHH) guidelines [29], health care providers should be aware of trends in drug use in their locality and their effects and STI clinics should incorporate these trends into sexual history taking for clients attending for STI screening. Currently, preexposure prophylaxis (PrEP) is becoming more widely available for MSM in most Western countries. A study in Amsterdam found a PrEP use prevalence among MSM of 7% in 2017, of which two-third was study-provided PrEP [30]. During the data collection period in the current study, we expect that only a small minority of our participants already used PrEP. PrEP was not yet covered by health insurances in the Netherlands and there were no PrEP studies offering free PrEP to our study population. However, PrEP use among MSM is expected to increase during the upcoming years [31]. A recent study in the Netherlands showed that over the first six months after initiation of PrEP, an increase in condomless anal sex with casual partners was observed [32]. Therefore, we recommend future studies to include PrEP use when assessing the relationship between chemsex and STI.

To our best knowledge, this is the first study on chemsex among MSM outside major cities in the Netherlands. We included a wide variety of drugs next to the three typical chemsex drugs, which allowed us to describe drug use patterns and their associations with STI. Another strength of our study was the use of STI test results instead of self-reported STI. However, some limitations are worth noting. One general limitation of our study was the cross-sectional design, in which causality and temporality cannot be determined, making it impossible to investigate the causal mechanisms through which drug use and STI operate. A limitation for the assessment of the prevalence of chemsex in MSM visiting the STI clinic outside the major cities in the Netherlands, was the risk of sampling bias. Only one-third of MSM visiting the STI clinic during the study period was asked to participate. However, several precautionary measures were taken to decrease the risk of systematic sampling bias. STI nurses were explicitly instructed to recruit MSM who visited the STI clinic regardless of their drug using and STI status. The reason that nurses did not recruit all MSM who visited the clinic

was mostly for random reasons (e.g. too short time, forgotten to ask). Indeed, no differences in age, educational level, ethnicity, and STI positivity were found between MSM who were recruited and MSM who were not recruited. Furthermore, the invitation for the questionnaire that was sent to the recruited MSM was developed to be appealing also for MSM who did not use drugs and questionnaires were available in Dutch and English. The response rate on the questionnaire was high (70%). We compared MSM who completed the questionnaire with MSM who were recruited but not completed the questionnaire. We showed that age, ethnicity, and STI positivity were comparable between those groups, but MSM who completed the questionnaire were more often higher educated. When comparing participants, MSM who completed the questionnaire, with all non-participants, MSM who were not recruited or did not complete the questionnaire, we showed that age and STI positivity were comparable but participants were slightly higher educated and more often had a western nationality. Educational level and ethnicity were not associated with drug use during sex in our study. Therefore, we expect that our estimated proportion of MSM engaging in drug use during sex is representative for the high-risk MSM who are served by STI clinics in the Netherlands. A limitation for the assessment of associations between the use of specific drugs during sex and STI, was that some drugs were used by too few MSM to calculate associations. In previous studies, the use of crystal meth or mephedrone has been associated with STI [33–35], but we were unable to test these associations. However, we show that MSM using these drugs always use other drugs as well, indicating that the STI risk of using these drugs may have been reflected in the association between number of drugs used and STI.

Conclusion

This study showed that drug use during sex is also prevalent among MSM visiting the STI clinic outside the major cities in the Netherlands. This indicates that STI clinics in both urban and non-urban areas should be aware of and be informed on this phenomenon. MSM using one of the typical chemsex drugs always use other drugs as well, and especially this behaviour—polydrug use—was associated with STI. This indicates that both STI prevention and drug harm reduction strategies might need to broaden the chemsex definition and include interactions between drugs.

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Chapter 3

Sex abroad among men who have sex with men and its association with chemsex, sexual risk behaviour and sexually transmitted infections: a cross-sectional study in the Netherlands

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Abstract

Almost half of MSM visiting Dutch STI clinics reported sex abroad in the past six months, mainly in Western countries. One in four MSM who had sex abroad used drugs during sex ('chemsex') abroad. Having sex abroad was associated with having multiple sex partners and casual sex partner(s).

Introduction

International travel is increasing in Europe and in the rest of the world. Increased ease of travel and the availability of online dating applications and websites facilitates quick formations of sexual relationships at every geographical location.

Travelling has been associated with behavioural disinhibition [1,2]. Away from everyday life's social constraints, people might be more inclined to engage in risk behaviour. Men who have sex with men (MSM) more often have sex abroad, and have a larger number of sexual partners abroad, than other travelers [3]. Increased condomless anal intercourse with casual partners has been observed among MSM travelling abroad compared to when staying at home [4]. One study from the UK showed that having sex abroad was associated with an increased risk of self-reported STI diagnosis [5]. Moreover, increased drug use was reported among MSM travelling abroad compared to MSM staying at their home country [6,7] and this could contribute to an increased risk for STIs or drug-use related accidents. Recently, the use of certain drugs during sex to boost sexual pleasure has increasingly been described among MSM and this has been associated with condomless sex and STIs [8-11]. This behaviour is described as 'chemsex'. The drugs mainly used are crystal methamphetamine, γ -hydroxybutyric acid (GHB), mephedrone, ketamine, ecstasy (XTC) and cocaine [11-13].

Limited data is available on the proportion of MSM who practice chemsex abroad and the association between sex abroad and chemsex. Furthermore, current evidence of the association between sex abroad and STIs is mainly from self-reported rates of STI infection [5], instead of biological sampling. The current study uniquely assessed sex abroad and its association with chemsex, sexual risk behaviour and laboratory confirmed STI test results among MSM visiting Dutch STI clinics.

Methods and materials

Data collection

The outpatient Public Health Service STI clinics in the Netherlands offer free and anonymous STI and HIV testing for MSM and also provide pre-exposure prophylaxis (PrEP) for high-risk MSM. MSM were defined as men who reported having sex with men in the preceding six

months. During consultations, all MSM are routinely universally tested for urogenital, anorectal, and oropharyngeal *Chlamydia trachomatis* (CT), *Neisseria gonorrhoeae* (NG), HIV, hepatitis B and syphilis. Each consultation further includes a standardized nurse-taken medical and sexual history, including sociodemographic characteristics and sexual behaviour. These data are registered in an electronic patient registry. For this study, nurses of nine STI clinics in the Netherlands were instructed to recruit MSM aged 16 years or older during their regular consultations for participation in an online questionnaire in 2017-2018. Recruitment was regardless of reported drug use during the consultation. Online questionnaire data were linked to the most recent consultation in the electronic patient registry. The median time between the consultation date and completion date of the online questionnaire was 19 days (IQR: 14-38).

Definitions

Chemsex behaviour

Chemsex was defined as the use of drugs before or during sex in the past six months. The drugs included were crystal meth, cocaine, designer drugs (2-CB, 3 MMC, 4-FA, 4-MEC), GHB, GBL, ketamine, MDMA, mephedrone, speed, and XTC. Drug use can vary for different place and time areas and therefore we assessed a larger variety of drugs than the four drugs normally included in the UK chemsex definition (i.e. crystal meth, GHB/GBL or mephedrone) [14].

STI diagnosis and sexual risk behaviour

STI diagnosis was defined as being diagnosed with CT, NG, infectious syphilis (Lues I, Lues II, Lues latens recens), acute hepatitis B and/or a newly diagnosed HIV infection at the most recent consultation of clients during the research period. Condomless anal intercourse was defined as not always using a condom during receptive or insertive sex. The number of sex partners in the past six months was categorized in '1-3', '4-6', '7-10' and 'more than 10' based on quartiles.

Sex abroad

Sex abroad was defined as having sex in other countries than the Netherlands in the past six months. Respondents were asked whether they had any sexual contact abroad in the past six months. Subsequently, more detailed questions were asked related to this sexual contact abroad: country in which it took place and whether chemsex drugs were used during this sexual contact. Countries were grouped into Western (Europe, North-America, Canada and Oceania) and non-Western countries (Africa, Latin America, Asia).

Statistical analysis

The proportion of MSM diagnosed with an STI was compared between MSM who had chemsex abroad, MSM who had sex abroad without chemsex and MSM who did not have sex abroad using chi-square tests. Associations between sex abroad and sociodemographic variables, chemsex, sexual risk behaviours and STI were assessed by univariable logistic regression analyses. All variables that were significantly associated with sex abroad ($p < 0.05$) in univariable analyses were included in a multivariable model.

Ethics statement

This study was approved by the Medical Ethical Committee of the University of Maastricht (METC 2018-0485).

Results

Study population

A total of 785 MSM were recruited during the study period and 405 fully completed the questionnaire (response 51.6%). The median age of participants was 40 years (IQR: 31-47), 92.8% (376/405) had a western ethnicity, and 65.9% (267/405) was higher educated. Chemsex was reported by 42.7% (173/405), the most reported drugs were XTC/MDMA (36.3%), GHB/GBL (33.1%), ketamine (18.0%), speed (12.8%) and cocaine (9.9%). The median number of sex partners in the past six months was 6 (IQR: 4-10). Anal condomless intercourse was reported by 60.2% (244/405). A recent STI diagnosis was found in 22.5% (91/405) of MSM (CT 10.1%, NG 13.8%, infectious syphilis 3.0%, HIV 1.0%).

Sex abroad in Western countries

Sex abroad in the past six months was reported by 46.2% (187/405). Sex abroad in Western countries was reported by 40.0% (162/405). Most visited countries were Germany (17.3%), Belgium (17.0%) and Spain (10.1%) (Europe). Almost one third (27.8%, 45/162) reported chemsex during travelling. In those reporting chemsex abroad, 26.7% (12/45) was diagnosed

with an STI, compared to 20.5% (24/117) in travellers without chemsex and 21.6% (47/218) in non-travelers, $p=0.13$).

Sex abroad in non-Western countries

Sex abroad in non-Western countries was reported by 6.2% (25/405). Most visited countries were Thailand (0.7%), China (0.7%) and Japan (0.5%). One percent (2/25) reported chemsex during travelling. In those reporting chemsex abroad, none of the MSM (0/2) were diagnosed with an STI, compared to 34.8% (8/23) in travellers without chemsex.

Associations with sex abroad

Chemsex and recent STI test diagnoses were not higher among MSM who had sex abroad than MSM who stayed at home. Having sex abroad was independently associated with having had multiple sex partners (≥ 4 partners) in the past six months, having sex with casual sex partner(s) and the use of PrEP (Table 1).

Table 1. Associations between sex abroad and sociodemographic characteristics, chemsex, sexual behaviour and STI diagnoses in 405 MSM visiting STD clinics in the Netherlands.

	All participants (N=405)	No sex abroad (N=218)	Sex abroad (N=187)	Outcome: Sex abroad	
	% of total (N)	% of total (N)	% of total (N)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Sociodemographic characteristics					
Age (median, SD)	40 (13.7)	40.19 (14.47)	40.62 (12.79)	1.00 (0.99-1.02)	
Ethnicity ^a					
Western	92.8 (376)	93.6 (204)	92.0 (172)	1	
Non-Western	7.2 (29)	6.4 (14)	8.0 (15)	1.27 (0.59-2.71)	
Educational level ^b					
Lower	33.3 (133)	35.0 (76)	33.1 (57)	1	
Higher	66.8 (267)	65.0 (141)	68.9 (126)	1.19 (0.78-1.81)	
Chemsex					
Chemsex					
No	57.3 (232)	58.3 (127)	56.1 (105)	1	
Yes	42.7 (173)	41.7 (91)	43.9 (82)	1.09 (0.73-1.62)	

continue

Table 1. Associations between sex abroad and sociodemographic characteristics, chemsex, sexual behaviour and STI diagnoses in 405 MSM visiting STD clinics in the Netherlands.

	All participants (N=405)	No sex abroad (N=218)	Sex abroad (N=187)	Outcome: Sex abroad	
	% of total (N)	% of total (N)	% of total (N)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Sexual behaviour and STI diagnosis					
Number of sex partners <6 months^c					
1-3	27.8 (111)	37.0 (80)	16.9 (31)	1	1
4-6	27.8 (111)	28.7 (62)	26.8 (49)	2.04 (1.17-3.57)*	2.12 (1.16-3.87)*
7-10	20.8 (83)	17.6 (38)	24.6 (45)	3.06 (1.68-3.56)***	2.36 (1.20-4.65)*
≥11	23.6 (94)	16.7 (36)	31.7 (58)	4.16 (2.31-7.48)***	3.04 (1.52-6.09)**
Condomless anal intercourse					
No	39.8 (161)	40.4 (88)	39.0 (73)	1	
Yes	60.2 (244)	59.6 (130)	61.0 (114)	1.06 (0.71-1.58)	
Casual sex partner					
No	27.2 (110)	36.2 (79)	16.6 (31)	1	1
Yes	72.8 (295)	63.8 (139)	83.4 (156)	2.86 (1.78-4.60)***	1.98 (1.15-3.40)*
Group sex					
No	82.2 (333)	86.2 (188)	77.5 (145)	1	
Yes	17.8 (72)	13.8 (30)	22.5 (42)	1.82 (1.08-3.04)	NS
PrEP use					
No	85.3 (307)	91.3 (179)	78.0 (128)	1	1
Yes	14.7 (53)	8.7 (17)	22.0 (36)	2.96 (1.59-5.50)**	2.06 (1.04-4.08)*
Recent STI diagnosis^d					
Negative	77.0 (304)	78.2 (169)	75.4 (135)	1	
Positive	23.0 (91)	21.8 (47)	24.6 (44)	1.17 (0.73-1.87)	
Known HIV positive					
No	89.4 (362)	90.8 (198)	87.7 (164)	1	
Yes	10.6 (43)	9.2 (20)	12.3 (23)	1.34 (0.71-2.53)	

^a Ethnicity was based on the definitions used by the Statistics Netherlands (www.cbs.nl). Western: person who was born in Europe (excluding Turkey), North-America, Oceania, Indonesia or Japan. Non-Western: person who was born or of whom at least one parent was born in Africa, Latin America, Asia (excluding Indonesia or Japan).

^b Educational level: Educational level was measured as current or last completed education and divided into lower educated (pre-vocational secondary education, secondary vocational education) and higher educated (university, higher professional education, pre-university/senior general secondary education). Educational level was missing for 5 participants and excluded pairwise from analysis.

^c Number of sex partners was missing for 6 participants and excluded pairwise from analysis.

^d STI laboratory test results were missing for 10 participants and excluded pairwise from analysis.

Discussion

Our study shows that almost half of MSM visiting Dutch STI clinics reported sex abroad in the past six months, mainly in Western countries. MSM rarely reported to have sex abroad in non-Western countries. Chemsex abroad was reported by one third of MSM who had sex abroad.

The majority of MSM who had sex abroad had sex in neighboring countries Belgium and Germany, but also in Spain, which was in line with a study among MSM residing in Belgium [8]. The European MSM Internet study report also showed that Germany and Spain are the most frequented countries for having sex abroad [15].

Studies from Sweden and the United States have shown that drug use was higher among MSM who had sex abroad [6] or MSM being at a gay resort [4] than at home. In our study, chemsex was as high among MSM who had sex abroad as MSM who had sex in the Netherlands. The Netherlands is known as a liberal country concerning drug use and this might be one explanation for the absence of an association between chemsex and having sex abroad. Nevertheless, chemsex abroad was common and using drugs abroad can be associated with additional health risks due to uncertainties regarding composition of drugs and the lack of knowledge in travelling MSM on available local health services [16].

Our study shows that recent STI diagnoses were comparable between MSM who had sex abroad and MSM who stayed at home, but there was an independent association between having multiple sex partners and casual sex partners and having sex abroad. Studies that compared sexual risk behaviour abroad to staying at home in the same group showed that there was an increase in casual sexual partners abroad [4,17]. PrEP use was also independently associated with having sex abroad, which might indicate that MSM are well-prepared in preventing HIV when having casual sex abroad. Nevertheless, inconsistent condom use and multiple sex partners among MSM who had sex abroad could contribute to the spread of bacterial STIs internationally. Therefore, prevention and care related to STIs and drug use related accidents is highly important in MSM who have (chem)sex abroad.

The generalizability of our study might be limited to the high-risk MSM population visiting Dutch STI clinics, since overall STI positivity (20% vs. 13%, $p<0.001$) was higher among our participants compared to all MSM visiting the STI clinics in 2018 ($n=14,957$). Because of the cross-sectional design, we cannot determine whether risk behaviour changes while having sex abroad or whether it is predetermined.

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Chapter 4

Use of doxycycline and other antibiotics to prevent STIs among men who have sex with men visiting sexual health clinics in the Netherlands

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Sexually Transmitted Infections. 2019; 0(0)

A clinical trial (ANRS IPERGAY) among 232 men who have sex with men (MSM) using HIV pre-exposure prophylaxis (HIV-PrEP) showed efficacy of post-exposure prophylaxis with doxycycline in reducing chlamydia and syphilis. [1] A survey showed high interest (84%) in trying doxycycline prophylaxis for prevention of STIs among MSM in the USA. [2] Actual use has been estimated to be nearly 10% among MSM using HIV PrEP in the UK [3] and Australia [4]. However, the use of doxycycline STI-prophylaxis is not recommended in UK guidelines, because of risk for selection and dissemination of doxycycline resistant strains. [5] In the Netherlands and most European countries, doxycycline STI-prophylaxis is not prescribed by sexual health clinics and general practitioners. This study is the first estimate of STI-prophylaxis use among MSM in the Netherlands.

The staff of nine Public Health Service STI clinics in the Netherlands was instructed to recruit MSM aged 16 years or older during their regular STI consultations for participation in an online questionnaire. Convenience sampling was used. The recruitment period was three months in 2018 for all participating STI clinics. The questionnaire included questions on drug use during sex (or ‘chemsex’), sexual behaviour, HIV-PrEP use and antibiotic STI-prophylaxis use. Descriptive analyses were used to provide estimates of antibiotic STI-prophylaxis use and characteristics of MSM using antibiotic STI-prophylaxis.

In total 785 MSM were recruited of whom 321 completed the question on antibiotic STI-prophylaxis use. Participants (n=321) had a median age of 41 years (IQR: 29-53) and 63% had a higher educational level. The median number of sex partners was 6 (IQR: 4-9), 12% was HIV positive. Chemsex was reported by 43%. Seven men (2.2%; 95% CI 1.1-4.4%) reported antibiotic STI-prophylaxis use; three men used azithromycin, two used doxycycline, one used ciprofloxacin and one did not report the specific antibiotic used. Four men used antibiotics at the time of sex, two when having symptoms and one used it daily. One man was HIV-positive, one used HIV-PrEP and five did not use HIV-PrEP. The characteristics of the seven men reporting STI-prophylaxis use can be found in Table 1.

In conclusion, antibiotic STI-prophylaxis use is low among MSM visiting the STI clinic in the Netherlands but its use is not limited to men using HIV-PrEP. We also show that doxycycline is not the only antibiotic used for STI-prophylaxis, as azithromycin and ciprofloxacin were also used. Although trials [1,6] have suggested that antibiotic STI-prophylaxis could be effective as a short-term strategy for high-risk MSM with a high incidence of STIs, the potential harm in terms of antimicrobial resistance should be further assessed. Nevertheless, MSM are already using antibiotic STI-prophylaxis themselves. Monitoring of this informal STI-prophylaxis use is important for optimal patient management, especially in the sexual health clinic context. Previous

studies assessing STI-prophylaxis use focused on the use of doxycycline [2] among MSM using HIV-PrEP only [2,3]. Our study shows that it might be useful to broaden monitoring on STI-prophylaxis use to a wide variety of antibiotics and to MSM who are not using HIV-PrEP as well.

Table 1: Characteristics of MSM visiting the STI clinic who used antibiotic STI-prophylaxis

Patient	Number of sex partners <6 months	Chemsex*	HIV positive	HIV-PrEP use	Intention to use HIV-PrEP	Antibiotic used STI-prophylaxis	Mode of use
1	6	No	No	No	No	Azithromycin	In case of symptoms
2	11	No	No	No	Yes	Azithromycin	In case of symptoms
3	5	No	No	No	Yes	Azithromycin	Daily
4	10	No	No	No	Yes	Ciprofloxacin	Around sex
5	10	Yes	No	Yes	NA	Doxycycline	Around sex
6	15	Yes	Yes	NA	NA	Doxycycline	Around sex
7	1	No	No	No	No	Unknown	Around sex
Total	Median: 10	29%	14%	14%	43%	NA	NA

NA: Not applicable.
Median age of patients was 40 years (IQR 35-43; range 35-57 years). All patients were higher educated.
*Chemsex: the use of drugs during sex. Drugs included in this definition were crystal meth, cocaine, designer drugs (2-CB, 3 MMC, 4-FA, 4-MEC), GHB, GBL, ketamine, MDMA, mephedrone, speed, and XTC.

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Chapter 5

Attitude and beliefs about the social environment associated with chemsex among MSM visiting STI clinics in the Netherlands: an observational study

5

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Abstract

Background

Drug use during sex, 'chemsex', is common among men who have sex with men (MSM) and related to sexual and mental health harms. This study assessed associations between chemsex and a wide range of determinants among MSM visiting STI clinics to increase understanding of characteristics and beliefs of MSM practicing chemsex.

Methods

In 2018, 785 MSM were recruited at nine Dutch STI clinics; 368 (47%) fully completed the online questionnaire. All participants reported to have had sex in the past six months. Chemsex was defined as using cocaine, crystal meth, designer drugs, GHB/GBL, ketamine, speed or XTC/MDMA during sex in the past six months. Associations between chemsex and psychosocial determinants, socio-demographics, sexual behaviour and using tobacco or alcohol were assessed by multivariable logistic regression analyses.

Results

Chemsex was reported by 44% of MSM (161/368) and was not associated with socio-demographics. Independent determinants were 'believing that the majority of friends/sex partners use drugs during sex' (descriptive norm) (aOR: 1.95, 95%CI: 1.43-2.65), 'believing that sex is more fun when using drugs' (attitude) (aOR: 2.06, 95%CI: 1.50-2.84), using tobacco (aOR: 2.65, 95%CI: 1.32-5.32), multiple sex partners (aOR: 2.69, 95%CI: 1.21-6.00), group sex (aOR: 4.65, 95%CI: 1.54-14.05) and using online dating platforms (aOR: 2.73, 95%CI: 1.13-6.62).

Conclusion

MSM practicing chemsex are a heterogeneous group regarding socio-demographics. They are likely to find themselves in distinct social networks where it is the norm to use drugs when having sex and pleasure is linked to chemsex. Health services should acknowledge the social influence and pleasurable experiences to increase acceptability of strategies aimed at minimizing the possible harms of chemsex.

Introduction

Drug use during sex, or ‘chemsex’, is a well-documented behaviour among men who have sex with men (MSM) (Tomkins, George, Kliner, 2019) [1,2]. The main type of drugs described in chemsex are drugs that stimulate sexual desire, such as crystal methamphetamine, gamma-hydroxybutyric acid (GBH)/gamma-butyrolactone (GBL), mephedrone, ecstasy (XTC) and ketamine [3,4]. A systematic review that included studies from Europe, Australia, and the United States of America, demonstrated that the proportion of MSM practicing chemsex ranged from 17% to 27% among MSM attending STI clinics in large cities [1]. A recent study by our research group showed that chemsex was also common practice among MSM living outside large cities in the Netherlands (36%) [5].

The upsides of chemsex that have been described for MSM are various and include the enhancement of sexual desire [6,7]. Chemsex has been associated with greater sexual satisfaction, but lower life satisfaction [8]. Chemsex has been associated with several adverse sexual and mental health outcomes. For example, chemsex has been associated with an increased risk of condomless anal intercourse [9-12], acquisition of sexually transmitted infections (STIs) [10,13,14] and anxiety and depression when the use was considered dependent [15].

Considering that chemsex is common among MSM and associated with health harms, health promotion strategies aimed at minimizing these harms, such as STI control strategies and safer drug use (harm reduction) strategies are important in this group. An understanding of the characteristics and beliefs associated with chemsex is needed to identify MSM practicing chemsex in health care and tailor health promotion strategies to their beliefs. Previous data on associations between chemsex and socio-demographics, i.e. age, ethnicity and educational level, have been inconsistent [1,8,14,16-18]. Concerning the use of other substances, tobacco use has been associated with chemsex, but no association has been found between regular alcohol consumption and chemsex [14,15]. Sexual risk behaviour, i.e. multiple sex partners, casual sex partners, group sex, and fisting, has been associated with chemsex [8,10,13,18-20]. A few studies have assessed associations between chemsex and psychosocial determinants from common behaviour-oriented theories (e.g. Theory of Planned Behaviour, Health Belief Model, Social Norms Theory). Lower perception of risk, or ‘risk perception’ [21], was associated with drug use and regular drug use in MSM [22]. A more favourable appraisal, or ‘attitude’ [23], towards drug use among lesbian, gay and bisexual people helped to explain the higher use of drugs compared to heterosexuals [24]. Acceptability of drug use among the social environment, or the ‘subjective norm’ [25], was positively associated with drug use in MSM [22]. Believing that most people in the social environment practice chemsex,

or the ‘descriptive norm’, was also related to chemsex among MSM in a qualitative study [19]. Adequate ability to refuse drugs and confidence in this ability, or ‘refusal skills and self-efficacy’ [26], were associated with less drug use among MSM [27]. Finally, a qualitative study found that drug use could be the result of a learned automatic response, or ‘habit’ [28], to sex for some MSM [29].

Most studies focused on a particular set of determinants. Only one quantitative study [22] assessed a broad framework of the above described psychosocial determinants, socio-demographics and sexual risk behaviour in relation with drug use among MSM. However, this study [22] assessed determinants of drug use in general, and these determinants might differ for chemsex. Therefore, to explore characteristics and beliefs of MSM practicing chemsex, in the present quantitative study, we developed a comprehensive framework including psychosocial determinants, socio-demographics, tobacco and alcohol use, and sexual behaviour possibly associated with chemsex (Figure 1).

Figure 1. Conceptual framework to explain the use of drugs during sex (chemsex) in men who have sex with men attending Dutch sexually transmitted infection clinics.

Methods and materials

Ethics statement

This study was approved by the Medical Ethical Committee of the University of Maastricht (METC 2018-0485). STI client registry data was collected within standard care. During recruitment, STI nurses provided information on the study and participants gave oral informed consent to be approached for the online questionnaire and this was registered in the STI client registry. Participants gave written informed consent at the beginning of the questionnaire (online Supplementary file I). Data from questionnaires and linkage to data from medical records were retrieved in a coded de-identified manner which was untraceable to participants by the researchers.

Study design

The outpatient Public Health Service STI clinics in the Netherlands offer free and anonymous STI and HIV testing, hepatitis B vaccinations, and sexual health counselling for risk groups, such as MSM. Of all unique clients visiting any STI clinic in the Netherlands in 2018 (111,271), 27% (29,531) were MSM [30]. MSM was defined as a man who reported having sex with a man in the preceding six months. Nurses of nine STI clinics in the Netherlands (list of participating STI clinics in online Supplementary File II) were instructed to recruit MSM aged 16 years or older during their STI consultations for participation in an online questionnaire on drug use; it was explicitly instructed to include MSM regardless of their drug use (yes or no) behaviour. Convenience sampling was used for recruitment. The recruitment period was three months in 2018 for all participating STI clinics.

Procedures

All STI consultations included a standardized nurse-taken medical and sexual history, including socio-demographics and sexual behaviour in the past six months. These data were registered in an electronic patient registry. Up to one week after the STI consultation, the questionnaire was sent by email to all MSM who had agreed to participate in the study. It was made clear that the questionnaire was intended for MSM regardless whether they used drugs or not in the past six months. The questionnaire included questions on drug use during sex, sexual behaviour, alcohol and tobacco use, and psychosocial determinants. Questionnaire data were linked to electronic patient registry data using the consultation code.

Outcome

The outcome in this study was chemsex, the use of drugs before or during sex, in the past six months. Crystal meth, cocaine, designer drugs (2-CB, 3 MMC, 4-FA, 4-MEC), GHB, GBL, ketamine, MDMA, mephedrone, speed, and XTC were included in this definition. Alcohol and cannabis are generally excluded from the chemsex definition because of their common use in a recreational context. Poppers are used during sex by MSM, but only using poppers during sex is normally not classified as chemsex in previous literature [3,9-11,13].

Determinants

Socio-demographics

Age, four-digit postal codes, educational level, and ethnicity were available from the coded electronic patient registry. Socioeconomic status (SES) scores based on income, educational level and employment were extracted from the Netherlands Institute for Social Research (<http://www.scp.nl>) per four-digit postal code area. Postal codes were also used to calculate urbanization (www.cbs.nl), urbanization was categorized into urban (≥ 1500 addresses/m²) and non-urban (< 1500 addresses/ m²). Categories for educational level (practical, theoretical) and ethnicity (western, non-western) were based on the definitions used by the Central Bureau of Statistics (www.cbs.nl).

Substance use

Frequency of alcohol consumption was coded into at least two times per week and four times per month or less. Tobacco use was measured as current smoking (yes or no).

Sexual behaviour

Number of sex partners in the past six months, bisexual behaviour (yes, no), and HIV status were available from the coded electronic patient registry. Type of sex partners was categorized into having sex with a steady partner, if participants reported only having sex with a steady partner, and having sex with casual partner(s), if participants reported having sex with other than steady partners (as well). Sex at the party scene included having reported to have sex at sex parties, darkrooms, or after parties. Group sex and/or fisting were combined into one variable reflecting esoteric sexual practices. The use of online dating platforms included having reported to use dating apps or websites to find sex partners.

Psychosocial determinants

The chosen list of items measuring the psychosocial determinants included a range of beliefs about the risks, advantages, social environment, refusal skills and habitual thoughts. The two items for descriptive norm had Cronbach's alpha higher than 0.8 and were combined in a mean score (Table 1).

Statistical analyses

Participants were defined as all MSM who fully completed the questionnaire. Descriptive analyses were used to calculate the proportion of participants reporting chemsex and proportions of participants reporting specific psychosocial beliefs about chemsex. We then assessed determinants for chemsex. We started with comparing socio-demographics, alcohol/tobacco use, sexual behaviour, and psychosocial determinants between MSM practicing chemsex and MSM not practicing chemsex using chi-square tests and t-tests (for continuous variables). Associations between chemsex and all variables were then assessed using univariable logistic regression analyses. Then, we built a multivariable four-step hierarchical regression model. The four blocks consisted of variables that were significantly ($p < 0.05$) associated with chemsex in univariable analyses (as shown in Table 2). In the first step, sociodemographics were entered (block 1). In the second step, tobacco/alcohol use variables were entered (block 2). In the third step, sexual behaviour variables were entered (block 3). Finally, psychosocial determinants were entered in the regression model (block 4). No variables were removed during the steps. For each block, the explained variance was described. The order of block-entry was based on previous literature (as described in Figure 1), known categories of variables associated with chemsex were entered first and the new category of variables, i.e. psychosocial determinants, were entered in the final step. As this study concerns an exploratory study, we did not adjust for multiple comparisons. All analyses were performed using IBM SPSS Statistics Version 24.

Table 1. Measurement of psychosocial determinants.

Determinants	Questions	Answering scale	Answering options	Interpretation	Items	Internal consistency
Risk perception	<i>I think that I am more at risk of acquiring an STI when I use drugs during sex</i>	Five-point Likert Scale	Totally disagree – totally agree	A higher score indicates having a higher risk perception of the consequences of chemsex	1	NA
Attitude	<i>I think that I can enjoy sex more when I use drugs</i> <i>I think that my fear of acquiring an STI decreases when I use drugs during sex</i>	Five-point Likert Scale	Totally disagree – totally agree	A higher score indicates a more positive attitude towards chemsex	2	0.38
Subjective norm	<i>My friends consider using drugs during sex to be a fun thing to do</i>	Five-point Likert Scale	Totally disagree – totally agree	A higher score indicates that chemsex is more considered to be a fun thing to do	1	NA
Descriptive norm	<i>How many of your friends use drugs during sex?</i> <i>How many of your sex partners use drugs during sex?</i>	Five-point Likert Scale	No one – everyone	A higher score indicates that more friends use drugs during sex	2	0.83
Peer pressure	<i>I sometimes experience pressure from my friends or sex partners to use drugs during sex</i>	Five-point Likert Scale	Totally disagree – totally agree	A higher score indicates more peer pressure	1	NA

continue

Table 1. Measurement of psychosocial determinants.

Determinants	Questions	Answering scale	Answering options	Interpretation	Items	Internal consistency
Refusal skills & self-efficacy	<i>I know how to refuse drugs during sex if I do not want to use them</i> <i>I manage to say no to friends or sex partners who offer me drugs during sex</i>	Five-point Likert Scale	Totally disagree – totally agree	A higher score indicates more refusal skills & self-efficacy	2	0.61
Habit	<i>I automatically think about drugs when having sex</i>	Five-point Likert Scale	Totally disagree – totally agree	A higher score indicates a more habitual thought	1	NA

Results

Study population

A total of 785 MSM were recruited to participate during the study period and 368 (47%) fully completed the questionnaire. Participants had a median age of 40 years (IQR 32–47), 65% was higher educated and 93% had a western nationality. The median number of sex partners in the preceding six months was 6 (IQR: 4–10). Chemsex in the past six months was reported by 44% (161/368) of participants, of whom 47% had chemsex in the last week. Among participants practicing chemsex, the most common drugs used were XTC/MDMA (85%), GHB/GBL (78%), and ketamine (43%). Crystal meth was reported by 9% and mephedrone by 4%. The use of four or more different drugs in the past six months was reported by 42% of MSM practicing chemsex. Combining different drugs during one chemsex session was reported by 81%; XTC/MDMA and GHB/GBL was the most reported combination (75%). Intravenous injection of drugs was reported by 4%. Among all participants, tobacco use was reported by 38% and regular alcohol consumption by 47%. The majority reported to have sex with casual partners (79%) and used online dating platforms for sex (78%). In general, participants reported to be aware of the STI risks of chemsex (median risk perception: 3.5), managed to refuse

drugs during sex, (median refusal self-efficacy: 4.4), and did not experience peer pressure to use drugs during sex (median peer pressure: 1.6). Figure 2 describes the proportions for the specific categories of psychosocial items.

Determinants associated with chemsex: univariable analyses

MSM who reported chemsex more often believed that they could enjoy sex more when using drugs (mean attitude 3.9 vs. 2.2, $p < 0.001$), felt less skilled to refuse drugs (mean refusal skills: 4.5 vs. 4.6, $p = 0.02$), perceived greater acceptance (mean subjective norm: 3.7 vs. 2.8, $p < 0.001$) and performance (mean descriptive norm: 3.7 vs. 2.8, $p < 0.001$) of chemsex among their social environment, and scored higher on automatically thinking about drugs when having sex (mean habitual thought: 2.2 vs. 1.3, $p < 0.001$) compared to MSM who did not report chemsex. Table 2 shows all other variables that were significantly associated with chemsex in univariable analyses.

Determinants associated with chemsex: multivariable analysis

Socio-demographics accounted for 6% of the variance in chemsex with age and SES being independently associated. The inclusion of tobacco use significantly increased the variance accounted for in chemsex ($\Delta R^2 = 0.06$, $p < 0.001$); the model explained 13% of the variance in chemsex; tobacco use remained associated. Entry of the sexual behaviour variables significantly increased the variance accounted for ($\Delta R^2 = 0.32$, $p < 0.001$); the model explained 45% of the variance in chemsex; independently associated were the number of sex partners, group sex and/or fisting, and using online dating platforms for sex. Finally, inclusion of psychosocial determinants significantly increased the variance accounted for in chemsex ($\Delta R^2 = 0.23$, $p < 0.001$); the final model explained 69% of the variance. Variables that remained associated with chemsex in the final multivariable model were attitude and the descriptive norm, tobacco use, multiple sex partners, group sex and using online dating platforms for sex (Table 3).

Figure 2. Proportions of all MSM, MSM who had chemsex, MSM who did not have chemsex reporting specific psychosocial beliefs about chemsex.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ indicate significant differences between chemsex-MSM and non-chemsex MSM.

^aDifferent answering options: No one – everyone.

Table 2. Characteristics of study population and univariable analyses of associations between chemsex and sociodemographics, alcohol/tobacco use, sexual behaviour and psychosocial determinants

	All participants (N=368)	Chemsex MSM (N=161)	No chemsex MSM (N=207)	Outcome: chemsex
	% of total (N) or mean $\pm$ SD	% within groups (N) or mean $\pm$ SD	% within groups (N) or mean $\pm$ SD	OR (95% CI)
Sociodemographics				
Age	40.6 $\pm$ 13.6	43 $\pm$ 12	38 $\pm$ 14	1.03 (1.01 – 1.04)**
Ethnicity				
Western	92.9 (342)	43.6 (149)	56.4 (193)	1
Non-western	7.1 (26)	46.2 (12)	53.8 (14)	1.11 (0.50 – 2.47)
SES^a				
Low	33.4 (123)	48.8 (60)	51.2 (63)	1
Middle	32.6 (120)	35.0 (42)	65.0 (78)	0.57 (0.34 – 0.95)*
High	34.0 (125)	47.2 (59)	52.8 (66)	0.94 (0.57 – 1.55)
Educational level				
Practical	35.1 (129)	47.3 (61)	52.7 (68)	1
Theoretical	64.9 (239)	41.8 (100)	58.2 (139)	0.80 (0.52 – 1.23)
Urbanization				
Non-urban	44.8 (165)	40.6 (67)	59.4 (98)	1
Urban	55.2 (203)	46.3 (94)	53.7 (109)	1.26 (0.83 – 1.91)
Alcohol/tobacco use				
Tobacco smoking				
No	62.2 (229)	56.8 (79)	43.2 (60)	1
Yes	37.8 (139)	35.8 (82)	64.2 (147)	2.36 (1.53 – 3.63)***
Regular alcohol consumption				
No	52.7 (194)	43.7 (76)	56.3 (98)	1
Yes	47.3 (174)	43.8 (85)	56.2 (109)	0.99 (0.66 – 1.50)
Sexual behaviour				
Same-sex sexual behaviour				
Only men	89.9 (331)	41.7 (138)	58.3 (193)	1
Men and women	10.1 (37)	62.2 (23)	37.8 (14)	2.30 (1.14 – 4.62)*
Type of sex partner(s)				
Steady	20.7 (76)	34.2 (26)	65.8 (50)	1
Casual	79.3 (292)	46.2 (135)	53.8 (157)	1.65 (0.98 – 2.80)
Number of sex partners past six months				
<5	38.3 (141)	26.2 (37)	73.8 (104)	1
5-10	39.4 (145)	52.4 (76)	47.6 (69)	3.10 (1.88 – 5.09)***
>10	22.3 (82)	58.5 (48)	41.5 (34)	3.97 (2.23 – 7.07)***

continue

Table 2. Characteristics of study population and univariable analyses of associations between chemsex and sociodemographics, alcohol/tobacco use, sexual behaviour and psychosocial determinants

	All participants (N=368)	Chemsex MSM (N=161)	No chemsex MSM (N=207)	Outcome: chemsex
	% of total (N) or mean ± SD	% within groups (N) or mean ± SD	% within groups (N) or mean ± SD	OR (95% CI)
Number of sex partners during sex				
1	67.1 (247)	30.0 (74)	70.0 (173)	1
2-3	22.3 (82)	73.2 (60)	26.8 (22)	6.38 (3.65 – 11.15)***
>3	10.6 (39)	69.2 (27)	30.8 (12)	5.26 (2.53 – 10.94)***
Group sex				
No	81.8 (301)	34.9 (105)	65.1 (196)	1
Yes	18.2 (67)	83.6 (56)	16.4 (11)	9.50 (4.77-18.92)***
Fisting				
No	91.0 (335)	39.7 (133)	60.3 (202)	1
Yes	9.0 (33)	84.8 (28)	15.2 (2)	8.51 (3.20-22.58)***
Sex at the party scene				
No	74.5 (274)	35.4 (97)	64.5 (177)	1
Yes	25.5 (94)	68.1 (64)	31.9 (30)	3.89 (2.36 – 6.41)***
Use of online dating platforms				
No	22.0 (81)	28.4 (23)	71.6 (58)	1
Yes	78.0 (287)	48.1 (138)	51.9 (149)	2.34 (1.37 – 3.99)**
Known positive HIV status				
No	89.7 (330)	39.7 (131)	60.3 (199)	1
Yes	10.3 (38)	78.9 (30)	21.1 (8)	5.70 (2.53 – 12.81)***
Psychosocial determinants^b				
Risk perception	3.5 ± 1.2	3.5 ± 1.2	3.5 ± 1.2	0.97 (0.81 – 1.15)
Attitude (enjoyment)^c	2.9 ± 1.2	3.9 ± 1.1	2.2 ± 1.2	3.45 (2.68 – 4.44)***
Attitude (decreased STI anxiety)^d	2.3 ± 1.1	2.4 ± 1.2	2.2 ± 1.2	1.19 (1.00 – 1.42)
Refusal skills	4.5 ± 0.9	4.5 ± 1.0	4.6 ± 0.8	0.74 (0.68 – 0.95)*
Refusal self-efficacy	4.4 ± 1.0	4.3 ± 1.0	4.5 ± 1.0	0.86 (0.70 – 1.05)
Subjective norm	3.2 ± 1.1	3.7 ± 0.9	2.8 ± 1.1	2.66 (2.05 – 3.44)***
Descriptive norm	2.6 ± 1.5	3.7 ± 1.2	1.8 ± 1.1	3.07 (2.48 – 3.80)***
Peer pressure	1.6 ± 1.0	1.7 ± 1.0	1.6 ± 0.9	1.19 (0.96 – 1.47)
Habit	1.7 ± 1.0	2.2 ± 1.2	1.3 ± 0.7	2.96 (2.20 – 3.98)***

Note. AOR, adjusted odds ratios; 95% CI, 95% confidence intervals.

*p < 0.05, **p < 0.01, ***p < 0.001.

^aBased on tertile distributions

^bScale 1 (totally disagree) – 5 (totally agree).

^cItem: I think that I can enjoy sex more when I use drugs.

^dItem: I think that my fear of acquiring an STI decreases when I use drugs during sex.

Table 3. Four-step hierarchical regression analysis assessing the impact of categories of determinants on the prediction of chemsex.

Step	Variables entered	Step 1			Step 2			Step 3			Step 4		
		aOR	95% CI		aOR	95% CI		aOR	95% CI		aOR	95% CI	
1	Age	1.03**	1.01 – 1.05		1.03***	1.02 – 1.05		1.02	0.99 – 1.04		1.01	0.98 – 1.04	
	SES, middle	0.53*	0.31 – 0.90		0.57*	0.33 – 0.97		0.61	0.31 – 1.18		0.78	0.34 – 1.78	
	SES, high	0.83	0.50 – 1.38		0.81	0.48 – 1.37		0.72	0.38 – 1.39		0.90	0.40 – 2.03	
2	Tobacco smoking, yes				2.62***	1.67 – 4.12		2.61**	1.51 – 4.50		2.65**	1.32 – 5.32	
3	Same-sex sexual behaviour, men and women							2.04	0.82 – 5.10		1.92	0.60 – 6.18	
	Number of sex partners six months, 5 – 10							2.49**	1.35 – 4.61		2.69*	1.21 – 6.00	
	Number of sex partners six months, > 10							1.65	0.76 – 3.63		1.52	0.54 – 4.22	
	Number of sex partners during sex, 2 or 3							3.52***	1.73 – 7.15		1.58	0.64 – 3.91	
	Number of sex partners during sex, > 4							1.07	0.40 – 2.90		0.40	0.12 – 1.51	
	Group sex, yes							5.07**	2.02 – 12.74		4.65**	1.54 – 14.05	
	Fisting, yes							6.53**	2.04 – 20.89		2.74	0.70 – 10.65	
	Sex at the party scene, yes							1.72	0.83 – 3.58		1.20	0.46 – 3.15	
	HIV status, positive							2.95*	1.05 – 8.32		2.45	0.67 – 9.00	
	Use of online platforms for sex, yes							3.10**	1.51 – 6.38		2.73*	1.13 – 6.62	
4	Refusal skills							0.74			0.74	0.50 – 1.09	
	Attitude (enjoyment) ^a							2.06***			2.06***	1.50 – 2.84	
	Subjective norm							1.05			1.05	0.70 – 1.56	
	Descriptive norm							1.95***			1.95***	1.43 – 2.65	
	Habit							1.17			1.17	0.78 – 1.76	
	R^2	0.064			0.125			0.452			0.685		
	ΔR^2	0.064***			0.061***			0.327***			0.233***		

Note. AOR, adjusted odds ratios; 95% CI, 95% confidence intervals.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

^aItem: I think that I can enjoy sex more when I use drugs.

Discussion

This is one of the first quantitative studies that explored a broad set of psychosocial, socio-demographic and sexual behavioural determinants for its association with chemsex among MSM. Chemsex was a prevalent behaviour (44% recent practice) in MSM who visited STI clinics in the Netherlands. XTC/MDMA, GHB/GBL and ketamine were the most used drugs during sex. Chemsex was independently associated with believing that the majority of friends and sex partners use drugs during sex (descriptive norm) and believing that sex is more fun when using drugs (attitude). Other determinants were smoking tobacco, having at least five sex partners in the past six months, having group sex and/or fisting, and using online dating platforms. Our conceptual model that included these determinants was able to explain almost seventy percent of the variance in chemsex with psychosocial and sexual behaviour determinants as most important.

In line with previous studies [13,19,20], chemsex was associated with sexual risk behaviour, such as having multiple sex partners and group sex. In addition, we found an independent association between chemsex and smoking tobacco, which was also present in two other studies [14,16]. In the long term, a study has shown that MSM practicing chemsex might be at risk of becoming drug dependent and not being able to return to enjoying sober sex [31]. The risk of dependency might vary per drugs used. For example, crystal meth and GHB/GBL are relatively more likely to cause physical addiction than other drugs [32]. Irrespective of causality, the presence of sexual health risks and possible drug and tobacco use related harms in MSM practicing chemsex confirms the importance of health promotion strategies aimed at minimizing these harms. To identify MSM practicing chemsex in health care and tailor health promotion strategies, it is important to understand their characteristics and beliefs. Our study indicates that MSM practicing chemsex are a heterogeneous group, as chemsex was comparably present in MSM of different age groups, socioeconomic statuses, ethnicities, educational levels and in MSM living in urban and non-urban areas. One study [14] also found no differences by educational level, SES, and ethnicity between MSM practicing chemsex and MSM not practicing chemsex. A systematic review [1] found that chemsex participation peaks between the age mid-thirties and early forties, but is evident at all ages, which was consistent with our study. This suggests that health services, such as STI clinics, should ask about chemsex in all MSM.

In general, MSM practicing chemsex reported to be aware of the STI risks related to drug use during sex and this risk perception did not differ between MSM practicing chemsex and MSM not practicing chemsex. Almost eighty percent reported that they believed to be more at

risk of acquiring an STI when using drugs during sex. Nevertheless, MSM practicing chemsex engage more often in sexual risk behaviour and are more often diagnosed with an STI than MSM not practicing chemsex [10,13,14]. This suggests that men practicing chemsex are not naïve to the STI risks of chemsex, but possibly lack understanding of how to manage them. Therefore, promoting STI preventive measures, such as pre-exposure prophylaxis (PrEP) to prevent HIV infection and correct condom use, remains highly relevant in this group.

A vast majority of MSM practicing chemsex indicated that they had the skills and self-efficacy to refuse drugs during sex when they not want to use them and did not experience peer pressure. Nevertheless, the social environment seems to play an important role in chemsex. Our study shows that MSM practicing chemsex think that the majority of their friends and sex partners also use drugs during sex while MSM not practicing chemsex think that only a minority use drugs during sex. The descriptive norm was independently associated with chemsex. A previous qualitative study also showed that chemsex was perceived as a normalized behaviour among MSM practicing chemsex in South London [19]. It has been suggested [19] that the proportion of MSM practicing chemsex is overestimated by men who practice chemsex. According to the social influence theory, believing that most people in one's social environment perform a certain behaviour can stimulate individuals to practice these behaviours themselves [33]. Another explanation could be provided by the social selection theory. This theory describes that an individual practicing a certain behaviour would change networks to spend more time with others who also practice the same behaviour. A social network approach would be necessary to assess the direction of social influence. Regardless of the direction, it is likely that MSM practicing chemsex operate within a distinct social network where drug use during sex is normalized [34]. Our study shows that the use of online dating platforms for sex is also independently associated with chemsex. Online dating platforms makes it easier to have chemsex at private settings [35]. The use of certain symbols indicating drug use in personal advertisements in these dating platforms [36] probably stimulates selection of sex partners who also use drugs and increases perceptions of ubiquity of chemsex.

A second psychosocial determinant independently associated with chemsex was a positive attitude towards drug use during sex. MSM practicing chemsex more often believed they could enjoy sex more when using drugs. Drugs are often used to enhance sexual pleasure [6,7], but when sex without drugs is not experienced as pleasurable anymore men face a risk of becoming drug dependent. One study [6] already described that the pleasurable sensations of chemsex form a positive association between drugs and sex that then provides the automatic and reflective motivation to combine sex and drugs in the future. In our study, almost one in five men practicing chemsex reported to automatically think about drugs when having sex.

Healthcare services should pay attention to men whose chemsex behaviour has become an habit to prevent future possible addiction problems. When minimizing the possible harms of chemsex, such as STIs and addiction, health care services should acknowledge the social influence and pleasurable experiences of chemsex to increase acceptability of these strategies.

Limitations

Our study should be viewed in light of some limitations. Because of the cross-sectional design, we were unable to assess causal relationships between determinants and chemsex. The questionnaire was completed by high-risk MSM, because they were recruited at the STI clinic and participants relatively had more sex partners than the total MSM population ($n=3493$) who visited the participating STI clinics during the study period (median 6 vs. 5, $p=0.02$). This could have led to an overestimation of the proportion of MSM practicing chemsex but enabled us to assess determinants associated with chemsex. Furthermore, MSM with a younger age (median age 40 vs. 34 years, $p<0.001$) and a non-western ethnicity (7% vs. 18%, $p<0.001$) were probably slightly underrepresented in our study. Ideally, the psychosocial determinants (especially concerning habit formation) would have been measured by multiple validated items. We wanted to increase the response rate by limiting the items in our questionnaire. That is also the reason why more complex items that have been associated with chemsex in a previous study [29], such as internalized homophobia and minority stress, were not measured in our questionnaire. Furthermore, recall bias and under-reporting bias on some psychosocial beliefs, such as experienced peer pressure to use drugs during sex, could have been possible. Finally, multiple comparisons might have increased risk for type 1 errors. Yet, for exploratory studies, correcting multiple comparisons is often a too strict approach (leading to more type II errors) and a flexible approach, as we took in our study, is deemed more suitable [37].

Conclusion

Our study shows that MSM practicing chemsex are a heterogeneous group concerning sociodemographic characteristics. STI risk factors, such as having multiple sex partners and group sex, and smoking tobacco were independently associated with chemsex, indicating a need for health promotion in MSM practicing chemsex. MSM practicing chemsex generally believed that the majority of their friends or sex partners also used drugs during sex and this was independently associated with chemsex. This suggests that MSM practicing chemsex are

likely to find themselves in distinct social and sexual networks where it is the norm to use drugs when having sex. MSM practicing chemsex generally believed that sex with drugs is more fun and this was also independently associated with chemsex. Health services should acknowledge the social influence and pleasurable experiences to increase acceptability of strategies aimed at minimizing the possible harms of chemsex, such as STIs and addiction.

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Chapter 6

Sexual, addiction and mental healthcare needs among men who have sex with men practicing chemsex: a cross-sectional study in the Netherlands

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Abstract

Drug use during sex ('chemsex') has been associated with sexually transmitted infections (STIs) and mental health harms. Little quantitative evidence exists on the health care needs of MSM practicing chemsex from a patient perspective. This study assessed self-perceived benefits and harms and the needs for professional counselling among MSM practicing chemsex. In 2018, 785 MSM were recruited at eight Dutch STI clinics and 511 (65%) completed the online questionnaire. Chemsex was defined as using cocaine, crystal meth, designer drugs, GHB/GBL, ketamine, speed and/or XTC/MDMA during sex <6 months. Chemsex was reported by 41% (209/511), of whom 23% (48/209) reported a need for professional counselling. The most reported topic to discuss was increasing self-control (52%, 25/48). Most MSM preferred to be counselled by sexual health experts (56%, 27/48). The need for professional counselling was higher among MSM who engaged in chemsex ≥ 2 times per month (30% vs. 17%, $p=0.03$), did not have sex without drugs (sober sex) in the past three months (41% vs. 20%, $p=0.04$), experienced disadvantages of chemsex (28% vs. 15%, $p=0.03$), had a negative change in their lives due to chemsex (53% vs. 21%, $p=0.002$), and/or had an intention to change chemsex behaviours (45% vs. 18%, $p<0.001$). Our study shows that almost one in four MSM practicing chemsex expressed a need for professional counselling on chemsex-related issues. STI healthcare providers should assess the need for professional counselling in MSM practicing chemsex, especially in MSM with above mentioned characteristics, such as frequent users.

Introduction

Men who have sex with men (MSM) are increasingly using drugs in a sexual context, a phenomenon referred to as chemsex [1,2]. Constructing a universal definition of chemsex is difficult, as the drugs used might vary per place and time area. In the United Kingdom (UK), chemsex is defined by the use of crystal methamphetamine, mephedrone, γ -Butyrolactone (GBL)/ γ -hydroxybutyric acid (GHB) during sex [3-6]. In the Netherlands, ecstasy (XTC), GHB and ketamine are the most popular drugs to use during sex among MSM [7,8].

Although chemsex can increase sexual pleasure for MSM [9,10], it could also lead to several health harms. Chemsex has been associated with condomless anal intercourse [2,11-13] and an increased risk of sexually transmitted infections (STIs) [4,12,14]. Furthermore, concern has been expressed by health care providers about the impact of chemsex on the psychosocial well-being of MSM [15]. Drug use in MSM has been associated with poor mental health, such as anxiety and depression [16,17], especially among MSM who considered their drug use to be problematic [18].

Scarce data is available on the extent to which chemsex is perceived to be problematic by MSM practicing chemsex and what their chemsex-related health care needs are. A recent systematic review [19] identified a lack in research that addresses the proportion of MSM practicing chemsex who need professional counselling. Only one quantitative study among MSM practicing chemsex in Ireland showed that one in four MSM reported a negative impact of chemsex on their lives and one in three MSM would like to receive professional help or advice about chemsex preferably from the STI clinic they were attending [11]. However, it remained unclear which characteristics were associated with having a need for professional counselling. For example whether these MSM engaged in chemsex more frequently compared to MSM without this need. Understanding the characteristics of MSM practicing chemsex with a need for professional counselling could help health care professionals to target prevention and care strategies. In addition, scarce data is available on what topics professional counselling should focus on from a patient point of view. Identifying the topics MSM would like to discuss with professionals could help to tailor chemsex prevention and care strategies. The current study aims to understand (1) to what extent MSM practicing chemsex perceive chemsex to be problematic by assessing self-perceived benefits and harms, the impact on their daily lives and intention to change chemsex behaviour and (2) the need for professional counselling among MSM practicing chemsex, including characteristics of MSM with this need, their preferred type of health care professionals and topics for counselling.

Methods

Study design

The outpatient Public Health Service STI clinics in the Netherlands offer free and anonymous STI and HIV testing, hepatitis B vaccinations, and sexual health counselling for risk groups, such as MSM. MSM was defined as a man who reported having sex with a man in the preceding six months. Study nurses of nine STI clinics in the Netherlands were instructed to recruit MSM aged 16 years or older during their regular STI consultations for participation in an online questionnaire on drug use in 2017-2018. Recruitment was passive and regardless of reported drug use during the consultation. At the time of recruitment, no protocol on chemsex-related counselling or interventions were available at the participating STI clinics. A list of participating STI clinics can be found in online Supplementary file I.

Procedures

All MSM were routinely universally tested for urogenital, anorectal, and oropharyngeal *Chlamydia trachomatis* (chlamydia), *Neisseria gonorrhoeae* (gonorrhoea), HIV, hepatitis B and syphilis. Each consultation included a standardized nurse-taken medical and sexual history, including sociodemographic characteristics and sexual behaviour in the preceding six months. These data were registered in an electronic patient registry. Up to one week after the STI consultation, the questionnaire was sent by email to all MSM who had agreed to participate in the study. The questionnaire included multiple-choice and open-ended questions about drug use before or during sex in the preceding six months, which types were used (online Supplementary file II) and the frequency of use. In those reporting any drug use during sex, additional questions on the setting, motives, self-perceived disadvantages of chemsex, intention to change their drug using behaviour, and the need for professional counselling were included. Electronic patient registry data containing data of sexual behaviour and biological STI test results of the inclusion consultation were linked to the online questionnaire.

Chemsex definition

Chemsex was defined as the use of drugs before or during sex in the past six months. The drugs included in this definition were crystal meth, cocaine, designer drugs (2-CB, 3 MMC, 4-FA, 4-MEC), GHB, GBL, ketamine, MDMA, mephedrone, speed, and XTC. In the United Kingdom (UK), chemsex is often defined as only the use of crystal meth, GHB/GBL or mephedro-

ne (referred to as ‘four-chems’) during sex [3]. In this study, a broader definition of chemsex was used, as previous studies have shown that other drugs, such as cocaine, ketamine and MDMA, are also commonly used during sex in the Netherlands. Alcohol and cannabis are generally excluded from the chemsex definition because of their common use in a recreational context [20].

Variables

Sociodemographic characteristics and sexual history

Dutch socioeconomic status (SES) scores based on income, educational level and employment were extracted from the Netherlands Institute for Social Research (<http://www.scp.nl>) per four-digit postal code area. Age and SES were based on tertile distributions. Educational level was measured as current education or highest level of education completed and was categorized into lower educated (pre-vocational secondary education, secondary vocational education) and higher educated (university, higher professional education, pre-university/senior general secondary education). Ethnicity was divided into Western ethnicity (persons born in Europe (excluding Turkey), North-America, Oceania, Indonesia or Japan) and non-Western ethnicity (persons born or of whom at least one parent was born in Africa, Latin America, Asia (excluding Indonesia or Japan) or Turkey) and was based on the definition of Statistics Netherlands (www.cbs.nl). Reported commercial sex work (CSW), sexual preference, number of sex partners in the preceding six months, HIV status, and recent STI diagnoses (diagnosed with chlamydia, gonorrhoea, HIV, hepatitis B, and/or syphilis during the inclusion consultation) were available from the coded electronic patient registry data.

Chemsex behaviours

Frequency of chemsex was calculated from the frequency of the drug type that was most frequently used (measured by a multiple choice question per drug type: ≤ 1 time per month, 2-4 times per month, 2-3 times per week, ≥ 4 times per week). The total number of different drugs used in the preceding six months was calculated as the sum of all drugs, and categorized into 1-2 drugs, 3-4 drug, and ≥ 5 drugs, based on tertile distribution. Last time sex without drugs (sober sex) was measured by a multiple choice question (in the past three months, more than three months ago, in the past year, more than one year ago). Years from chemsex debut, further referred to as duration of use, was calculated from the current age of participants minus the age of chemsex debut and categorized into 0-5 years, 6-12 years and ≥ 13 years, based on tertile distribution. Combining drugs included the use of at least two different drugs during one chemsex session. Intention to change chemsex behaviours included the intention to quit

drug use, decrease the frequency of using drugs, combine fewer different drugs, and/or lower the dose of drugs.

Experiences of chemsex

Experience of disadvantages and unwanted sexual experiences after using drugs during sex were dichotomized for analyses. Experienced impact of practicing chemsex on one's daily life was categorized into no impact, positive and negative impact, in which for example 'social isolation' was categorized as negative and 'more intimacy' as positive.

Needs for professional counselling

The need for professional counselling was measured using the question: 'Would you like to talk to a health care professional about drug use during sex?'. The question was broadly formulated to provide an explorative insight whether any information, help, intervention or referral was needed. The outcome need for professional counselling in analyses included the answering options 'yes' and 'maybe'. Health care professionals and topics for counselling included in the questionnaire can be found in online Supplementary file III.

Statistical analyses

Participants were defined as all MSM who fully completed the questionnaire. The proportion of MSM practicing chemsex was calculated among all participants (n=511). Further analyses were restricted to participants who reported chemsex in the preceding six months (n=209). Descriptive statistics were used to present the proportion of MSM reporting specific motives, self-perceived disadvantages, changes in daily life, and intention to change chemsex behaviours (primary outcome). Descriptive statistics were used to calculate the proportion of MSM reporting a need for professional counselling. Characteristics of MSM reporting a need for professional counselling and MSM who did not were compared using chi-square tests (secondary outcome). Characteristics tested included sociodemographic characteristics, sexual history, chemsex behaviours, and experiences of chemsex, which are described above under variables. All analyses were performed using SPSS V24 (IBM SPSS Statistics for Windows, IBM Cooperation, Armonk, New York, USA). P-values <0.05 were considered statistically significant.

Ethics statement

This study was approved by the Medical Ethical Committee of the University of Maastricht. STI patient registry data was collected within standard care. Separate approval from the

Medical Ethical Committee of the University of Maastricht was obtained to use and link the questionnaire data to the electronic patient registry data (METC 2018-0485).

Results

Characteristics of participants

A total of 785 (23%) MSM were recruited to participate during the study period and 511 (65%) fully completed the questionnaire. Participants had a median age of 38 years (IQR: 27-50), 63% was higher educated and 90% had a Western ethnicity. The median number of sex partners in the preceding six months was 6 (IQR: 3-10) and 23% was recently diagnosed with an STI. Chemsex in the preceding six months was reported by 41% of MSM (209/511). The most reported drugs were XTC/MDMA (82%, 172/209), GHB/GBL (77%, 160/209), and ketamine (41%, 85/209). Crystal meth was used by 8% (16/209) and mephedrone by 5% (10/209). Intravenous injection of drugs was reported by 8% (16/209), the following drugs were injected: 4-MEC (50%, 8/16), 3-MMC (44%, 7/16), crystal meth (44%, 7/16) and ketamine (31%, 5/16). One in four MSM (24%, 51/209) used five or more different drugs in the preceding six months. Almost half of MSM (45%, 93/209) engaged in chemsex at least two times per month. The majority (77%, 160/209) of MSM who had sex with drugs also had sex without drugs in the past month. Thirteen percent (27/209) of MSM who had sex with drugs had their last sex without drugs more than three months ago.

Motives, experienced disadvantages and impact on daily life

The most reported motives for having chemsex and experienced disadvantages are presented in Figure 1a. Two-thirds of MSM (127/209) experienced disadvantages of chemsex (Figure 1b). Unwanted sexual experiences were reported by 18% (39/209). A negative impact on daily life since one started practicing chemsex was reported by 9% (19/209). Examples of negative changes were: 'dependency on drugs' (n=6), 'HIV infection' (n=2), 'loneliness' (n=2), 'fatigue' (n=1), and 'rape' (n=1). A positive impact was reported by 31% (64/209). Examples of positive changes mentioned were: 'enjoying sex' (n=12), 'enrichment of (sex)life' (n=11), and 'feeling free and relaxed' (n=9). The majority (60%, 126/209) reported no change in their daily lives.

Figure 1. Motives and experienced disadvantages of chemsex. **A)** Motives for having chemsex among MSM practicing chemsex (N=209), measured by a multiple choice question, note: the motives being part of a community, social pressure, less concerns about hepatitis C, because of customers, and less concerns about bacterial STI were reported by less than 3% and therefore not presented in the figure; **B)** Experienced disadvantages among MSM practicing chemsex who reported experienced disadvantages (N=127), measured by an open question, in the Netherlands.

Intention to change chemsex behaviours

Intention to change chemsex behaviours was reported by 19% (40/209) of all MSM practicing chemsex. Decreasing the frequency of drug use was the most reported intended change (70%, 28/40), followed by quitting drug use (45%, 18/40), lowering the dose (35%, 14/40), and combining fewer drug types (8%, 3/40). Of MSM with an intention to change chemsex behaviours, 45% (18/40) also indicated a need for professional counselling.

The need for professional counselling

The need for professional counselling was reported by 6% (13/209), 17% (35/209) indicated that they might want to be counselled, and 77% (161/209) indicated no need for professional counselling. The need for professional counselling was comparable between MSM who used at least one of the four-chems (crystal meth, GHB, GBL, mephedrone, UK definition of chemsex) and MSM who only used other drugs than these four-chems during sex (22% versus 26%, $p=0.64$). Most participants with a need for professional counselling preferred to talk to a sexual health expert or an expert on alcohol and drugs (Figure 2). Most reported topics to discuss with professionals were increasing self-control, safer drug use, and reducing the risk of acquiring HIV or an STI (Figure 2). Of MSM practicing chemsex who did not want to be counselled by a professional, the majority did not experience any need or did not know what

professionals could do for them (Figure 2). A perceived stigma on discussing chemsex with health care professionals was reported by 14% (29/209).

Figure 2. Needs for professional counselling including preferred topics and healthcare professionals among MSM with a need for professional counselling (N=48) and explanations for having no need for professional counselling among MSM without a need for professional counselling (n=161).

Characteristics of MSM with a need for professional counselling

The need for professional counselling was higher among MSM who engaged in chemsex at least two times per month, did not have sex without drugs in the past three months, experienced disadvantages, experienced a negative life change, or had the intention to change chemsex behaviours (Table 1).

Table 1. Characteristics of MSM who reported a need for professional counselling in the Netherlands in 2018.

		All MSM practicing chemsex (N=209)	MSM with a need for professional counselling (n=48, 23%)	MSM with no need for professional counselling (n=161, 77%)	
		% (N) of total	% (N) within groups	% (N) within groups	P
Characteristics^a					
Age					0.905
	16-29	18.4 (38)	21.1 (8)	78.9 (30)	
	30-44	36.7 (76)	21.1 (16)	78.9 (60)	
	45-74	44.9 (93)	23.7 (22)	76.3 (71)	
Ethnicity					0.304
	Western	92.8 (192)	21.4 (41)	78.6 (151)	
	Non-western	7.2 (15)	33.3 (5)	66.7 (10)	
Educational level					0.448
	Lower educated	38.6 (80)	25.0 (20)	75.0 (60)	
	Higher educated	62.4 (127)	20.5 (26)	79.5 (101)	
SES^b					0.488
	Low	33.3 (65)	24.6 (16)	75.4 (49)	
	Medium	29.2 (57)	21.1 (12)	78.9 (45)	
	High	37.4 (73)	16.4 (12)	83.6 (61)	
Commercial sex work					0.366
	No	97.6 (202)	21.8 (44)	78.2 (158)	
	Yes	2.4 (5)	40.0 (2)	60.0 (3)	
Sexual preference					0.707
	Men	86.5 (179)	21.8 (39)	78.2 (140)	
	Men and women	13.5 (28)	25.0 (7)	75.0 (21)	
Number of sex partners					0.246
	1-4	21.4 (44)	31.8 (14)	68.2 (30)	
	5-10	31.1 (64)	18.8 (12)	81.3 (52)	
	>10	47.6 (98)	20.4 (20)	79.6 (78)	
Recent STI diagnosis^c					0.677
	No	64.0 (130)	20.8 (27)	79.2 (103)	
	Yes	36.0 (73)	23.3 (17)	76.7 (56)	
HIV status					0.505
	Negative	73.4 (152)	21.1 (32)	78.9 (120)	
	Positive	26.6 (55)	25.5 (14)	74.5 (41)	

continue

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	All MSM practicing chemsex (N=209)		MSM with a need for professional counselling (n=48, 23%)	MSM with no need for professional counselling (n=161, 77%)	
	% (N) of total		% (N) within groups	% (N) within groups	P
Chemsex behaviour					
Total number drugs used					0.405
	1-2	39.2 (82)	24.4 (20)	75.6 (62)	
	3-4	34.9 (73)	17.8 (13)	82.2 (60)	
	≥5	25.8 (54)	27.5 (14)	72.5 (37)	
Frequency chemsex ^d					0.028
	≤1 time per month	55.5 (116)	17.2 (20)	82.8 (96)	
	≥2 times per month	44.5 (93)	30.1 (28)	69.9 (65)	
Duration of use (years) ^e					0.195
	0-5	35.7 (74)	23.0 (17)	77.0 (57)	
	6-12	30.4 (63)	28.6 (18)	71.4 (45)	
	≥13	33.8 (70)	15.7 (11)	84.3 (59)	
Combining drugs					0.663
	No	18.7 (39)	25.6 (10)	74.4 (29)	
	Yes	81.3 (170)	22.4 (38)	77.6 (132)	
Last time sober sex ^f					0.026
	Past three months	87.1 (182)	20.3 (37)	79.7 (145)	
	More than three months ago	12.9 (27)	40.7 (11)	59.3 (16)	
Intention to change chemsex behaviours					<0.001
	No	81.9 (169)	17.8 (30)	82.2 (139)	
	Yes	19.1 (40)	45.0 (18)	55.0 (22)	
Experiences chemsex					
Experience of disadvantages					0.019
	No	39.2 (82)	14.6 (12)	85.4 (70)	
	Yes	60.8 (127)	28.3 (36)	71.7 (91)	

continue

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	All MSM practicing chemsex (N=209)	MSM with a need for professional counselling (n=48, 23%)	MSM with no need for professional counselling (n=161, 77%)	
	% (N) of total	% (N) within groups	% (N) within groups	P
Impact on daily life				0.009
No impact	60.3 (126)	18.3 (23)	81.7 (103)	
Positive	30.6 (64)	23.4 (15)	76.6 (49)	
Negative	9.1 (19)	52.6 (10)	47.4 (9)	
Unwanted sexual experiences				0.099
No	81.3 (170)	20.6 (35)	79.4 (135)	
Yes	18.7 (39)	33.3 (13)	66.7 (26)	

Note: the proportion of MSM who indicated a need for professional counselling did not differ between different STI clinic regions ($p=0.412$)

^aCharacteristics of two participants practicing chemsex were missing in the STI patient registry.

^bData of 14 participants were missing as postal code was not recorded.

^cLaboratory confirmed STI test results. Recent STI diagnoses were missing for six participants in the STI patient registry.

^dFrequency chemsex: categories 2-4 times per month ($n=82$), 2-3 times per week ($n=8$) and ≥ 4 times per week ($n=3$) were combined into ≥ 2 times per month.

^eAge of two participants practicing chemsex was missing and duration of use could therefore not be calculated for two participants.

^fLast time sober sex: categories more than 3 months ($n=27$), in the past year ($n=0$) and more than 1 year ago ($n=0$) were combined into one category more than 3 months ago. Of the 27 MSM who did not have sober sex in the past three months, 85% (23/27) practiced chemsex in the past month.

Discussion

This is one of the first quantitative studies that explores whether MSM perceive chemsex as problematic in their daily lives and whether they have a need for professional counselling. This study provides insight into the characteristics of MSM practicing chemsex who indicated a need for professional counselling and their specific needs.

A higher proportion of MSM practicing chemsex was found in our study (41%) compared to other studies among MSM visiting the STI clinics in large cities in several Western countries (17-27%) [21]. A possible explanation could be the broad chemsex definition we used in our study compared to these other studies. However, the use of specific drugs, for example GHB, was also higher in our study (31%) compared to a study among MSM visiting the STI clinic in

Amsterdam (16%) [12]. Possibly, we included high-risk MSM in our study which might have resulted in a higher proportion of chemsex.

Our study shows that for MSM chemsex is a way to enhance sexual pleasure, by increasing arousal, prolonging sex, and intensifying sexual sensations. Qualitative studies with MSM in London also suggested that chemsex might be seen as a strategic choice for enhancing the qualities valued in sex [9,15]. At the same time, our study shows that more than half of men practicing chemsex experienced disadvantages. Most of these disadvantages were negative short term effects of drugs, such as headache and fatigue. A negative impact on one's daily life was reported by one in ten MSM. Men experiencing a negative impact reported serious health harms, such as dependency on drugs, loneliness and HIV infection. Health care providers frequently visited by MSM, such as STI clinics, could play an important role in signalling these health harms and refer men to mental or addiction help when needed. The majority of men practicing chemsex reported no impact or a positive impact of chemsex on their daily lives, suggesting that there is also a group that does not experience chemsex to be problematic. This confirms a recent study [11] showing that three-quarters of MSM practicing chemsex enjoyed it and were in control of their sex life.

Our study shows that one in four MSM practicing chemsex might want to be counselled on chemsex by a professional. We show that the need for professional counselling was similar for MSM using at least one of the four-chems (crystal meth, GHB, GBL, mephedrone, UK definition of chemsex) and MSM only using other drugs during sex. By excluding other drugs than the four-chems in the chemsex definition, MSM with a need for help would be missed in health care. Most popular topics to discuss with professionals were increasing self-control, safer use of drugs and reducing the risk of acquiring an STI. Sexual health experts or experts on alcohol and drugs would be the preferred professionals. As STI clinics are a trusted source for MSM to discuss personally sensitive issues [11,15,22,23], they could play an important role in delivering prevention and care strategies that address safer sex and drug use, and refer MSM to addiction and mental health care professional when needed. Strengthening connections and knowledge-sharing between STI clinics and addiction and mental health care professionals might be necessary to enable STI clinics to provide adequate information on safer drug use and develop referral pathways.

In assessing whether professional counselling is needed, health care professionals should ask about the following associated topics: frequent chemsex, no recent sober sex, experience of disadvantages and/or a negative change in daily life, and intention to change chemsex behaviours. These topics might indicate that these men are spiralling into the negative con-

sequences of chemsex. As described in a qualitative study, chemsex journeys can spiral from exciting and self-exploratory into feeling out of control, isolation and high-risk behaviour [24]. The indicators found in our study probably only reflect the signals of problematic chemsex on the surface. As suggested by one study [25], syndemics of HIV, poor mental health, stigmatization, drug use could lead to feelings of loneliness, emptiness, depression, and emotional and sexual inhibition which might be the more deeper underlying facilitators of problematic chemsex. Nevertheless, the indicators found in our study could serve as opening questions to discuss chemsex issues in health care and might be useful for assessing whether professional counselling is needed. One example of evidence-based professional counselling to reduce sexual and drug use risk behaviour among MSM is Motivational Interviewing [26].

STI clinics and other health care professionals should also be aware of unwanted sexual experiences among MSM practicing chemsex. As already showed in other studies [15,27], unwanted sexual experiences were common among MSM practicing chemsex in our study (19%). Qualitative research showed that the concept of consent was often complicated in a chemsex setting [15]. Men who feel they have been a victim of non-consensual sex should be made aware of support and linked to post-exposure prophylaxis for HIV where appropriate.

This study should be viewed in light of some limitations. Most data were retrospectively collected and self-reported, which could have led to recall bias and social desirability bias on potentially stigmatized behaviours, such as admitting one's drug use had a negative impact on one's life and professional help is needed. This might have led to an underestimation of the proportion of MSM indicating a negative life change and a need for professional counselling. Because of the limited number of MSM with a need for professional counselling ($n=48$), we did not assess independent determinants and only described characteristics of this group. Due to the small number, results should be interpreted carefully. Furthermore, the questionnaire was completed by the high-risk MSM visiting STI clinics, since the median number of sex partners (6 vs. 5, $p=0.02$) and overall STI positivity (23% vs. 19%, $p=0.02$) were higher among study participants compared to the total MSM population ($n=3493$) who visited the participating STI clinics during the study period. This might have led to an overestimation of the proportion of MSM practicing chemsex. Study nurses were explicitly instructed to recruit all MSM regardless of reported chemsex, but we cannot entirely rule out the possibility of sampling bias. We do not have information on chemsex among non-participants and cannot confirm whether there was a sampling bias concerning reported chemsex. However, nurses reported that the absence of recruitment was mainly due to practical reasons, such as lack of time. Therefore, we believe that non-inclusion was random and not based on self-report of sexual risk behaviour or chemsex.

Conclusion

The majority of MSM practicing chemsex used drugs to increase the qualities valued in sex and did not experience serious harms of chemsex. Nevertheless, one in four might want to be counselled by a professional on chemsex-related issues. We identified a set of indicative characteristics of MSM with a need for professional counselling (n=48), including frequent chemsex, prolonged time since sober sex, experience of disadvantages and intending to change chemsex behaviour. These topics might be helpful for health care professionals to discuss with MSM to identify their needs for professional counselling.

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Chapter 7

The availability and feasibility of chemsex services within sexual health clinics in the Netherlands: a cross-sectional study among STI nurses

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Abstract

Objectives

Chemsex - using illicit drugs during sex - is prevalent among men who have sex with men (MSM) and associated with sexual and mental health harms. Sexually transmitted diseases (STI) clinics are a frequently visited and trusted healthcare facility for MSM. This study assessed the frequency and extent to which chemsex is addressed by Dutch STI nurses.

Methods

Of the 24 Dutch public STI clinics, an online questionnaire was distributed in 20 STI clinics (83%) in 2019; the questionnaire was sent to 191 STI nurses of whom 108 (57%) completed the questionnaire. The main outcome was addressing chemsex during regular MSM consultations, measured on a five-point Likert scale (never–always). Items measuring knowledge, attitude, self-efficacy and the social norm, were also measured on a five-point Likert scale (totally disagree–totally agree).

Results

Of the 108 participating STI nurses, 77 (71%) addressed chemsex regularly or always during MSM consultations. In general, STI nurses indicated to have sufficient knowledge about chemsex (mean: 3.6, SD: 0.5) and a positive attitude towards addressing chemsex (mean: 4.3, SD: 0.5). A need for training on chemsex was reported by 82 (76%) STI nurses, especially in signaling problematic chemsex (56/82, 68%). Three STI clinics (15%) had a protocol on addressing chemsex and three STI clinics (15%) had referral pathways to addiction care.

Conclusion

STI nurses from Dutch STI clinics regularly addressed chemsex during MSM consultations. Our results show relevance of educating STI nurses on signaling problematic chemsex and arranging referral pathways to addiction care to optimize chemsex related health care.

Introduction

Chemsex has been described as the intentional use of illicit drugs during sexual activities and typically occurs among men who have sex with men (MSM) [1,2]. The drugs included in the definition of chemsex might vary per country and calendar time. In the UK, chemsex includes the use of mephedrone, crystal methamphetamine and γ -Butyrolactone (GBL)/ γ -hydroxybutyric acid (GHB) [1]. In the Netherlands, ecstasy (XTC), GHB and ketamine are mostly used by MSM during sexual activities [3,4]. The European MSM Internet survey from 2017 showed that the proportion of MSM practicing chemsex in the Netherlands was highest compared to other European countries [5].

From a public health perspective, chemsex has been associated with increased sexual risk behaviour and sexually transmitted diseases (STIs) [6-9]. Moreover, MSM considering their chemsex to be problematic or MSM who are dependent on chemsex might face a risk of mental health harms, such as anxiety and depression [10-12]. From a patient perspective, studies in Ireland and the Netherlands have shown that a majority of MSM practicing chemsex might consider their drug use as relatively unproblematic [13,14]. Experiencing a negative impact on daily life due to chemsex ranged from 9% to 25% and up to one third of MSM indicated that they would like to be counselled by professionals on chemsex-related issues [13,14]. A study from our research group showed that MSM would like to discuss increasing self-control, safer drug use, and reducing the risk of acquiring HIV or an STI [14]. In general, MSM preferred to address chemsex at the STI clinic they were attending [13-17].

STI clinics already play an important role in the prevention and cure of sexually transmitted diseases in MSM. At least a proportion of MSM who practice chemsex regularly attend STI clinics and should therefore not be considered a hidden population [18]. As STI clinics are a trusted and frequently visited place by MSM, these clinics might play an important role in reaching MSM practicing chemsex and counselling on chemsex-related health issues. One study showed that addressing chemsex in consultations was reported in 80% of STI clinics in the United Kingdom (UK) [18]. However, no data exists on the availability and feasibility of such chemsex services within STI clinics in the Netherlands. Therefore, we assessed (1) the frequency and the extent to which chemsex is addressed by STI nurses during MSM consultations, (2) encountered facilitators and barriers to address chemsex, (3) the needs for training in addressing chemsex and (4) the proportion of STI clinics that have facilitators for addressing chemsex in place.

Methods and methods

Study design

In the Netherlands, there are eight centrally coordinated public sexual health centers with 24 outpatient STI clinics. The outpatient STI clinics in the Netherlands offer free and anonymous STI testing, hepatitis B vaccinations and sexual health counselling for risk groups, such as MSM. MSM were defined as men who had sex with other men. In 2018, 49.873 MSM visited one of the Dutch STI clinics [19]. MSM are advised to visit the STI clinic two to four times per year to test for STIs. MSM are routinely universally tested for common STIs, such as *Chlamydia trachomatis*, *Neisseria gonorrhea*, syphilis and HIV. Each consultation further includes sexual health counselling, in which sexual risk behaviour and sexual health issues are addressed. STI nurses generally provide this sexual health counselling. STI nurses are trained to use motivational interviewing for sexual health counselling. STI doctors are consulted in case of STI related complaints or treatments. We developed an online questionnaire for STI nurses on addressing chemsex in co-creation with STI nurses and doctors. The questionnaire included both multiple choice and open-ended questions about the frequency of addressing chemsex in STI consultation, encountered facilitators and barriers and needs for training in addressing chemsex. The questionnaire was pilot-tested by four STI nurses. Completing the questionnaire took approximately 15 minutes. All eight sexual health centers in the Netherlands participated in the study. The managers of the eight sexual health centers were instructed to send the online questionnaire to all STI nurses working in all outpatient STI clinics in their region during three months from September 2019 to December 2019. Of the total of 24 outpatient STI clinics, 20 STI clinics (83%) participated in this study. The questionnaire was not sent to four STI clinics by the managers. In the participating clinics, the questionnaire was sent to 191 STI nurses of whom 108 completed the questionnaire (response: 57%). On average, 5 STI nurses per STI clinic responded (minimum: 1, maximum: 17). Of the 108 participating STI nurses, 97 (90%) were women. Forty-one STI nurses (38%) were aged between 15-35 years, 38 (35%) between 36-50 years and 29 (27%) were aged 51 years or older. Half of STI nurses (51%) have been working at the STI clinic for less than five years.

Variables

Addressing chemsex in STI consultations

The main outcome in this study was the frequency of addressing chemsex in MSM clients during regular STI consultations by STI nurses. This was measured on a five-point Likert scale (never, rarely, sometimes, often, always). Addressing chemsex during a consultation included at initiation of the STI nurse or at initiation of the client. Chemsex was defined as the use of drugs before or during sex in the past six months. The drugs included in this definition were crystal meth, cocaine, designer drugs (2-CB, 3 MMC, 4-FA, 4-MEC), GHB, GBL, ketamine, MDMA, mephedrone, speed, and XTC. The moment an STI nurse would ask about chemsex and the topics addressed were measured with multiple choice questions (answering options in online Supplementary file I). STI nurses were also asked to estimate on a scale (0-100) the percentage of MSM visiting the STI clinic who practiced chemsex.

The experienced and desired role of STI nurses in addressing chemsex

A secondary outcome was the experienced and desired role of STI nurses in addressing chemsex. This was measured by a multiple choice question that asked which healthcare organisation should address chemsex (answering options in online Supplementary file I) and an open question asking what role STI nurses should have in addressing chemsex.

Facilitators and barriers STI nurses encounter when addressing chemsex

Items measuring the concepts knowledge, attitude, self-efficacy and social norm were measured on a five-point Likert scale (totally disagree, disagree, disagree/agree, agree, totally agree). If the total score of items of a concept had good internal reliability with Cronbach's $\alpha > 0.7$ in our study population ($n=108$), a mean score was calculated. Knowledge about chemsex was measured by 9 items (Cronbach's $\alpha=0.845$), attitude towards addressing chemsex by 3 items (Cronbach's $\alpha=0.862$), self-efficacy on addressing chemsex by 5 items (Cronbach's $\alpha=0.627$), the social norm of addressing chemsex among colleagues and managers at the STI clinic by 3 items (Cronbach's $\alpha=0.752$) and intention to address chemsex by 1 item. Items are presented in Figure 1.

Needs for training in addressing chemsex

The needs for training in addressing chemsex of STI nurses were measured with a multiple choice question (answering options in online Supplementary file I).

Facilitators for addressing chemsex in STI clinics

In STI clinics, we measured the availability of facilitators for addressing chemsex, including the availability of a sexual history questionnaire that includes a question about drug use, a protocol on addressing chemsex in MSM clients (for questions that should be asked to identify problematic chemsex), contacts in regional addiction care to whom MSM experiencing problematic chemsex can be referred to, and the availability of a specialised chemsex program within the STI clinic.

Statistical analysis

Firstly, data were analyzed in STI nurses (n=108). We used descriptive statistics to assess the proportions of STI nurses who addressed chemsex, the moments they would ask about chemsex, the topics they asked about and the healthcare organisations they would refer clients practicing chemsex to. Means and standard deviations (SD) were used to describe the current status of encountered facilitators and barriers. Univariable multilevel linear models were used to assess associations between encountered facilitators and barriers and the outcome frequency of addressing chemsex. Variables significantly associated with addressing chemsex in univariable analyses were included in a multivariable model. Multilevel models were used to take into account that STI nurses were nested within STI clinics. P-values <0.05 were considered statistically significant.

Secondly, data were analyzed in STI clinics (n=20). We used descriptive statistics to assess the availability of facilitators for addressing chemsex in STI clinics, including the proportion of clinics that used sexual history questionnaires asking for drug use, the proportion of clinics that have a protocol on addressing chemsex, the proportion of clinics that have referral contacts to regional addiction care in place and the proportion of clinics that have specialised chemsex support programs within their clinic. One response per clinic was randomly selected for these analyses. . Multiple responses in one clinic were checked for consistency. When inconsistent answers were given on the availability of facilitators within one STI clinic, we checked this at the website or we asked a contact person of the concerning STI clinic.

Ethics statement

This study was approved by the Medical Ethical Committee of the University of Maastricht (METC 2019–1468). Data were collected and presented in a de-identifiable manner.

Results

Addressing chemsex in STI consultations

Of the 108 participating STI nurses, 105 (97%) reported to address chemsex with MSM clients during consultations: 3 (3%) never, 3 (3%) rarely, 25 (23%) sometimes, 37 (34%) regularly and 40 (37%) always (mean: 4.00, SD: 0.99). The proportion of addressing chemsex did not differ per STI clinic ($p=0.92$). All but one STI nurse used motivational interviewing during consultations (99%). STI nurses estimated that half of MSM visiting the STI clinic practiced chemsex (mean: 48%, SD: 24). The most reported reasons to address chemsex were an indication in the sexual history questionnaire (60/108, 56%), on client's indication (55/108, 51%), on indication of previous consultations (51/108, 47%), during all consultations with MSM (41/108, 39%) and having a suspicion of drug use (37/108, 34%). The most reported topics to address with MSM practicing chemsex in addition to regular STI care were motives for having chemsex (83/108, 77%), unwanted sexual experiences (83/108, 77%), the drugs used (63/108, 58%) and frequency of chemsex (57/108, 53%) (Table 1). Referring MSM to other healthcare organisations' was reported by 62 STI nurses (57%); they mostly referred to regional addiction care organisations (41/62, 66%), sexologists (26/62, 42%), general practitioners (23/62, 37%) or specialised chemsex services outside the clinic (21/62, 34%). Referral to online help was reported by only 8 STI nurses (7%).

Experienced and desired role of STI nurses in addressing chemsex

Almost all STI nurses (101/108, 94%) indicated that addressing chemsex belongs to regular consultations in the STI clinic and most STI nurses (102/108, 94%) agreed that all STI nurses should have knowledge about chemsex. The most reported roles in an open question were addressing chemsex (38/108, 35%), referring clients to other healthcare organisations when needed (38/108, 35%), signaling chemsex and problematic chemsex (33/108, 31%), being a trusted party where MSM can openly discuss problems or questions (27/108, 25%), identifying risks of chemsex together with clients using motivational interviewing (26/108, 24%) and providing information on chemsex (20/108, 19%).

Facilitators and barriers STI nurses encounter when addressing chemsex

In general, STI nurses indicated to have sufficient knowledge about chemsex and having sufficient knowledge was positively associated with addressing chemsex (Table 2). Approximately

one in five indicated that their knowledge about drug intake methods and health care institutions for referral was insufficient (Figure 1). STI nurses had a positive attitude about addressing chemsex, considered it important and part of their job (Figure 1). Having a positive attitude was positively associated with addressing chemsex (Table 2). Most common barriers for addressing chemsex were experiencing time pressure and having insufficient connection with MSM practicing chemsex (Figure 1). Having insufficient connection with MSM practicing chemsex was negatively associated with addressing chemsex (Table 2). STI nurses indicated that colleagues and managers considered addressing chemsex important (Figure 1). Almost all STI nurses had the intention to address chemsex with MSM clients and this was positively associated with addressing chemsex (Table 2). The only concept associated with addressing chemsex in the multi-variable model was knowledge (regression coefficient: 0.63; 95%CI: 0.25-1.00).

Needs for training of STI nurses in addressing chemsex

A training in the field of chemsex was received by 75 STI nurses (69%). The need for training in the field of chemsex was reported by 82 STI nurses (76%), of whom 29 STI nurses (35%) had not received a previous training. STI nurses reported that they would like to receive training in the following topics: determining whether chemsex is experienced problematic by MSM clients (56/82, 68%), health risks of chemsex (56/82, 68%) and strategies to prevent health risks of chemsex (49/82, 60%) (Table 3).

Facilitators for addressing chemsex in STI clinics

Of the 20 participating STI clinics, 11 clinics (55%) used a sexual history taking questionnaire that includes a question about drug use and 3 clinics (15%) had a protocol on addressing chemsex in MSM clients. Three STI clinics (15%) had a contact person at regional addiction care to which they could refer MSM experiencing problematic chemsex. A specialised chemsex support program was available at one STI clinic (5%), and this concerned a chemsex consultation provided by trained peer educators.

Table 1. Chemsex-related topics discussed by STI nurses during consultations with MSM clients in addition to regular STI care.

Topics to discuss with MSM practicing chemsex:	N (% of total participants)
Chemsex (behavioural aspects)	70 (64.8)
• Used drugs	63 (58.3)
• Used combinations of drugs	36 (33.3)
• Frequency of chemsex	57 (52.8)
• Last time sex without drugs (sober sex)	34 (31.5)
• Injection of drugs	50 (46.3)
• Intention to have chemsex	31 (28.7)
Reasons to use drugs during sex	83 (76.9)
Health risks of chemsex (other than STI risks)	49 (45.4)
• Dependency	27 (25.0)
• Difficulty having sex without drugs	43 (39.8)
• Addiction	35 (32.4)
• Sexual health issues (e.g. decreased libido)	27 (25.0)
• Mental health issues (e.g. depression)	28.0 (25.9)
• Financial issues	7 (6.5)
• Social issues	18 (16.7)
• Overdose	11 (10.2)
Prevention of health risks of chemsex (other than STIs)	38 (35.2)
• Safe use of needles	24 (22.2)
• Not combining specific drug types	17 (15.7)
• Decrease the frequency of using drugs	18 (16.7)
• Stop using drugs	11 (10.2)
Unwanted sexual experiences	83 (76.9)

Note: All STI nurses addressed STI topics standard, including sexual risk behaviour, prevention of STIs and HIV (condom use and PrEP), STI testing and possible treatment.

Figure 1. Experienced facilitators and barriers by STI nurses to address chemsex during regular consultations with MSM clients.

Numbers in figure represent rounded percentages of participants who responded a specific answering scale. Green represents facilitators and red represents barriers.

Table 2. Means and standard deviations of concepts and their association with the outcome addressing chemsex during consultations with MSM clients.

	Mean (SD)	Regression coefficient (95%CI) Univariable Linear Mixed Models	p-value
Knowledge	3.6 (0.5)	0.90 (0.59 - 1.21)	<0.001
Attitude	4.3 (0.5)	0.39 (0.03 - 0.75)	0.034
Self-efficacy			
Time pressure	3.1 (1.1)	-0.12 (-0.30 - 0.05)	0.174
Insufficient connection	3.0 (1.0)	-0.39 (-0.56 - -0.22)	<0.001
Interference	2.7 (1.0)	-0.24 (-0.43 - -0.05)	0.014
Other topics have priority	2.9 (0.8)	-0.10 (-0.35 - 0.15)	0.433
Insufficient understanding	2.5 (0.8)	-0.21 (-0.45 - 0.03)	0.082
Social norm	3.6 (0.5)	0.27 (-0.08 - 0.62)	0.130
Intention	4.2 (0.5)	0.56 (0.22 - 0.90)	0.001

Table 3. Chemsex related topics in which a need for training was reported by STI nurses.

Needs for training in addressing chemsex:	N (% of participants who indicated a need for training)
Addressing chemsex	43 (52.4)
Most used drugs during sex	41 (50.0)
Health risks of chemsex	56 (68.3)
Experienced positive effects of chemsex	45 (54.9)
Language use of MSM practicing chemsex	43 (52.4)
Risk-analysis related to STIs	23 (28.0)
Risk-analysis related to acute effects (e.g. overdose)	39 (47.6)
Risk-analysis related to mental health issues	43 (52.4)
Interaction effects between drugs and medication	39 (47.6)
Determining whether chemsex is problematic	56 (68.3)
Short behavioural interventions	38 (46.3)
Sources where reliable chemsex information can be found	34 (41.5)
Referral pathways to other healthcare organisations	43 (52.4)
Motivational interviewing related to chemsex	28 (34.1)
Strategies to prevent health risks of chemsex	49 (59.8)
Unwanted sexual experiences	35 (42.7)

Discussion

Our study is one of the first studies that describes addressing chemsex from a healthcare provider perspective. Our study suggests that nearly all STI nurses (97%) working at the Dutch Public Health Service outpatient STI clinic addressed chemsex during their regular STI consultations with MSM clients. The majority of STI nurses addressed chemsex on a regular basis. Half of STI nurses indicated to address chemsex at initiation of the client. STI nurses were positive about addressing chemsex and considered it to be part of their job. They indicated that their role should be addressing chemsex, identifying risks, providing information, signaling problematic use and referring MSM clients to other healthcare organisations when needed. Although a training in the field of chemsex was received by the majority of STI nurses, two-third still had a need for training. A protocol on addressing chemsex and referral paths to addiction care were lacking in most STI clinics and might need to be facilitated to help STI nurses addressing chemsex, signaling problematic use and using adequate referral paths.

Previous studies have shown that MSM practicing chemsex felt comfortable to discuss chemsex related issues at the STI clinic they were attending [13-16]. Our study shows that the majority of STI nurses indeed addressed chemsex with their MSM clients. At all participating STI clinics in this study, both urban and less urban, chemsex was addressed. A study from the UK also showed that STI clinics in both urban and less urban regions reported chemsex consultations equally [18]. A previous study from our research group already showed that chemsex was as prevalent among MSM living in urban areas and MSM living in non-urban areas in the Netherlands [4]. The importance of prevention and care related to chemsex among MSM living in urban areas and MSM living in non-urban areas seems to be acknowledged by STI clinics in both urban and less urban areas.

In general, STI nurses had a positive attitude towards addressing chemsex, they considered it important and part of their job. They indicated that their managers and STI team were similarly positive to address chemsex. Taking into account that chemsex is highly prevalent among MSM in the Netherlands, associated with sexual and mental health harms and STI nurses considered it an important topic, incorporating chemsex in routine screening at STI clinics might be helpful and feasible to prevent these harms.

The majority indicated to have sufficient knowledge about chemsex, drugs used, intake methods, motives and experienced positive and negative effects. Nevertheless, three quarters of STI nurses still had a need for training in the field of chemsex, especially on the health risks of chemsex, connecting to the language used by MSM practicing chemsex and deter-

mining whether chemsex was perceived problematic. Our study shows that having sufficient knowledge about chemsex was positively associated with addressing chemsex and hereby underpins the importance of providing training related to chemsex to STI nurses. A study in the UK also showed high interest in training in assessing problematic chemsex among STI healthcare providers [18]. A study assessing the mental health impact of chemsex showed that drug use among MSM was associated with anxiety and depression only when the use was considered problematic or dependent [10]. Several studies have shown that a majority of MSM did not consider chemsex problematic [13,14]. For this group, regular STI prevention and care together with drug use related harm reduction (e.g. information on safer drug use) might be sufficient. A previous study also showed that MSM practicing chemsex preferred to address reduction of sexual and drug use related health risks with health care professionals [14]. To assess whether further help is needed, the following topics could be indicative: frequent chemsex, prolonged time no sober sex, experiencing a negative impact on daily life and intending to change chemsex behaviour [14]. Our study shows that frequency of chemsex, difficulty to have sober sex and several experienced health risks were discussed by approximately half of STI nurses. As a protocol on chemsex was only available in three of the twenty participating STI clinics, it might be helpful to include these indicative topics in a protocol to assess problematic chemsex together with clients. Although a standard protocol could provide helpful guidelines, tailoring and acknowledgement of personal experiences remains important to increase acceptance and efficacy of prevention and care strategies. The majority of STI nurses in our study discussed motives for having chemsex and hereby acknowledged experienced positive effects for clients. Furthermore, all STI nurses used motivational interviewing during consultations, and this is a tailored evidence-based technique to help clients weigh the pros and cons of a behaviour and prevent health harms [20].

Another possible organisational improvement for STI clinics might be standardized referral pathways to mental health care and addiction organisations, as our study shows this facility in only three. Several studies have argued that strengthening referral pathways and collaboration between STI clinics and addiction and mental healthcare organisations is needed to serve the needs of MSM considering their chemsex problematic [18,21,22]. Another possibility would be a specialised chemsex service within the STI clinic, with both the expertise of sexual health experts, addiction and mental health care professionals. Such a specialised chemsex service has shown positive results in London [2]. Our study shows that this was currently not available in all but one STI clinic.

Our study should be interpreted alongside several methodological strengths and limitations. The proportion of STI nurses who indicated to address chemsex regularly might be slight-

ly overestimated, as STI nurses who were positive about addressing chemsex might have responded more frequently than STI nurses who were negative. It was explicitly stated that the questionnaire was anonymous and answers were not visible for managers. Nevertheless, there might have been some social desirability and recall bias in questions about the frequency of addressing chemsex, related knowledge and attitude. All eight sexual health centers in the Netherlands participated in this study and the response rate of participating outpatient STI clinics (20/24, 83%) was high, which increases the representativity of our study to sexual health care in the Netherlands. The generalizability of this study to sexual health care internationally might be limited to countries with a comparable organisation of sexual health care, such as the UK. Similar studies in other relevant health care settings, such as alcohol and drugs institutions and general practitioners, would be important to get a complete overview of health care for MSM practicing chemsex. Moreover, STI clinics are a frequently visited and trusted healthcare facility for MSM, but it is likely that not all MSM practicing chemsex are currently seen at STI clinics. A recent study from the UK showed that 34% of app-recruited MSM practicing chemsex did not attend an STI clinic in the past year [23]. More research is needed on which strategies work best in reaching this hidden group of MSM practicing chemsex.

Conclusion

Overall, Dutch STI nurses working at STI clinics counselled MSM clients about chemsex on a regular basis. They indicated to have sufficient knowledge, but would like to receive additional training in health risks of chemsex, language of MSM practicing chemsex and determining whether chemsex is perceived problematic. STI clinics are well positioned to address chemsex, signal problematic chemsex and refer clients to addiction and mental healthcare organisations beyond regular STI prevention and care. To facilitate this, standardized screening for chemsex, a protocol with guidelines to signal problematic chemsex and adequate referral pathways should be organised.

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Chapter 8

Prevalence of drug use during sex among swingers and perceived benefits and risks: a cross-sectional internet survey in the Netherlands

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Abstract

Objectives

Drug use during sex has been associated with sexually transmitted infections (STI). While a growing body of research has investigated drug use during sex among men who have sex with men, data in swingers is limited. Swingers are heterosexual couples who have sex with others and singles who have sex with these couples. Our study assessed the prevalence of drug use during sex and perceived benefits and risks among swingers.

Methods

In 2018, 1005 swingers completed an online questionnaire that was advertised at Dutch swinger websites. We assessed the associations between drug use during sex <6 months (any drug use excluding alcohol and erection medicines) and sociodemographic characteristics, alcohol use and condomless sex using backward multivariable logistic regression analysis. We compared drug use, motives, beliefs and experienced effects between heterosexual male, bisexual male and female drug-using swingers using χ^2 -tests.

Results

Drug use during sex was reported by 44% (443/1005): 51% in women, 44% in bisexual men and 39% in heterosexual men ($p < 0.01$). Condomless vaginal (46%) and anal sex (22%) was higher in drug-using swingers (vs 34% and 13% in non-drug-using swingers, $p < 0.001$). Among drug-using swingers, XTC (92%), GHB (76%) and laughing gas (69%) were mostly used. Prolonging sex (68%) and increasing arousal (66%) were the most reported motives. Most reported positive effects were feeling happy (78%) and increasing energy (78%). Ninety-four per cent considered drug use to be pleasurable. The most reported negative effect was feeling tired (53%), 7% reported that they might become addicted or felt uncomfortable having sex without drugs.

Conclusion

This study among a large group of swingers shows that drug use during sex is highly prevalent. STI clinics should discuss drug use during sex among swingers and provide information on safer sex and drug use, while acknowledging the perceived benefits, such as the increased quality of sex.

Introduction

Swingers, that is heterosexual men and women who as a couple have sex with others, are a generally older sexually-active group that show high rates of sexually transmitted infections (STI) and sexual risk behaviour, such as unprotected sex with multiple sex partners and group sex [1-3]. Although swingers self-identify as heterosexual, they also engage in same-sex sexual behaviour [4,5]. Swingers can play a role in the transmission of STI, both within their own network and to other populations [1,6].

The use of drugs might be a determining factor for sexual risk behaviour, due to disinhibiting effects of drugs and thereby overruling of intentions to practice safe sex [7]. Indeed, drug use during sex has been associated with sexual risk behaviour in swingers [8] and an increased risk for STI in female swingers [1]. Aside from the sexual health risks, drug use during sex has been associated with psychosocial harms, such as addiction [7,9].

A previous study from our research group showed that approximately 40 per cent of swingers visiting the STI clinic reported using drugs in the preceding 6 months [1]. This percentage is four times higher than the estimated drug use prevalence in the general adult population in the Netherlands [10]. Gamma-hydroxybutyric acid (GHB), 3,4-Methylenedioxyamphetamine (MDMA), laughing gas, cannabis and poppers are mostly used during sex by swingers [1].

The data available among swingers suggests that drug use during sex is common and associated with sexual health risks. However, we lack knowledge about the perceived benefits and risks of drug use during sex and the intention to quit drug use among swingers. This information is important to identify specific beliefs and healthcare needs of swingers and tailor STI control strategies and drug use interventions to their beliefs and needs. Tailoring ensures that prevention and care will be more effective in benefitting the individual and public health. This study assessed patterns of drug use during sex, sexual risk behaviour, motives, beliefs, experienced effects and intention to quit drug use among heterosexual male, bisexual male and female swingers in a national cross-sectional internet survey.

Methods

Data collection

In 2018, an online survey was advertised at national swinger websites to recruit a broad sample of swingers in the Netherlands. Convenience sampling was used. A banner with a link to the survey was published on four (out of twelve that were approached) websites. The participating websites included two swinger dating websites, one swinger club website and one online magazine for swingers, the non-participating websites were eight swinger club websites. Participants were requested to fill in the survey individually and participate in the survey once. Participants who were 'part of a heterosexual couple and as a couple had sex with others' or 'singles who had sex with other heterosexual couples' were invited to complete the questionnaire. Participants who did not meet this definition of swinging, were aged 18 years or younger and/or did not swing in the last year were excluded from the analysis.

Materials

The online survey was developed on the basis of extensive work with swingers in STI clinical practice. The survey consisted of questions on sociodemographic characteristics, sexual behaviour, STI testing and drug use during sex. In those reporting drug use during sex, additional questions about the drug types, frequency, motives, beliefs, experienced effects and intention to quit drug use were asked. Beliefs (eg. I consider drug use during sex to be pleasurable) and intention to quit drug use during sex in the next 12 months were measured on a five-point Likert Scale (totally disagree – totally agree). Motives and experienced effects were measured by multiple choice questions, and participants had the option to provide multiple answers (questions can be found in online Supplementary File I).

Definitions

Heterosexual male swingers were defined as men who reported having sex with female swing partners. Bisexual male swingers were men who reported having sex with both female and male swing partners and men who were part of a heterosexual couple who reported having sex with male swing partners. Female swingers were all women. Sex with a condom was defined as always using a condom when having sex with swing partners. Condomless sex was defined as inconsistent condom use (i.e. never, sometimes, usually) with swing partners. STI testing was defined as having had an STI test in the preceding 12 months. Drug use during

sex was defined as the use of any drug (listed in online supplementary file II) during sexual activities while swinging in the preceding 6 months, excluding alcohol and erection medicines (referred to as 'drug use during sex'). Number of drugs used was calculated as the sum of all drugs used in the preceding 6 months, and categorised into one drug, two–three drugs, four–five drugs and $\geq$ six drugs (tertiles). Alcohol use was defined as using at least three units of alcohol during one swing session.

Statistical analysis

Sociodemographic characteristics, sexual risk behaviour, STI testing, alcohol and drug use during sex were described among all participants and subgroups (heterosexual male, bisexual male and female swingers) were compared using chi-square tests or unpaired t-tests. Factors (swingers subgroup, age, educational level, alcohol use, condomless sex) possibly associated with drug use during sex (outcome) were tested using multivariable logistic regression analysis. The stepwise backward procedure was used, which means that variables were deleted from the model starting with the least significant one, until only significant variables remained. P-values <0.05 were considered statistically significant. Interaction terms between subgroup and significant factors (age, educational level, alcohol use, condomless sex) were added to the regression model to assess whether associations were different for subgroups. P-values <0.10 were considered statistically significant for effect modification. When there was significant effect modification, regression analyses were stratified for subgroups. Further analyses were restricted to drug-using swingers. Descriptive statistics and chi-square tests were used to describe proportions of motives, beliefs, experienced effects, and intention to quit and differences between subgroups. P-values <0.05 were considered statistically significant. All analyses were performed using SPSS V21 (IBM SPSS Statistics for Windows, IBM Cooperation, Armonk, New York, USA).

Results

Between May and August 2018, 1005 swingers fully completed the questionnaire which represented a completion rate of 68% (1005/1478) of those who started the survey but had not completed it. All 1005 participants met the inclusion criteria of recent swinging and being aged older than 18 years. More than half of participants (58%, 580/1005) engaged in swinging at least once per month, 30% (306/1005) once per 3 months and 12% (119/1005) one or two

times per year. More heterosexual men (40%, 402/1005) than bisexual men (31%, 311/1005) and women (29%, 292/1005) completed the survey.

Characteristics of study population and subgroups

The median age of participants was 47 years (IQR 39–54 years). Heterosexual men (median age: 48 years) and bisexual men (median age: 49 years) were older than women (median age: 42 years) (all p -values <0.001). Heterosexual men and bisexual men were more often higher educated than women (62% and 62% vs 53%, $p=0.033$). Condomless vaginal sex was reported by 39% (393/1005), condomless oral sex by 96% (964/1005) and both did not differ between subgroups (respectively $p=0.490$ and $p=0.991$). Condomless anal sex was reported by 17% (170/1005) and was higher among bisexual male (19%) and female swingers (19%) than heterosexual male swingers (13%; $p<0.001$). STI testing was reported by 64% and was similar for subgroups ($p=0.051$). The STI clinic (44%) and general practitioner (40%) were the most reported testing locations for all subgroups (online supplementary file III).

Drug and alcohol use during sex

Drug use during sex in the preceding 6 months was reported by 44% (443/1005) (95% CI: 41% to 47%) of all participants: 51% among women (149/292), 44% among bisexual men (137/311) and 39% (157/402) among heterosexual men ($p=0.002$). Using at least three units of alcohol during sex was reported by 42% (418/1005) and did not differ between subgroups.

Drug use during sex, condomless sex and STI testing

Condomless vaginal sex was reported by 46% among drug-using swingers (compared with 34% in non-drug-using swingers, $p<0.001$), condomless anal sex by 22% in drug-using swingers (compared with 13% in non-drug-using swingers, $p<0.001$) and condomless oral sex by 98% in drug-using swingers (compared with 95% in non-drug-using swingers, $p=0.020$). STI testing was reported by 75% drug-using swingers (compared with 56% in non-drug-using swingers, $p<0.001$). The STI clinic was the most reported STI testing location in drug-using swingers (57% vs 31% in non-drug using swingers, $p<0.001$) and the general practitioner in non-drug-using swingers (49% vs 31%, $p<0.001$).

Drug use during sex and associated determinants

In the multivariable model, being a woman, aged 44–52 years (compared with aged 19–43 years), having condomless vaginal sex, anal sex with condom, condomless anal sex and no alcohol use were independently associated with drug use during sex (Table 1). The association between alcohol use and drug use during sex differed significantly for subgroups ($p=0.080$, significant effect modification). The use of at least three units of alcohol during one swing session was significantly associated with no drug use during sex only in women (aOR: 0.48, 95% CI: 0.30 to 0.77).

Patterns of drug use among drug-using swingers

Among drug-using swingers, XTC/MDMA (92%, 409/443), GHB/GBL (76%, 338/443) and laughing gas (69%, 304/443) were the most reported drugs. None of the swingers reported to have injected drugs. Half of drug-using swingers reported to use drugs during sex once per month. The use of four or more different drugs during sex in the preceding 6 months was reported by 69% (305/443). No differences in the drugs used or use patterns were found between subgroups (Table 2).

Table 1: Logistic regression analysis with drug use during sex <6 months as outcome among all participants

	All participants (N=1005)	Drug use during sex (N=443)		
	% of total (N)	% within groups (N)	OR (95% CI)	aOR ^a (95% CI) ^a
Swingers subgroup				
Heterosexual male	40.0 (402)	39.1 (157)	1	1
Bisexual male	30.9 (311)	44.1 (137)	1.23 (0.91-1.66)	1.19 (0.87-1.63)
Female	29.1 (292)	51.0 (149)	1.63 (1.20-2.21)**	1.88 (1.35-2.60)***
Age group^b				
19-43	34.6 (347)	39.8 (138)	1	1
44-52	36.1 (362)	48.9 (177)	1.45 (1.08-1.95)*	1.52 (1.11-2.08)**
53-74	29.2 (293)	43.3 (127)	1.16 (0.85-1.59)	1.14 (0.81-1.61)
Educational level^c				
Practical	40.9 (411)	47.7 (196)	1	
Theoretical	59.1 (594)	41.6 (247)	0.78 (0.61-1.01)	NS
Vaginal sex				
No/with condom ^d	51.4 (612)	39.4 (241)	1	1
Without condom	39.1 (393)	51.4 (202)	1.63 (1.26-2.10)***	1.51 (1.13-2.10)**

continue

Table 1: Logistic regression analysis with drug use during sex <6 months as outcome among all participants

		All participants (N=1005)	Drug use during sex (N=443)		
		% of total (N)	% within groups (N)	OR (95% CI)	aOR^a (95% CI)^a
Anal sex^e					
	No	33.4 (336)	34.8 (117)	1	1
	With condom	49.7 (499)	45.9 (229)	1.59 (1.19-2.11)**	1.74 (1.29-2.34)***
	Without condom	16.9 (170)	57.1 (97)	2.49 (1.71-3.63)***	1.98 (1.29-3.03)**
≥3 units of alcohol at one swing session					
	No	58.4 (587)	47.5 (279)	1	1
	Yes	41.6 (418)	39.2 (164)	0.71 (0.55-0.92)**	0.72 (0.55-0.94)*

Note: Significant associations are in bold. ***<0.001, **<0.01, *<0.05.

As condomless oral sex was reported by 96% (964/1005), oral sex was not included in this analysis.

^a Stepwise backward regression model, non-significant factors were deleted from the model: educational level.

^b Age groups were based on tertile distributions. The age of 3 participants was missing and excluded pairwise from analysis.

^c Educational level categories were based definitions used by the Statistics Netherlands (www.cbs.nl).

^d Categories no and with condom were combined into one low risk category; only 23 participants reported no vaginal sex.

^e Anal sex was independently associated with drug use during sex (aOR: 1.56 (1.06-2.30)*)

Table 2: Drug types, frequency of drug use, number of drug types compared between heterosexual, bisexual men and women who used drug during sex in the preceding six months (N=443)

	Drug-using swingers (N=443)	Heterosexual male drug-using swingers (N=157)	Bisexual male drug-using swingers (N=137)	Female drugs-using swingers (N=149)	
	% of total (N)	% of total (N)	% of total (N)	% of total (N)	p
Frequency drug use during sex					0.401
Once per month	51.0 (226)	52.9 (83)	46.7 (64)	53.0 (79)	
2-3 times per month	34.8 (154)	33.1 (52)	37.2 (51)	34.2 (51)	
Once per week	10.6 (47)	12.1 (19)	9.5 (13)	10.1 (15)	
Several times per week	3.6 (16)	1.9 (3)	6.6 (9)	2.7 (4)	
Number of drug types used					0.257
1 drug	7.7 (34)	7.6 (12)	4.4 (6)	10.7 (16)	
2-3 drugs	23.3 (103)	25.5 (40)	24.8 (34)	19.5 (29)	
4-5 drugs	30.0 (133)	33.1 (52)	27.7 (38)	28.9 (43)	
≥6 drugs	38.8 (172)	33.8 (53)	43.1 (59)	40.3 (60)	
XTC/MDMA	92.3 (409)	91.1 (143)	91.2 (125)	94.6 (141)	0.410
GHB/GBL	76.3 (338)	75.2 (118)	78.8 (108)	75.2 (112)	0.700
Laughing gas	68.6 (304)	69.4 (109)	71.5 (98)	65.1 (97)	0.487
Cannabis	50.6 (224)	50.3 (79)	51.1 (70)	50.3 (75)	0.989
Poppers	46.7 (207)	39.5 (62)	51.1 (70)	50.3 (75)	0.076
Ketamine	47.7 (71)	45.2 (71)	49.6 (68)	47.7 (71)	0.749
Speed	30.0 (133)	29.9 (47)	28.5 (39)	31.5 (47)	0.851
Cocaine	21.2 (94)	24.8 (39)	19.7 (27)	18.8 (28)	0.384
4-FA	7.4 (33)	7.0 (11)	6.6 (9)	8.7 (13)	0.763
2-CB	5.0 (22)	3.2 (5)	8.0 (11)	4.0 (6)	0.149
Crystal meth	1.6 (7)	1.3 (2)	2.2 (3)	1.3 (2)	0.800
3 MMC	3.4 (15)	3.2 (5)	4.4 (6)	2.7 (4)	0.760
Mephedrone	2.9 (13)	3.2 (5)	4.4 (6)	1.3 (2)	0.314
Heroin	0.2 (1)	0.6 (1)	NA	NA	NA
Naphyrone	(0)	NA	NA	NA	NA
Magic mushrooms	4.1 (18)	5.1 (8)	2.9 (4)	4.0 (6)	0.657
MXE	1.8 (8)	0.6 (1)	1.5 (2)	3.4 (5)	0.203
Basecoke	1.4 (6)	1.3 (2)	1.5 (2)	1.3 (2)	0.991

Note: p-values of χ^2 tests or Fisher-exact tests (if cells have an expected count less than 5).

NA: Not applicable.

Abbreviations: XTC/MDMA: Ecstasy/3,4-Methylenedioxymethamphetamine, GHB/GBL: Gamma-hydroxybutyric acid/Gamma-butyrolactone, 4-FA: 4-Fluoroamphetamine, 2-CB: 2,5-dimethoxy-4-bromophenethylamine, 3 MMC: 3-Methylmethcathinone, MXE: Methoxetamine

Motives, beliefs and experienced effects among drug-using swingers

The majority of heterosexual male, bisexual male and female drug-using swingers indicated to consider drug use during sex to be pleasurable (94%), acceptable (84%) and exciting (66%) (Table 3). The most reported motives for using drugs were prolonged sex (68%), increased arousal (66%), decreased inhibitions (64%) and intensification of sexual sensations (61%). Prolonged sex was more important for men than women ($p<0.001$). Increased energy (78%), happy feeling (78%) and lovingly/intimate feeling (77%) were the most reported experienced positive effects for all subgroups (Table 3). Half of respondents considered drug use during sex to be unhealthy (47%) but only a minority considered drug use to be unwise (14%) or dangerous (15%) (Table 4). Feeling tired (53%) was the most reported experienced negative effect and this was more often reported by women than men ($p=0.012$). One in four reported that drug use during sex had a negative effect on their health. One in five reported to feel depressed the days after using drugs during sex and this was more often reported by heterosexual male and female swingers than bisexual male swingers ($p=0.013$). Only 4% had the intention to quit drug use. This percentage was higher among women than heterosexual men and bisexual men ($p=0.017$) Table 4).

Table 3. Motives, positive beliefs and experiences of drug use during sex compared between heterosexual, bisexual male and female swingers who reported drug use

	All participants (N=443)	Heterosexual male swingers (N=157)	Bisexual male swingers (N=137)	Female swingers (N=149)	
	% (N)	% (N)	% (N)	% (N)	p
Motives^a					
Prolonged sex	67.9 (301)	74.5 (117)	76.6 (105)	53.0 (79)	<0.001
Increased arousal	66.4 (294)	65.6 (103)	70.8 (97)	63.1 (94)	0.371
Decreased inhibitions	64.3 (285)	65.0 (102)	62.8 (86)	65.1 (97)	0.900
Intensification sexual sensations	61.2 (271)	61.1 (96)	65.0 (89)	57.7 (86)	0.454
Increased sexual desire	43.1 (191)	45.2 (71)	46.0 (63)	38.3 (57)	0.334
Increased intimacy	42.7 (189)	40.1 (63)	51.1 (70)	37.6 (56)	0.051
Increased quality of sex	40.0 (177)	42.0 (66)	48.9 (67)	29.5 (44)	0.003
Increased self-confidence	26.2 (116)	28.0 (44)	19.7 (27)	30.2 (45)	0.098
Group sex	13.3 (59)	15.3 (24)	16.8 (23)	8.1 (12)	0.052

continue

Table 3. Motives, positive beliefs and experiences of drug use during sex compared between heterosexual, bisexual male and female swingers who reported drug use

	All participants (N=443)	Heterosexual male swingers (N=157)	Bisexual male swingers (N=137)	Female swingers (N=149)	
	% (N)	% (N)	% (N)	% (N)	p
Partners more attractive	12.2 (54)	15.3 (24)	13.1 (18)	8.1 (12)	0.129
Experimenting	6.1 (27)	5.1 (8)	5.1 (7)	8.1 (12)	0.485
Decreased pain	5.4 (24)	1.3 (2)	6.6 (9)	8.7 (13)	0.005
Everybody does it	2.7 (12)	1.9 (3)	2.2 (3)	4.0 (6)	0.490
Social pressure	2.2 (10)	1.3 (2)	1.5 (2)	4.0 (6)	0.287
Craving	1.6 (7)	2.5 (4)	0.7 (1)	1.3 (2)	0.574
Being part of a community	1.6 (7)	0.6 (1)	1.5 (2)	2.7 (4)	0.343
Less concerns STI	0.2 (1)	0.0 (0)	0.7 (1)	0.0 (0)	NA
Positive beliefs: drug use during sex is^b					
Pleasurable	93.9 (416)	93.0 (146)	92.0 (126)	96.6 (144)	0.187
Acceptable	84.4 (374)	85.4 (134)	84.7 (116)	83.2 (124)	0.873
Exciting	65.7 (291)	69.4 (109)	59.1 (81)	67.8 (101)	0.147
Experienced positive effects^a					
Happy feeling	78.3 (347)	81.5 (128)	73.7 (101)	79.2 (118)	0.261
Increased energy	77.9 (345)	79.6 (125)	81.8 (112)	72.5 (108)	0.141
Lovingly/intimate feeling	76.7 (340)	76.4 (120)	83.2 (113)	71.1 (106)	0.051
Decreased inhibitions	73.4 (325)	68.2 (107)	73.7 (101)	78.5 (117)	0.120
Relaxed feeling	69.1 (306)	68.8 (108)	66.4 (91)	71.8 (107)	0.612
Increased arousal	60.0 (266)	57.3 (90)	67.2 (92)	56.4 (84)	0.119
Intensified experience of light and sound	46.5 (206)	47.8 (75)	47.4 (65)	44.3 (66)	0.801
More comfortable in making physical contact	41.5 (184)	43.9 (55)	46.7 (64)	34.2 (51)	0.074
Postponed orgasm	41.3 (183)	55.4 (87)	56.9 (78)	12.1 (18)	<0.001
Intensified orgasm	37.2 (165)	29.3 (46)	39.4 (41)	43.6 (65)	0.027
Making contacts easier	33.2 (147)	36.3 (57)	38.7 (53)	24.8 (37)	0.024
Less aware of place and time	30.0 (133)	31.2 (49)	27.0 (37)	31.5 (47)	0.647
Being able to have harder sex	23.7 (105)	19.1 (30)	24.1 (33)	28.2 (42)	0.171

continue

Table 3. Motives, positive beliefs and experiences of drug use during sex compared between heterosexual, bisexual male and female swingers who reported drug use

	All participants (N=443)	Heterosexual male swingers (N=157)	Bisexual male swingers (N=137)	Female swingers (N=149)	
	% (N)	% (N)	% (N)	% (N)	p
Forget my problems	20.3 (90)	17.8 (28)	22.6 (31)	20.8 (15)	0.583
Being more alert	11.1 (49)	11.5 (18)	10.2 (14)	11.4 (17)	0.930
Feeling comfortable days after using	8.6 (38)	8.9 (14)	12.4 (17)	4.7 (7)	0.058

Note: p-values of χ^2 -tests or Fisher-exact tests (if cells have an expected count less than 5).

NA: Not applicable,

^aAll possible answering options on multiple choice questions are displayed.

^bScales (4: agree, 5: totally agree) are displayed

Table 4. Negative beliefs, experiences and intention to quit drug use during sex compared between heterosexual, bisexual male and female swingers who reported drug use

	All participants (N=443)	Heterosexual male swingers (N=157)	Bisexual male swingers (N=137)	Female
	% (N)	% (N)	% (N)	% (N)
Negative beliefs: drug use during sex is ^a				
Unhealthy	46.7 (207)	46.5 (73)	46.7 (64)	47.0 (70)
Unwise	13.8 (61)	13.4 (21)	10.2 (14)	17.4 (26)
Dangerous	15.1 (67)	14.0 (22)	16.1 (22)	15.4 (23)
Experienced negative effects^b				
Feeling tired days after using	53.3 (236)	49.0 (77)	47.4 (65)	63.1 (94)
Damaging my health	25.5 (113)	23.6 (37)	27.0 (37)	26.2 (39)
Feeling depressed the days after using	20.3 (90)	22.3 (35)	12.4 (17)	25.5 (38)
Functioning less well at work days after using	16.0 (71)	17.8 (28)	15.3 (21)	14.8 (22)
Having less energy for my kids days after using ^c	14.9 (48)	15.7 (19)	14.3 (15)	14.6 (14)
Having headache	12.9 (57)	12.1 (19)	13.1 (18)	13.4 (20)
Insomnia days after using	10.8 (48)	13.4 (21)	7.3 (10)	11.4 (17)
Feeling sick	8.8 (39)	5.7 (9)	6.6 (9)	14.1 (21)
Feeling uncomfortable to have sex without drugs	7.4 (33)	7.6 (12)	9.5 (13)	5.4 (8)
Possibility of addiction	7.4 (33)	8.9 (14)	6.6 (9)	6.7 (10)
Need higher dose of drugs to get the same effects	3.8 (17)	5.7 (9)	4.4 (6)	1.3 (2)
Intention to quit drug use in the next twelve months	3.6 (16)	3.2 (5)	0.7 (1)	6.7 (10)
				0.017

Note: p-values of χ^2 -tests or Fisher-exact tests (if cells have an expected count less than 5).

^aScales (4: agree, 5: totally agree) are displayed.

^bAll possible answering options on multiple choice questions are displayed.

^cOnly among participants who reported to have children (n=713).

Discussion

This large study shows that almost half of swingers who completed an online survey in the Netherlands reported drug use during sex (44%) and this finding is in line with a previous study among swingers visiting the STI clinic in the Netherlands [1]. Another online survey among swingers in Belgium found a drug use prevalence of 19%. [8] One possible explanation for the lower drug use prevalence found in the study of Platteau et al [8] could be that some drug types, such as laughing gas, were not included in the definition of drug use. Our study shows that XTC/MDMA, GHB/GBL and laughing gas were the most popular drugs. The majority of drug-using swingers used four or more different drugs in the preceding 6 months.

We found an independent association between being a female swinger and drug use during sex. This difference was not found in previous studies [1,8] but these studies did not differentiate between heterosexual and bisexual male swingers. These studies [1,8] compared female swingers with all male swingers, whereas drug use seems to be higher among bisexual male swingers than heterosexual male swingers. In the general population, recreational drug use is mostly higher among men compared with women [10]. A possible explanation might be that women more often take drugs during sex to be physically and mentally capable of receiving esoteric sex acts with multiple sex partners by increasing arousal levels and facilitating easier intercourse. We did not observe differences in the specific drugs used or drug use patterns between heterosexual male, bisexual male and female swingers, but it should be noted that some drugs were used by too few participants to be able to detect differences between subgroups. Drug use patterns among swingers seem to be comparable with MSM with regard to the drug use prevalence during sex [11,12] the drugs used [12,13] and polydrug use [11]. Nevertheless, the use of laughing gas during sex seems to be more common among swingers than MSM.

Condomless vaginal and anal sex were associated with drug use during sex, and this finding was in line with previous studies [1,8]. Anal sex with a condom was also associated with drug use during sex, but this was due to the fact that anal sex in itself was reflected by this measure and having anal sex was associated with drug use during sex. The high drug use prevalence and its association with sexual risk behaviour indicate that swingers are an important target population for prevention strategies. These strategies should address the practice of safer sex in all swingers along with drug use-related harm reduction in drug-using swingers, such as the provision of information on safer drug use and psychosocial support. STI clinics are frequently visited by swingers [2,14]. Our study shows that more drug-using swingers than non-drug-using swingers reported STI testing, indicating self-selection for STI testing in drug-

using swingers. The STI clinic was the most reported STI testing location for drug-using swingers. STI clinics could therefore play an important role in delivering these prevention strategies. However, swingers are often under-recognised in STI clinics. A previous study showed that half of STI clinic-attending swingers whose sexual behaviour is in line with the swinger definition do not identify themselves to be a swinger [15]. Moreover, many STI clinics internationally do not specifically ask about swinging behaviour [15] and drug use during sex. Therefore, a first step would be to openly discuss (a) swinging behaviour in STI clinics and (b) drug use during sex.

When delivering health information on safer sex and drug use, it is important to tailor messages to the beliefs and perceptions of the target population to increase people's motivation and ability to process the message carefully, thereby increasing the chance of persistent changes in behaviour [16]. Our study shows that drugs were mostly used to increase the perceived quality of sex by prolonging sex, increasing arousal and decreasing inhibitions, and this was similar for subgroups. On average, drug-using swingers had more positive than negative beliefs on drug use. The majority thought that drug use during sex was pleasurable, acceptable and exciting. When delivering information about possible sexual and psychosocial health risks of drug use during sex it is important to acknowledge these perceived benefits, such as the increased quality of sex. Prolonging sex and postponing an orgasm might be more important topics to discuss with men, and decreasing pain might be more important for women. Only a minority indicated an intention to quit drug use. These results suggest that the majority of drug-using swingers might not consider their drug use to be problematic. Nevertheless, half of drug-using swingers felt tired the days after using, one in four reported that drug use had a negative effect on their health and one in five felt depressed the days after using drugs during sex. Seven per cent indicated that they might become addicted or felt uncomfortable to have sex without drugs. STI clinics could ask drug-using swingers about these negative experiences and, when needed, refer them to addiction or mental healthcare services.

To our knowledge, this is one of the first studies that assessed drug use during sex among swingers. Another strength of our study is the reach of a large group of swingers by advertising the survey on several swinger websites. Swingers are a hidden population for research and their behaviour is under-studied. Moreover, we assessed a large variety of different aspects of drug use during sex and we compared these aspects between heterosexual male, bisexual male and female swingers. Nevertheless, our study should be viewed in light of some limitations. It should be noted that all answers were self-reported, which gave insight into the beliefs and experiences of swingers, but we could not provide proportions of drug-

using swingers who would meet the clinical diagnosis of depression or addiction. Another general limitation of this study was the lack of information on swingers who did not participate in the survey. Therefore, we cannot ensure that the results can be generalised to the total population of swingers in the Netherlands. As virtual venues, such as the internet, are more often used by drug-using swingers to meet with swing partners than physical venues, such as clubs [4] the drug use prevalence might have been overestimated. However, the prevalence estimates of drug use were comparable with a previous study that recruited swingers at STI clinics in the Netherlands [1]. Another limitation of this study was the cross-sectional design. We were unable to assess causal relationships between drug use and determinants. Beliefs and other psychosocial determinants were not measured among swingers who did not use drugs, which limited our assessment of determinants of drug use to sociodemographic characteristics, sexual risk behaviour and alcohol use.

Conclusion

This study shows that drug use during sex is highly prevalent among swingers and associated with condomless sex. This indicates that STI clinics should not only ask about drug use during sex among MSM, but also among swingers. When providing information about safer sex and drug use during sex, it is important to acknowledge the perceived benefits of drug use during, such as the increased quality of sex. Seven per cent indicated that they might become addicted or felt uncomfortable to have sex without drugs. STI clinics could ask about these negative experiences and, when needed, refer them to addiction or mental healthcare services.

Key messages

- Drug use during sex was highly prevalent among swingers (44%).
- Condomless sex was higher among drug-using swingers than non-drug using swingers.
- When providing health information about safer sex and drug use, it is important to acknowledge swingers' perceived benefits, such as the increased quality of sex.

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Chapter 9

General discussion

The studies presented in this thesis aimed to understand chemsex, drug use during sex, among men who have sex with men (MSM) from a public health and user perspective. This thesis includes both large prevalence studies and in depth studies examining international upcoming trends and hereby covers many aspects related to chemsex and MSM. Following research and healthcare responses on chemsex in the UK, we aimed to increase our understanding of the local reality in the Netherlands and inform tailored healthcare policy and practice. We assessed the prevalence of chemsex in urban and non-urban regions in the Netherlands, its context, associated sexual and mental health risks, psychosocial determinants, healthcare needs of MSM practicing chemsex and the availability of healthcare services for clients practicing chemsex within Dutch STI clinics.

A public health perspective

Surveillance of risk behaviours and associated public health harms is a first step in public health [1]. To reduce possible public health harms, targeted and tailored health promotion is necessary. To inform such health promotion strategies, it is needed to understand the characteristics and beliefs of a target group. Therefore, we assessed the prevalence of chemsex, associated public health harms and characteristics and beliefs of MSM practicing chemsex using behaviour-oriented theories [2].

Prevalence of chemsex

Studies in large cities in the UK and the Netherlands have raised awareness of a possible increasing group of MSM who are using relatively four new drugs, i.e. crystal meth, GHB/GBL, mephedrone, to enhance sexual pleasure and this behaviour was called chemsex [3-7]. Several studies have showed that chemsex was common among MSM in large cities [4,6,7]. In **chapter 2** we showed that chemsex was also highly prevalent outside large cities in the Netherlands. Using a broad definition of chemsex, including a wide variety of drugs (crystal meth, cocaine, designer drugs, GHB/GBL, ketamine, mephedrone, speed and/or XTC/MDMA), chemsex was reported by 35% of MSM visiting Dutch STI clinics. Using the strict UK definition of chemsex (crystal meth, GHB/GBL, mephedrone) used in a study among MSM in Amsterdam [6], we showed that GHB/GBL use was higher in a less urban area outside Amsterdam (26% vs. 16%) and crystal meth (2% vs. 4%) and mephedrone (2% vs. 3%) use were comparable. This was the first study to prove the high prevalence of chemsex among MSM living outside large cities. Our findings correspond to the National Drug Monitor among our general

Dutch adult population indicating that GHB/GBL use is more common in less urban areas [8]. One factor possibly contributing to the common use of GHB/GBL in less urban areas is that this drug is easy to make by users or local producers. Based on these findings, we suggested that STI healthcare providers should ask about chemsex in MSM clients in both urban and non-urban areas.

We showed in **chapter 3** that XTC/MDMDA (27%), GHB/GBL (26%) and ketamine (12%) were most frequently used by Dutch MSM in a sexual context and that these drugs are often combined. A study from the UK that also included a wide variety of drugs showed that the most popular drugs to use in a sexual context among MSM were mephedrone, GHB/GBL and crystal meth [4]. A study from the United States of America (USA) showed regional differences within the USA in the drug types used [9], by showing that for example crystal meth was more popular in western regions than eastern regions. This confirms that the use of specific drugs might vary per country and region and calls for local monitoring of the specific drugs used. Based on local monitoring, healthcare professionals could be educated on the drugs most used for chemsex among their clients. Education on specific drugs is important, as the health risks might vary per drugs used. For example, crystal meth and GHB/GBL are relatively more likely to cause physical addiction than other drugs. With increasing international mobility and the availability of online dating applications, we suggested that MSM would not only have chemsex in their own country but also practice chemsex while travelling. We showed in **chapter 3** that a substantial amount of Dutch MSM also practiced chemsex abroad (28%), mostly in Western countries. Information on local health services, STI risks and risks due to uncertainties of drug compositions abroad might be relevant for this travelling group. Although chemsex behaviours are probably not exclusive to Western high-income settings [10-12], most epidemiological studies on chemsex stem from Western Europe and North America. More research on chemsex is needed outside these Western high-income settings.

Public health harms associated with chemsex

Chemsex has been associated with public health harms, partly due to health risks of drug use in general and partly due to associated sexual risk behaviour. Drug use in general, and especially the widespread use of a cheap depressant as GHB/GBL, entails risks of overdosing, unconsciousness, sleep problems and insomnia, weight loss, memory loss, becoming drug dependent and mental health harms. Drug use in MSM has been associated with poor mental health, such as anxiety and depression [13,14], especially among MSM who considered their drug use to be problematic [15]. Furthermore, drug use can have an impact on decision-making processes whereby an individual may engage in certain risk behaviours that

were not intended prior to the consumption of drugs. In **chapter 5**, we showed that sexual risk behaviour, including having multiple sex partners and group sex, was more common among MSM practicing chemsex than MSM not practicing chemsex. Consistent with previous studies [4,6,16,17], we showed in **chapter 2** that chemsex, and especially polydrug use, was associated with an increased risk for STIs. Of MSM who practiced chemsex 33% was recently diagnosed with an STI compared to 12% in MSM who did not practice chemsex. Remarkably, of MSM who had used three or more different drugs in the past six months, even 44% was recently diagnosed with an STI. Because XTC/MDMA and cocaine, which are not included in the UK chemsex definition (crystal meth, GHB/GBL, mephedrone), were commonly used in a sexual context and associated with an increased risk for STIs, we recommended STI clinics to broaden their definition of chemsex. It would be better not to use a predefined strict definition of chemsex when asking about chemsex in clients, as MSM using other drugs with similar STI risks would be missed when using the UK chemsex definition that only includes the four typical chemsex drugs. Some drug intake methods, such as intravenous injection, are more harmful in terms of injuries and sexual and addiction risks than others, for example oral intake. We showed in **chapter 2** and **6** that MSM practicing slamming, the chemsex term for intravenous injection of drugs, only represented a small subgroup ranging from 6% to 8% among MSM practicing chemsex and none of them reported to have shared needles. Monitoring of this high-risk behaviour remains relevant to adequately respond with for example needle exchange programs in STI clinics when needed.

Perceived STI risk and prevention methods

In general, MSM practicing chemsex reported to be aware of the STI risks related to chemsex. In **chapter 5**, we showed that almost eighty percent reported that they believed to be more at risk of acquiring an STI when using drugs during sex. However, use of general STI prevention methods, such as condom use, was very low among MSM practicing chemsex. We showed in **chapter 2** that more than sixty percent of MSM practicing chemsex reported condomless anal sex. These findings were in line with a study showing higher sexual risk behaviour but also higher STI risk perception among MSM practicing chemsex [18]. An alternative method to prevent HIV, pre-exposure prophylaxis (PrEP), was introduced and made available for high-risk MSM at Dutch STI clinics in 2019. PrEP was used by 30% of Dutch MSM practicing chemsex. As it was only recently available during the study period in this thesis, we expect that this percentage will increase in the upcoming years. Providing information on the availability of PrEP for the high-risk group of MSM practicing chemsex is highly relevant. Although there are some concerns about PrEP compliance while being under the influence of drugs, a study from France and Canada showed correct use of PrEP among MSM practicing chemsex

and concluded that PrEP would be a suitable tool to prevent HIV infections among MSM practicing chemsex [18]. As condom use seems to be a non-popular STI prevention method [19] and HIV can recently be prevented in an alternative way, we suggested other prevention methods for bacterial STIs might have increased in popularity among MSM. A survey showed high interest in trying doxycycline prophylaxis for prevention of STIs, including gonorrhea and syphilis, among MSM in the USA [20]. Although trials have suggested that antibiotic use to prevent STIs could be effective as a short-term strategy for high-risk MSM with a high incidence of STIs [21,22], the potential in terms of antimicrobial resistance should be further assessed [23]. We showed in **chapter 4** that antibiotic use to prevent bacterial STIs was low (2%) among MSM visiting Dutch STI clinics. Monitoring of this STI prevention method remains important for optimal client management. Based on our findings, we could conclude that MSM practicing chemsex are not naïve to the STI risks of chemsex, but possibly need support in managing them. STI clinics could provide information and advice for correct PrEP use while under the influence of drugs and the importance of regular STI testing. Furthermore, STI clinics should make endeavour to reach MSM practicing chemsex who are not regularly seen at STI clinics. Dutch STI nurses already visit outreach locations, such as gay saunas, for STI testing, but it is still likely that not all MSM practicing chemsex are currently seen at STI clinics. A study in Amsterdam has shown that chemsex was equally prevalent in MSM visiting the STI clinic and MSM using online dating applications [6]. A recent study from the UK showed that 34% of app-recruited MSM practicing chemsex did not attend an STI clinic in the past year [24]. Reaching this hidden group for regular STI testing and treatment is important to reduce STI transmission in the high-risk group of MSM practicing chemsex.

Beliefs and characteristics of MSM practicing chemsex

The public health risks associated with chemsex call for holistic health promotion strategies to prevent and cure STIs and addiction and mental health harms in MSM practicing chemsex. From a public health perspective, an understanding of the characteristics and beliefs of a target group is vital for tailoring and hereby increasing acceptability of such health promotion strategies [2]. A systematic review found that chemsex participation peaks between the age mid-thirties and early forties, but is evident at all ages [25]. Furthermore, two studies have found no differences in educational level and region of birth between MSM practicing chemsex and MSM not practicing chemsex [16,26]. In **chapter 3** we confirmed that MSM practicing chemsex are a heterogenous group concerning sociodemographic characteristics, suggesting that health services should ask about chemsex in MSM of all age groups, ethnicities and educational levels. Regarding psychosocial beliefs, the majority of MSM practicing chemsex indicated that they had sufficient skills and self-efficacy to refuse drugs when they

not want to use them. Nevertheless, the social environment seems to play an important role in chemsex. A qualitative study in which MSM practicing chemsex described chemsex to be ubiquitous among the MSM population [27]. We showed in **chapter 5** that MSM practicing chemsex perceived greater acceptance and performance of chemsex among their sex partners and friends (social norm) than MSM not practicing chemsex. This suggests that MSM practicing chemsex are likely to find themselves in distinct social networks where it is the norm to use drugs when having sex. The most common place to have chemsex was the home setting and online dating applications were the most used platform to find sex partners. The use of certain symbols indicating drug use in personal advertisements in online dating applications [12] probably stimulates selection of sex partners who also use drugs and increases perceptions of ubiquity of chemsex. We further showed in **chapter 5** that MSM practicing chemsex generally believed that sex with drugs is more fun (attitude). We recommend healthcare services to acknowledge the social influence and pleasurable experiences to increase acceptability of health promotion strategies. Moreover, social networks and online dating applications might offer a window of opportunity to reach MSM who are not regular STI clinic visitors for chemsex related health promotion strategies.

A user perspective

We outlined that chemsex entails public health risks and showed the importance of health promotion and care strategies in this group. We also looked at chemsex from the perspective of the individual, or a user perspective. We were interested in both positive and negative experiences of MSM practicing chemsex and their self-perceived healthcare needs.

Experiences of MSM practicing chemsex

We showed in **chapter 6** that chemsex is a way to enhance sexual pleasure by increasing arousal, prolonging sex and decreasing inhibitions. This was consistent with previous qualitative studies, indicating that chemsex was a strategic choice for enhancing the qualities valued in sex for MSM [3,28,29]. Our thesis provides one of the first studies that estimated how many MSM perceive chemsex to be problematic and how many MSM practicing chemsex indicated a need for help. Although more than half of MSM practicing chemsex experienced acute negative effects of drug use, such as headache and fatigue, a serious negative impact on one's daily life was reported by one in ten MSM practicing chemsex. Men experiencing a negative impact reported serious health harms, such as dependency on drugs, loneliness and HIV

infection. However, a majority of MSM practicing chemsex reported no experienced impact or a positive impact of chemsex on their daily life. This confirms a study from Ireland showing that three-quarters of MSM practicing chemsex enjoyed it and were in control of their sex life [30]. Men experiencing a positive impact reported changes such as enrichment of sex life and a relaxed and free feeling.

Healthcare needs of MSM practicing chemsex

In **chapter 6** we described that one in four MSM might want to be counselled on chemsex-related issues by healthcare professionals on increasing self-control, safer drug use and reducing the risk of acquiring an STI. Action and coping planning [2] might be useful a strategy for increasing self-control and planning for safer drug use and sex. STI healthcare providers would be the preferred healthcare professionals and this confirms previous findings [3,30-32]. The different experienced impact of chemsex calls for a different healthcare approach for different groups of MSM practicing chemsex. On the one hand, harm reduction might be important for the vast majority of MSM who experience no or a positive impact of chemsex. This harm reduction could consist of regular STI prevention and care complemented with information on safer drug use and increasing self-control. On the other hand, addiction and mental healthcare in addition to regular STI prevention and care might be needed in a minority of MSM practicing chemsex who experience a negative impact on daily life. As STI clinics are a frequently visited and trusted healthcare setting for MSM, STI healthcare providers could play an important role in making the differentiation between MSM experiencing a positive or no impact and MSM who experience a negative impact, provide harm reduction strategies, and refer some MSM practicing chemsex to addiction and mental healthcare when needed. The multidisciplinary healthcare needs indicate the relevance of strengthening connection and knowledge sharing between STI clinics and addiction and mental healthcare professionals to provide holistic health care for MSM practicing chemsex. We showed in **chapter 6** that some signals might help healthcare professionals in making the differentiation in healthcare needs: frequent chemsex, no recent sober sex, experience of disadvantages and/or a negative change in daily life and intention to change chemsex behaviours. STI healthcare providers should keep asking about these indicators in MSM practicing chemsex who visit the STI clinic every six months, as men might spiral from positive into negative experiences in time. The indicators found in our thesis probably only reflect the signals of problematic chemsex on the surface. As suggested by one study [33], syndemics of HIV, poor mental health and drug use could lead to feelings of loneliness, emptiness, depression and emotional and sexual inhibition, and this might be underlying factors that help explaining why for some men chemsex becomes problematic and for others it does not have a serious negative impact. Also, a qua-

litative study described chemsex as a way to treat, escape or alleviate symptoms of isolation, shame or homophobia [3]. More research is needed into these factors as this could help to develop psychosocial treatment options for MSM experiencing problematic chemsex.

A healthcare provider perspective

We discussed that the different experiences of MSM practicing chemsex call for differentiated healthcare responses. Whereas STI prevention and care, information on safer drug use and increasing self-control are important health promotion strategies for the majority of MSM practicing chemsex, additional addiction or mental health care might be needed in a minority of MSM practicing chemsex. As these strategies are multidisciplinary, we were interested in the availability and feasibility of chemsex services within Dutch STI clinics from a healthcare providers perspective and possibilities to optimize these services.

The availability and feasibility of chemsex support services within Dutch STI clinics

As STI clinics are frequently visited and trusted healthcare facilities by MSM, STI healthcare providers could play an important role in addressing chemsex. In London, some specific chemsex support services have been arranged at STI clinics. In **chapter 7** we showed that the majority of Dutch STI nurses, namely 71%, already addressed chemsex in MSM consultations on a regular basis at STI clinics. We previously indicated that chemsex should be addressed in urban and non-urban areas. In **chapter 7** we showed that chemsex was already addressed at all STI clinics, both in urban and less urban areas. A study among healthcare workers at STI clinics in the UK also showed that chemsex was equally addressed in urban and non-urban areas [34]. STI nurses in our study indicated that their role could be identifying chemsex, discussing health risks, providing harm reduction information, signalling problematic chemsex and referring MSM clients to other healthcare organisations when needed. The majority of STI nurses in our study considered addressing chemsex to be an important part of their job and generally had sufficient knowledge about chemsex, drugs used, intake methods, motives and experienced positive and negative effects. The majority of STI nurses has already received a training on chemsex. Nevertheless, there was a high need for training on chemsex, especially on identifying problematic chemsex, and this was in line with findings in the UK [34]. A short screening tool for problematic chemsex, including the found indicators such as frequent chemsex, together with a training on how to use this tool might be helpful. STI nurses also indicated a need for training in the health risks of chemsex and strategies to prevent these health risks. From these findings, we conclude that chemsex consultations in MSM

are already widespread in Dutch STI clinics and STI nurses are aware of different aspects of chemsex but also still need training in some aspects to optimize chemsex support. Therefore, we created an information brochure for STI nurses working at Dutch Public Health Service STI clinics including a short screening tool with the found indicators for problematic chemsex, information on health risks and harm reduction strategies (Appendix). This information brochure was based on the results of our thesis and input from STI healthcare providers and experts in the field of drug use and addiction. The information brochure will be implemented in all Dutch STI clinics.

Possibilities to improve chemsex support services within STI clinics

Although awareness and action on chemsex seems to be high in Dutch STI nurses, a study among healthcare workers at STI clinics in the UK expressed concern about the lack of a consistent approach for chemsex in STI clinics [34]. In **chapter 7** we also showed that only 15% of Dutch STI clinics had a protocol on chemsex and 15% had a referral pathway to addiction healthcare. Routine screening, i.e. question on chemsex in medical history form, was available in 55% of Dutch STI clinics. Only one STI clinic had a specialised chemsex support service, which was a walk-in consultation hour with peers and experts in the field of chemsex. Implementing routine chemsex screening in all Dutch STI clinics could help to identify MSM practicing chemsex and provide information on increasing self-control and safer sex and drug use and hereby reduce health risks. A screening tool for problematic chemsex could help STI nurses to differentiate MSM who need additional help and referral pathways will ensure that MSM with a need for additional help receive appropriate healthcare. Although a screening tool, protocol and referral pathways might optimize consistency in chemsex services at STI clinics, a client-based approach will still be needed to provide tailored information and support. Motivational interviewing is one effective way to ensure a client-based approach [35]. In **chapter 7** we showed that all Dutch STI nurses used motivational interviewing during their consultations. For example, during motivational interviewing personal motives and risks could be discussed and clients will be motivated to think about personal strategies in reducing these risks that are applicable to their setting. Implementation and evaluation research on screening tools, protocols, referral pathways and specialised chemsex services is needed to identify best practices in delivering chemsex care in STI clinics.

Chemsex support services within other healthcare organisations

Other healthcare settings could also play an important role in delivering chemsex related health promotion and care. Some studies have shown that MSM not always feel comfortable

to disclose their sexuality and sexual activities at mainstream healthcare services [3,36]. MSM generally fear misunderstanding, discrimination and stigmatization in mainstream settings [36]. This indicates the importance of tailored and non-judgmental chemsex support services. One other healthcare setting where problematic chemsex could be identified and clients could be referred to addiction and mental healthcare organisations might be general practitioners. It is unknown whether sufficient awareness and knowledge on chemsex is present at general practitioners. Furthermore, before referral pathways to addiction and mental healthcare could be organised, research on chemsex awareness and available support services in addiction and mental healthcare settings is needed. Although some Dutch drug use related healthcare services have developed tailored harm reduction information and peer-support groups for MSM practicing chemsex [37,38], it is unknown whether knowledge on chemsex is sufficient in addiction and mental healthcare settings to provide tailored treatment programmes for chemsex related addiction, depression or anxiety. Furthermore, research on knowledge on chemsex among the police is needed to identify whether the police could adequately respond to sexual offending within the chemsex scene. As unwanted sexual experiences are common among MSM practicing chemsex [39-41], MSM should be able and feel comfortable to declare sexual offending at the police. If knowledge on chemsex is insufficient in these mainstream organisations, it is important to educate healthcare workers on chemsex among MSM in these organisations so that MSM would feel more comfortable to disclose their sexuality and details about their chemsex activities.

Chemsex in other population groups

Although the term chemsex could increase awareness in healthcare settings, it is predominantly used for MSM and this might enhance stigma in a sexual minority group that has historically often been stigmatized. The automatic link between chemsex and MSM might make people think that all MSM practice chemsex, whereas more than half of MSM visiting the STI clinic did not have chemsex. Moreover, drug use during sex is probably not only a common behaviour among MSM, but also in other population groups. In **chapter 8** we showed that drug use during sex was reported by 44% of swingers. Swingers are heterosexual couples who have sex with others. Swingers self-identify as heterosexual, but also often engage in same-sex sexual behaviour [42,43]. Drug use during sex was higher among female swingers compared to heterosexual male swingers. The most reported drugs were XTC/MDMA, GHB/GBL and laughing gas. Similar to the motives of MSM, swingers reported to use drugs during sex to increase sexual pleasure by prolonging sex and increasing arousal. Drug use during

sex was associated with condomless sex with swing partners. This indicates that STI clinics should not only ask about chemsex among MSM but also among swingers. A fear of becoming addicted or feeling uncomfortable having sex without drugs was reported by 7%. STI clinics could also play an important role in signalling problematic drug use in swingers and refer them to addiction and mental healthcare organisations when needed. As drug use in general is higher among youngsters [8], it is possible that drugs are also commonly used in a sexual context in this group. Indeed, a study among young people in nine European countries showed that a substantial amount of young people used alcohol and/or drugs for sexual purposes and this was associated with increased sexual risk behaviour [44]. In teenage women, drug use has been associated to increased risks of pregnancies [44]. It is thus likely that for example heterosexual young women practicing chemsex have other healthcare needs than MSM or swingers. Therefore, more research is needed on the prevalence of chemsex, its context, health risks and healthcare needs among youngsters.

Conclusion

Chemsex is a widespread behaviour among MSM in both urban and non-urban areas in the Netherlands. Men practicing chemsex use drugs to increase sexual pleasure and often find themselves in social networks where the majority of their friends and sex partners also practice chemsex. Chemsex mostly takes place in the home setting, arranged by online dating applications. Chemsex has been related to public health harms, including an increased risk for sexually transmitted infections and mental health issues. Prevention of these public health harms is considered important from a public health perspective, a user perspective and a healthcare provider perspective. As a majority of MSM practicing chemsex does not experience a negative impact on their daily life, health promotion strategies focused on regular STI prevention and care, information on safer drug use and increasing self-control might be sufficient for this group. One in ten MSM practicing chemsex reported a negative impact of chemsex on their daily life. For this group, additional mental or addiction health care might be needed. We identified a set of indicators for a need for professional counselling, including frequent chemsex, no recent sober sex, experiencing a negative impact and having an intention to change chemsex behaviours, which will help healthcare providers in making the differentiation in experiences and healthcare needs. Making this differentiation in healthcare settings ensures tailoring to the different experiences and healthcare needs of MSM practicing chemsex. Healthcare providers, in this case STI nurses, recognized the importance of addressing chemsex at the STI clinic and identifying problematic chemsex. As STI clinics are

a frequently visited and trusted healthcare facility by MSM, they might play an important role in providing these health promotion strategies and making this differentiation. Although chemsex is already frequently addressed in STI clinics and awareness and knowledge on chemsex in STI nurses seems high, a need for training in identifying problematic chemsex, health risks and health promotion strategies was reported by a majority of STI nurses. To educate STI nurses about the health risks and health promotion strategies, collaboration between healthcare organisations in the field of sexual health and drug use and addiction is necessary. Based on the results of this thesis, we created an information brochure (Appendix) and this was a co-creation of public researchers, STI nurses and doctors and experts in the field of drug use and addiction. A further step in chemsex related research would be implementation and evaluation research of this information brochure. Another knowledge gap includes strategies to reach MSM practicing chemsex who do not regularly visit the STI clinic. It is highly important to reach this possible hidden group to reduce STI transmission and offer chemsex support to those in need. Furthermore, more research on available chemsex support services is needed in other healthcare settings, such as addiction and mental healthcare organisations, to develop standard referral pathways. Finally, this thesis mainly focuses on MSM in a developed Western country, but we would recommend to study this behaviour also in other population groups and other settings.

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Appendices

Summary

Nederlandse samenvatting

Valorisation of the thesis

Dankwoord

Portfolio

List of publications

Information brochure

Summary

The studies described in this thesis assessed chemsex, drug use during sex, from a public health and a user perspective, by assessing the prevalence in the Netherlands, the context, sexual health risks, psychosocial determinants, healthcare needs of the target group and the availability of healthcare services on chemsex in Dutch STI clinics.

Evidence on the prevalence of chemsex and associated health risks was increasing in large cities in the UK and the Netherlands, such as London and Amsterdam. However, no data was available on chemsex outside these large cities. In **chapter 2** we assessed the prevalence of chemsex among MSM living outside large cities in the Netherlands and the association between chemsex and STIs. We used a combination of online questionnaire data and STI client registry data of MSM who visited Public Health Service STI clinics in Limburg, a region consisting of urban (≥ 1500 addresses/m²) and non-urban areas (< 1500 addresses/m²). Chemsex, using cocaine, crystal meth, designer drugs, GHB/GBL, ketamine, mephedrone, speed, XTC/MDMA during sex, was reported by 35% (95%CI: 29-41). XTC/MDMA, GHB/GBL and ketamine were the most popular drugs. The proportion chemsex was comparable between MSM living in urban areas and MSM living in non-urban areas. Polydrug use – using different drugs – was common with 93% of MSM practicing chemsex using at least two drugs. STI positivity was higher among MSM practicing chemsex (33%) than MSM not practicing chemsex (12%). Especially the use of three or more different drugs during sex in the past six months was strongly associated with an increased risk for STI. Based on the current findings, we recommend STI clinics in both urban and non-urban areas to be aware of and be informed on chemsex and polydrug use.

International mobility is increasing worldwide and sex abroad is more easily facilitated by online dating applications. In general, people might be more inclined to engage in risk behaviour abroad away from everyday social life's constraints. In **chapter 3** we assessed whether having sex abroad was associated with chemsex, sexual risk behaviour and STIs. We used online questionnaire data of MSM who visited one of the nine participating STI clinics in different regions in the Netherlands in chapter 3 and in the following chapters 4 to 6. We showed that almost half of MSM visiting Dutch STI clinics had sex abroad in the past six months, mainly in Western countries. MSM rarely reported to have sex abroad in non-Western countries. Chemsex abroad was reported by one third of MSM who had sex abroad. Using drugs abroad can be associated with additional health risks due to uncertainties regarding composition of drugs and the lack of knowledge in travelling MSM on available local health services. Having sex abroad was associated with sexual risk behaviour, i.e. multiple sex partners and casual sex partners, and PrEP use. These results suggest that prevention and care related to STIs and drug use related accidents is important in travelling MSM.

Recently, STI clinics provide PrEP to high-risk MSM for HIV prevention. Alternatives for condom use to prevent other STIs than HIV might be increasing in popularity. A clinical trial showed efficacy of postexposure prophylaxis doxycycline in preventing chlamydia and syphilis. A survey showed high interest in trying antibiotic prophylaxis for prevention of STIs among MSM. However, the use of antibiotic prophylaxis is not recommended in UK guidelines because of risk for selection and dissemination of antibiotic resistant strains. In **chapter 4** we assessed informal use of antibiotic prophylaxis among MSM. We showed that antibiotic prophylaxis use was reported by only 2% (95%CI: 1-4) among MSM visiting Dutch STI clinics. Monitoring of this informal use is important for optimal patient management.

MSM practicing chemsex comprise an important risk group for STIs, drug use related accidents and possible mental health harms. An understanding of the characteristics and beliefs associated with chemsex is needed to identify MSM practicing chemsex in healthcare and tailor health promotion strategies to their beliefs. In **chapter 5** we described the characteristics of MSM practicing chemsex in terms of sociodemographic characteristics, sexual behaviour and psychosocial beliefs. We showed that MSM practicing chemsex are a heterogeneous group concerning sociodemographic characteristics, suggesting that health services should ask about chemsex in MSM of all age groups, ethnicities and educational levels. STI risk behaviour, such as having multiple sex partners and group sex, and smoking tobacco were independently associated with chemsex, indicating a need for health promotion. MSM practicing chemsex are likely to find themselves in distinct social networks where it is the norm to use drugs when having sex. MSM practicing chemsex generally believed that sex with drugs is more fun. We recommend health services to acknowledge the social influence and pleasurable experiences to increase acceptability of health promotion strategies aimed at minimizing the possible health harms of chemsex.

From a public health perspective, MSM practicing chemsex are considered to be a risk group for STIs, drug use related accidents and mental health harms. However, little was known about the healthcare needs from a user perspective. In **chapter 6** we described the sexual, addiction and mental healthcare needs of MSM practicing chemsex. We showed that a majority of MSM practicing chemsex used drugs to increase the qualities valued in sex and did not experience a negative impact of chemsex on their daily life. Nevertheless, one in four might want to be counselled by a professional on increasing self-control, safer use of drugs and reducing the risk of acquiring an STI. The preferred professionals were sexual health experts. We identified a set of indicative characteristics of MSM with a need for professional counselling, including frequent chemsex, prolonged time since sober sex, experiencing disadvantages, experiencing a negative impact on daily life and intending to change chemsex behavi-

our. These topics might be helpful for healthcare providers to discuss with MSM to identify their needs for professional counselling.

As STI clinics are frequently visited by MSM and the preferred place to discuss chemsex, STI clinics could play an important role in addressing chemsex. **Chapter 7** provides information on the availability and feasibility of healthcare services for MSM practicing chemsex within Dutch STI clinics. We used online questionnaire data of STI nurses working at one of the twenty participating Dutch STI clinics. Overall, 71% of STI nurses addressed chemsex with MSM clients on a regular basis. The majority indicated to have sufficient knowledge and was positive about addressing chemsex in MSM consultations. Nevertheless, a majority of STI nurses reported a need for training, especially in identifying problematic chemsex. We concluded that STI clinics are well placed to identify chemsex, provide information on health risks and strategies to reduce these risks, identify problematic chemsex and refer clients to addiction and mental healthcare organisations beyond regular STI prevention and care. It is important that STI nurses are provided with information and training in identifying problematic chemsex.

In **Chapter 8** we assessed the prevalence of drug use during sex in another group than MSM, namely swingers, and their positive and negative experiences with drug use during sex. Swingers are heterosexual couples who have sex with others. We used data of an online survey that was advertised at national swinger websites. Drug use during sex was reported by 44% (95% CI: 41-47) and the most reported drugs were poppers, XTC/MDMA and GHB/GBL. Drug use during sex was associated with condomless sex with swing partners. This indicates that STI clinics should not only ask about drug use during sex among MSM but also among swingers. Similar to MSM, swingers reported to use drugs during sex to increase sexual pleasure by prolonging sex and increasing arousal. When providing information on safer sex and drug use during sex, it is important to acknowledge these perceived benefits. A fear of becoming addicted or feeling uncomfortable having sex without drugs was reported by 7%. STI clinics could also play an important role in signalling problematic drug use in swingers and refer them to addiction and mental healthcare organisations when needed.

Nederlandse samenvatting

Dit proefschrift beschrijft chemseks, drugsgebruik tijdens de seks, onder mannen die seks hebben met mannen (MSM) vanuit een volksgezondheids- en gebruikersperspectief. We onderzochten het voorkomen van chemseks in Nederland, de context, seksuele gezondheidsrisico's, psychosociale determinanten, zorgbehoeften van de doelgroep en de beschikbaarheid van gezondheidszorg gericht op chemseks in Nederlandse SOA poli's.

Onderzoek naar chemseks en bijbehorende gezondheidsrisico's neemt toe in grote steden in Engeland en Nederland, zoals Londen en Amsterdam. Er waren echter geen gegevens beschikbaar over chemseks buiten deze grote steden. In **hoofdstuk 2** hebben we het voorkomen van chemseks onder MSM buiten de grote steden onderzocht. Verder onderzochten we de relatie tussen chemseks en het risico op seksueel overdraagbare aandoeningen (SOA). Hiervoor maakten we gebruik van een combinatie van online vragenlijstgegevens en geregistreerde SOA-poli cliëntgegevens van MSM die de SOA-poli in Limburg bezochten. Limburg is een regio bestaande uit stedelijke (≥ 1500 woonadressen/m²) en niet-stedelijke gebieden (< 1500 woonadressen/m²). We definieerden chemseks als het gebruik van cocaïne, crystal meth, designer drugs, GHB, ketamine, mephedrone, speed, XTC tijdens de seks. Chemseks werd gerapporteerd door 35% (95% CI: 29-41). XTC en GHB waren de meest populaire drugs. Het voorkomen van chemseks was vergelijkbaar in stedelijke gebieden en niet-stedelijke gebieden. Polydrugsgebruik - gebruik van verschillende drugs - kwam vaak voor, 93% gaf aan twee of meer verschillende drugs te hebben gebruikt. Het SOA-vindpercentage was hoger onder MSM die chemseks hadden (33%) dan MSM die geen chemseks hadden (12%). Vooral het gebruik van drie of meer verschillende drugs was sterk gerelateerd aan een verhoogd risico op SOA. Het is dus belangrijk dat SOA-poli's in zowel stedelijke als niet-stedelijke gebieden geïnformeerd zijn over chemseks en polydrugsgebruik.

Internationale mobiliteit neemt wereldwijd toe en seks in het buitenland is makkelijker geworden door de opkomst van online datingapplicaties. In het algemeen zijn mensen meer geneigd om risicogedrag te vertonen in het buitenland. In **hoofdstuk 3** hebben we onderzocht of seks in het buitenland geassocieerd was met chemseks, seksueel risicogedrag en SOA. We hebben in dit hoofdstuk en in de volgende hoofdstukken online vragenlijstgegevens gebruikt van MSM die een van de negen deelnemende SOA-poli's in Nederland hebben bezocht. We laten zien dat bijna de helft van de MSM seks in het buitenland heeft gehad in het afgelopen half jaar, voornamelijk in Westerse landen. Seks in niet-Westerse landen kwam nauwelijks voor. Chemseks in het buitenland werd gerapporteerd door een derde van MSM die seks in het buitenland had. Het gebruik van drugs in het buitenland kan gepaard gaan met extra gezondheidsrisico's als gevolg van onzekerheden over de samenstelling van drugs en het gebrek aan kennis over beschikbare lokale gezondheidsorganisaties. Seks in het

buitenland was geassocieerd met seksueel risicogedrag, namelijk meerdere sekspartners en losse sekspartners, en PrEP-gebruik. Deze bevindingen suggereren dat preventie en zorg met betrekking tot SOA en drugsgebruik gerelateerde risico's belangrijk zijn voor reizende MSM die chemseks hebben.

Onlangs is PrEP beschikbaar gesteld op Nederlandse SOA-poli's voor hoog-risico MSM ter preventie van HIV. Alternatieven voor condoomgebruik om andere SOA dan HIV te voorkomen nemen mogelijk ook toe in populariteit. De werkzaamheid van antibiotica-profylaxe tegen chlamydia en syfilis infecties werd bevestigd in een klinische studie. Een andere studie toonde grote belangstelling voor antibiotica-profylaxe aan onder MSM. Gebruik van antibiotica-profylaxe wordt niet aanbevolen in Engelse richtlijnen vanwege het risico op selectie en verspreiding van antibioticaresistente stammen. In **hoofdstuk 4** hebben we informeel gebruik van antibiotica-profylaxe onderzocht. We laten zien dat het gebruik van antibiotica-profylaxe beperkt is tot 2% (95%CI: 1-4) onder MSM die de Nederlandse SOA-poli's bezochten. Monitoring van dit informele gebruik blijkt belangrijk voor optimale SOA-zorg.

MSM die chemseks hebben vormen een belangrijke risicogroep voor SOA, drugsgerelateerde ongevallen en mogelijke mentale gezondheidsproblemen. Inzicht in de kenmerken en overtuigingen van MSM die chemseks hebben is belangrijk om de doelgroep te identificeren in gezondheidszorg en gezondheid bevorderende strategieën op maat te maken. In **hoofdstuk 5** beschreven we de sociaal-demografische kenmerken, seksueel gedrag en psychosociale overtuigingen van MSM die chemseks hebben. We laten zien dat MSM die chemseks hebben een heterogene groep zijn wat betreft sociaal-demografische kenmerken. Dit suggereert dat gezondheidsorganisaties moeten vragen naar chemseks onder MSM van alle leeftijdsgroepen, etnische groepen en van alle opleidingsniveaus. Seksueel risicogedrag, zoals het hebben van meerdere sekspartners en groepsseks, en het roken van tabak waren geassocieerd met chemseks, duidend op het belang van gezondheidsbevordering in deze groep. MSM die chemseks hebben bevinden zich waarschijnlijk in sociale netwerken waar het de norm is om drugs te gebruiken tijdens de seks. MSM die chemseks hebben geloofden dat seks met drugs leuker is. We bevelen gezondheidsorganisaties aan om rekening te houden met de sociale invloed en plezierige ervaringen om ervoor te zorgen dat gezondheid bevorderende strategieën beter geaccepteerd worden door de doelgroep.

Vanuit het perspectief van volksgezondheid zijn MSM die chemseks hebben een belangrijke risicogroep voor seksuele en mentale gezondheidsproblemen. Er was weinig bekend over de zorgbehoeften vanuit een gebruikersperspectief. In **hoofdstuk 6** beschreven we de seksuele, verslavings- en mentale gezondheidszorgbehoeften van MSM die chemseks hebben.

De meerderheid had chemseks om seksueel plezier te verhogen en gaf aan geen negatieve invloed van chemseks te ervaren op het dagelijks leven. Desondanks gaf één vierde aan mogelijk met een professional te willen praten over het krijgen van meer zelfcontrole, veiliger drugsgebruik en het verminderen van het risico op SOA. MSM gaven de voorkeur om hierover te praten met seksuele gezondheidsprofessionals. We beschreven een aantal indicatieve kenmerken van MSM met een zorgbehoefte, waaronder frequente chemseks, langere tijd geen seks zonder drugs, ervaren nadelen, ervaren negatieve invloed op het dagelijks leven en de intentie om chemseks gedrag te veranderen. Deze kenmerken kunnen voor gezondheidsprofessionals nuttig zijn bij het identificeren van zorgbehoeften onder MSM die chemseks hebben.

SOA poli's kunnen een belangrijke rol spelen bij het bespreekbaar maken van chemseks, omdat zij vaak bezocht worden door MSM en MSM de voorkeur geven aan het bespreken van chemseks op de SOA poli. **Hoofdstuk 7** geeft informatie over de beschikbaarheid en haalbaarheid van zorg gericht op chemseks binnen Nederlandse SOA poli's. We hebben in dit hoofdstuk online vragenlijstgegevens gebruikt van verpleegkundigen werkzaam in een van de twintig deelnemende Nederlandse SOA-poli's. Over het algemeen gaf 71% van de verpleegkundigen aan chemseks regelmatig met MSM te bespreken tijdens het consult. De meerderheid gaf aan voldoende kennis te hebben en positief te zijn over het bespreken van chemseks in het consult. Toch gaf ook een meerderheid aan behoefte te hebben aan een training op het gebied van chemseks, voornamelijk over het herkennen van problematisch chemseks. Op basis van deze bevindingen concluderen we dat SOA-poli's een goede plek zijn om naast de reguliere SOA preventie en zorg in het consult naar chemseks te vragen, informatie te verstrekken aan MSM over gezondheidsrisico's en strategieën om deze risico's te beperken, problematische chemseks te signaleren en MSM eventueel door te verwijzen naar verslavings- of mentale gezondheidsorganisaties. Het is echter belangrijk dat SOA verpleegkundigen informatie en training krijgen over het herkennen van problematische chemseks.

In **hoofdstuk 8** hebben we het voorkomen van drugsgebruik tijdens de seks in een andere groep dan MSM onderzocht, namelijk onder swingers. Swingers zijn heteroseksuele koppels die seks hebben met anderen. Ook hebben we de positieve en negatieve ervaringen van swingers met drugsgebruik onderzocht. We gebruikten hiervoor online vragenlijstgegevens die werden geadverteerd op nationale swinger-websites. Drugsgebruik tijdens de seks werd gerapporteerd door 44% (95%CI 41-47) en de meest gebruikte drugs waren poppers, XTC en GHB. Drugsgebruik tijdens de seks was geassocieerd met seks zonder condoom met swing partners. Dit geeft aan dat SOA poli's niet alleen moeten vragen naar drugsgebruik bij MSM, maar ook bij swingers. Net als MSM, geven swingers aan dat zij drugs tijdens seks gebruiken om seksueel plezier te verhogen. Zij geven aan drugs te gebruiken om seks te verlengen en

opwinding te verhogen. Bij het verstrekken van informatie over veiligere seks en drugsgebruik, is het belangrijk om met deze ervaren voordelen rekening te houden. Een angst om verslaafd te raken of zich ongemakkelijk te voelen om seks zonder drugs te hebben werd gerapporteerd door 7%. SOA poli's zouden ook een belangrijke rol kunnen spelen bij het signaleren van problematisch drugsgebruik bij swingers en deze indien nodig doorverwijzen naar verslavings- of mentale gezondheidsorganisaties.

Valorisation of the thesis

Social relevance

The World Health Organisation (WHO) states that efforts should be made in reducing the harms to individuals, communities and society related to drugs, including HIV infection. In our thesis, we showed that drug use during sex, chemsex, is widespread among the MSM community in both urban and non-urban areas in the Netherlands. Chemsex has been related to mental and sexual health issues for individuals practicing chemsex and STI and HIV transmission in MSM communities practicing chemsex. Although this was not the focus of this thesis, chemsex has also been related to negative societal consequences, such as loss of social networks, reduced ability of daily functioning and a negative impact on employment. Our thesis indicates that chemsex does not have to be problematic for all MSM, but prevention of harms and possible treatment of STIs and mental health issues is highly important in this group. This thesis informs targeting and tailoring health promotion and care strategies for MSM practicing chemsex.

Target groups, tailored strategies and healthcare responses resulting from this thesis

Our thesis suggests that different target groups could be identified within MSM practicing chemsex, based on their different experiences and healthcare needs. One target group includes a majority of MSM practicing chemsex who do not experience a serious negative impact of chemsex on their daily life. For this group, regular STI prevention and care, information on safer drug use and increasing self-control might be sufficient to prevent the health harms of chemsex. Both the target group, MSM practicing chemsex, and healthcare providers, STI nurses, recognized the importance of these health promotion strategies. Monitoring of this target group is important to prevent that they might still spiral into more serious negative consequences of chemsex, such as addiction and depression. A second target group concerns approximately one in ten MSM practicing chemsex who experience a negative impact of chemsex on their daily life. It is important to identify this group in healthcare settings, as they might need additional mental or addiction healthcare. Our thesis provided indicators for healthcare providers to make this differentiation, including frequent chemsex, no recent sober sex, experiencing disadvantages or a negative impact of chemsex on daily life and having an intention to change chemsex behaviours. STI clinics are proven to be a suitable healthcare setting to provide these health promotion strategies and identify problematic chemsex. However, to provide health promotion strategies related to both safer sex and safer drug use and referral of MSM experiencing problematic chemsex to addiction or mental healthcare, collaboration between different healthcare settings is required. One

multidisciplinary healthcare response resulting from this thesis was an information brochure (Appendix) based on the healthcare needs of MSM practicing chemsex and training needs of STI nurses. The information brochure included health risks of chemsex, health promotion strategies related to safer sex and safer drug use and a short screening tool for problematic chemsex. This information brochure was a cocreation of public health researchers, STI nurses and doctors and experts in the field of drug use. This information brochure will be distributed online and on paper to STI nurses in all Dutch STI clinics.

Tailoring health promotion and care strategies to increase acceptability is especially important in MSM practicing chemsex as some MSM fear judgement and stigma in mainstream healthcare organisations. Our thesis assessed the local reality of the chemsex scene and hereby informs tailored health promotion strategies. We showed the most popular drugs to use during sex and the settings in which chemsex mostly takes place, which ensures that information in health promotion strategies is relevant for the target group. We suggested that it is important that healthcare providers recognize the experienced sexual pleasure and social influences when providing information on the health risks and strategies for safer sex and drug use. We showed that knowledge on these different aspects of chemsex was already high in STI nurses in Dutch STI clinics and a majority of STI nurses discussed chemsex on regular basis in MSM consultations. As STI nurses still reported a need for training in certain topics, we developed and distributed an information brochure which was adapted to the reported healthcare workers' training needs. For example, a high need for training in identifying problematic chemsex was reported and the information brochure included a short screening tool for problematic chemsex. Education of healthcare providers, such as STI nurses, will optimize tailored chemsex support services for the target group, MSM practicing chemsex. Information on the local reality of chemsex is also highly relevant in other healthcare settings, such as addiction and mental healthcare organisations. A next step needed to provide adequate chemsex support would be follow up of healthcare responses in addiction and mental healthcare organisations. This would ensure that STI nurses could refer MSM experiencing problematic chemsex to tailored addiction and mental healthcare services. To keep healthcare providers informed of the current chemsex situation and possible changing trends, monitoring of chemsex among MSM is needed. As almost all STI nurses already asked their MSM clients about chemsex, it would be feasible to introduce a surveillance system for chemsex within Dutch STI clinics. Including questions on chemsex in the standardized nurse-taken medical and sexual history in STI clinics would be one option for this surveillance system.

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Portfolio

Courses and training

2020

Introductory course on principles of Problem Based Learning (PBL)

Maastricht University

Mentoring skills course

Maastricht University

2019

Basiscursus Regelgeving en Organisatie voor Klinisch Onderzoekers (eBROK)

Nederlandse Federatie van Universitair Medische Centra

2018

Werken met R statistics

GGD Zuid-Limburg

Advanced English writing course for PhD-students

Maastricht University

Presentations

International oral presentations

European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE)

Saint Julian's, Malta (2018)

International poster presentations

European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE)

Stockholm, Sweden (2019)

International Society for Sexually Transmitted Diseases Research (ISSTD) Conference

Vancouver, Canada (2019)

International Union Against Sexually Transmitted Infections (IUSTI) Conference

Dublin, Ireland (2018)

National oral presentations

Trimbos Instituut Monitor Drugsincidenten (MDI) symposium
Utrecht (2019)

Rijksinstituut Volksgezondheid en Milieu (RIVM) SOA expert meeting
Utrecht (2019)

Care and Public Health Research Institute (CAPHRI) research day
Maastricht (2018)

Annual Research Day Medical Microbiology
Maastricht (2018)

Trimbos Instituut Expert Meeting Chemsex
Utrecht (2018)

Teaching

Begeleiding van Jill Geraets, Msc student Maastricht University, stage: Onderzoek naar gedragsdeterminanten van chemseks onder mannen die seks hebben met mannen (*3 maanden, 2019*)

Begeleiding van Mischa Lenaers, Msc student Maastricht University, stage: Onderzoek naar risicofactoren voor SOA onder heteroseksuele jongeren (*12 maanden, 2020-2021*)

Memberships

RIVM Seksueel Overdraagbare Aandoeningen Peilstation (SOAP) registratiecommissie

List of publications

2020

Evers YJ, Hoebe CJP, Dukers-Muijters NHTM, Kampman CJG, Kuizenga-Wessel S, Bakker NCM, Schamp SMAA, Van Buel H, Van Der Meijden WCJPM, Van Liere GAFS (2020). Sexual, addiction and mental healthcare needs among men who have sex with men practicing chemsex: a cross-sectional study in the Netherlands. *Preventive Medicine Reports*. 18. <https://doi.org/10.1016/j.pmedr.2020.101074>

Evers YJ, Dupont H, Crutzen R, Heuperman P (2020). Using the Confidence Interval-Based Estimation of Relevance to identify determinants of cannabis use among high school students in the Netherlands. *Health Psychology Bulletin*. 4(1), pp. 10–17. <https://doi.org/10.5334/hpb.18>

Peters CMM, Evers YJ, Dukers-Muijters NHTM, Hoebe CJP (2020). STI and chemsex also highly prevalent among male sex workers (MSW) outside Amsterdam, the Netherlands. *Sexually Transmitted Diseases*. 47(6):1. doi: 10.1097/OLQ.0000000000001174

Evers YJ, Geraets JJH, Van Liere GAFS, Hoebe CJP, Dukers-Muijters NHTM (2020). Attitude and beliefs about the social environment associated with chemsex among MSM visiting STI clinics in the Netherlands: an observational study. *PLoS ONE*. 15(7):e0235467. <https://doi.org/10.1371/journal.pone.0235467>

Evers YJ, Dukers-Muijters NHTM, Van Liere GAFS, Hoebe CJP (2020). Sex abroad among men who have sex with and its association with chemsex, sexual risk behaviour and sexually transmitted diseases: a cross-sectional study in the Netherlands. *Sexually Transmitted Diseases*. 47(9): e92-e32. doi: 10.1097/OLQ.0000000000001207.

Evers YJ, Levels L, Dukers-Muijters NHTM, Van Liere GAFS, Hoebe CJP (2020). The availability and feasibility of chemsex services within sexual health clinics in the Netherlands. *Sexually Transmitted Diseases*. 2020. 47(9): 639-644. doi: 10.1097/OLQ.0000000000001209.

2019

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Evers YJ, Van Liere GAFS, Dukers-Muijers NHTM, Hoebe CJP (2019). Use of doxycycline and other antibiotics to prevent STIs among men who have sex with men visiting sexual health clinics in the Netherlands. *Sexually Transmitted Infections*. 0:1 – 2. doi:10.1136/sextrans-2019-054325.

Information Brochure

CHEMSEKS ONDER MSM

Informatiebrochure voor centra seksuele gezondheid

OPZET VAN HET ONDERZOEK

Deze informatie is tot stand gekomen uit een vragenlijstonderzoek onder mannen die seks hebben met mannen (MSM) en die één van de negen deelnemende Centra Seksuele Gezondheid (CSG)* hebben bezocht in 2018-2019. Het totaal aantal deelnemers is 558 MSM.

Dit vragenlijstonderzoek bestond uit verschillende rondes en aanvullende vragen zijn toegevoegd gedurende de onderzoeksperiode. Daarom kan het aantal deelnemers enigszins verschillen per onderwerp.

Verder is deze informatie gebaseerd op vragenlijstonderzoek onder sociaal verpleegkundigen werkzaam bij de CSG. Het totaal aantal deelnemers is 108 CSG verpleegkundigen werkzaam in twintig* van de vierentwintig CSG in Nederland.

De vragenlijsten en interpretatie van bevindingen zijn opgesteld met behulp van verpleegkundigen, MSM zelf, een regionale verslavingsinstelling Mondriaan en de stichting Mainline, Drugs & Gezondheid.

*De deelnemende CSG staan achterin de folder vermeld.

INHOUD

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STRATEGIEËN**

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IN NEDERLAND**

WAT IS CHEMSEKS?

Chemseks of Party en Play

Chemseks is het gebruik van drugs vlak vóór of tijdens de seks. Drugs die zijn meegenomen in deze definitie staan in onderstaande tabel.

In Engeland wordt het gebruik van crystal meth, GHB, GBL en mephedrone tijdens seks gedefinieerd als chemseks.

In Nederland zien we echter dat ook andere drugs, zoals XTC/MDMA, ketamine en cocaïne, tijdens de seks worden gebruikt.

Slamseks of slammen

Injecteren van drugs vlak vóór of tijdens de seks wordt ook wel slamseks of slammen genoemd.

Booty bumpen

Anaal inbrengen van drugs met een spuit zonder naald wordt ook wel booty bumpen genoemd.

Drugs	Gebruikte namen	Inname methoden	Effect
Cocaine	Coke, Charlie, Blow, Snow, White, Sos	Snuiven, roken, injecteren	Stimulerend
Crystal meth	Tina, Ice, Crystal, T, Shabu, Yaba, Shista	Snuiven, roken, injecteren, anaal inbrengen	Stimulerend
GHB/GBL	G, Buisje, Tante Gea, Liquid Ecstasy	Drinken, injecteren	Verdovend
Ketamine	K, Special K, Keta, Ket, Vitamin K	Slikken, snuiven, injecteren	Verdovend, stimulerend, bewustzijnsveranderd
Mephedrone	Meow meow, M-Cat, Plant food, 4-MMC	Slikken, injecteren, anaal inbrengen	Stimulerend
Speed	Amfetamine, Pep	Snuiven, slikken, injecteren	Stimulerend
XT/MDMA	M, Molly, Pili, Candy	Slikken	Stimulerend, bewustzijnsveranderd
2-CB		Slikken	Stimulerend, bewustzijnsveranderd
4-FA	4-FMP, 4 Fluor, 4F, Flava	Slikken	Stimulerend, bewustzijnsveranderd
3-MMC		Slikken, injecteren, anaal inbrengen	Stimulerend
4-MEC		Slikken, injecteren, anaal inbrengen	Stimulerend

HOE VAAK KOMT CHEMSEKS VOOR?

Ongeveer 40% van de MSM die een CSG heeft bezocht rapporteert chemseks in de afgelopen zes maanden.

De meest gebruikte drugs zijn:

- XTC/MDMA
- GHB/GBL
- Ketamine

Crystal meth wordt gebruikt door 3% en mephedrone door 2%. Drugs worden vaak gecombineerd, vooral XTC/MDMA met GHB/GBL. Ongeveer 8% rapporteert slamseks, waarbij de volgende drugs worden geïnjecteerd: crystal meth, ketamine, 3-MMC en 4-MEC.

De meest gebruikte chemseks drugs (%)

Chemseks wordt gerapporteerd door MSM in zowel steden als dorpen. Chemseks vindt voornamelijk plaats in de thuis-setting, waarbij MSM met elkaar afspreken via online dating applicaties (zoals Grindr en Gay-Romeo). MSM die chemseks hebben bevinden zich vaak in een sociale omgeving waarin de meerderheid van vrienden en sekspartners ook drugs gebruikt. We zien geen verschillen in leeftijd, opleidingsniveau en migratieachtergrond bij MSM die wel en geen chemseks hebben. Uitvragen van chemseks lijkt dus belangrijk onder alle MSM die een CSG bezoeken.

ERVAREN POSITIEVE EFFECTEN

MSM geven aan drugs te gebruiken tijdens de seks om seksueel plezier te verhogen. Meest gerapporteerde redenen door MSM zijn: meer opwinding, langdurige seks en minder remmingen.

Zestig procent geeft aan dat chemseks geen invloed heeft op het dagelijks leven. Ongeveer 30% geeft aan dat chemseks een positieve invloed heeft op het dagelijks leven. Voorbeelden van positieve veranderingen zijn: ‘genieten van seks’, ‘verrijking van het seksleven’ en ‘ik voel me vrij en relaxed’. Dit wijst er op dat er een groep MSM is die chemseks niet als problematisch ervaart.

Redenen chemseks door MSM (%)

GEZONDHEIDSRISICO'S

Seksueel risicogedrag en SOA

Drugsgebruik kan invloed hebben op besluitvormingsprocessen. Een persoon maakt mogelijk meer grensverleggende en soms risicovolle besluiten dan vooraf (zonder drugs) was bedoeld. Chemseks gaat samen met seksueel risicogedrag en een verhoogd risico op seksueel overdraagbare aandoeningen (SOA). De volgende SOA werden gevonden onder MSM die chemseks hebben: chlamydia (17%), gonorrroe (17%), infectieuze syfiilis (2%) en een nieuwe HIV infectie (1%). Bijna 80% van MSM geeft aan zich bewust te zijn van seksuele gezondheidsrisico's van chemseks.

SOA vindpercentage (%)

12%

MSM zonder chemseks

.....

33%

MSM met chemseks

44%

MSM met 3 of meer verschillende drugs

Seksueel risicogedrag onder MSM die chemseks rapporteren (%)

Seks zonder condoom

64%

Langdurig (>12 uur) seks

39%

Meerdere sekspartners

37%

Onbekende sekspartner

22%

GEZONDHEIDSRISICO'S

Ongewenste seksuele ervaringen

Het kan moeilijker zijn om toestemming te geven voor bepaalde seksuele handelingen als men onder invloed is van drugs.

Ongewenste seksuele ervaringen worden gerapporteerd door één vijfde van MSM die chemseks hebben.

Acute negatieve effecten

Twee-derde geeft aan wel eens nadelen te ervaren van chemseks. Het gaat hierbij vooral om hoofdpijn, vermoeidheid, erectieproblemen en een kater achteraf.

Negatieve invloed op dagelijks leven

Drugsgebruik kan samengaan met een verhoogd risico op mentale gezondheidsproblemen, zoals afhankelijkheid, depressie en angst. Een ervaren negatieve invloed op het dagelijks leven wordt in de geestelijke gezondheidszorg vaak gebruikt als indicator voor mentale gezondheidsproblemen. Eén tiende van MSM geeft aan dat chemseks een negatieve invloed heeft op hun dagelijks leven.

ZORGBEHOEFEN

Waarover willen MSM die chemseks hebben praten?

Ongeveer één vierde van MSM die chemseks hebben wilt mogelijk wel eens met een gezondheidszorgprofessional praten over chemseks, vooral over het krijgen van meer zelf-controle, veiliger drugsgebruik, het risico op HIV verminderen, risico op bacteriële SOA verminderen en over het risico op hepatitis C verminderen.

Gespreksonderwerpen van MSM met gezondheidsprofessionals (%)

Met wie willen MSM praten over chemseks?

Het CSG is een vertrouwde plek voor MSM om gevoelige onderwerpen te bespreken. MSM hebben de voorkeur om chemseks te bespreken met CSG verpleegkundigen. Het CSG kan daarom een belangrijke rol spelen in het bespreken van chemseks en mogelijke gezondheidsrisico's.

CHEMSEKS IN HET CONSULT

Wat doen verpleegkundigen tijdens hun consult met chemseks?

Bijna drie vierde van de verpleegkundigen bespreekt chemseks al regelmatig tijdens consulten met MSM. Het merendeel van verpleegkundigen geeft aan voldoende kennis te hebben en positief te staan tegenover het bespreken van chemseks in het CSG-consult. Verpleegkundigen geven aan de volgende rollen te vervullen op het gebied van chemseks in het consult:

- Uitvragen chemseks, gebruikte drugs, slamseks.
- Vertrouwde plek waar MSM openlijk kunnen praten over chemseks gerelateerde problemen.
- Bespreken ervaren voordelen en risico's van chemseks met 'Motivational Interviewing'.

- Herkennen problematische chemseks.
- Doorverwijzen naar andere gezondheidszorgorganisaties.

Welke trainingsbehoeften op het gebied van chemseks hebben verpleegkundigen?

Ook al heeft twee derde van de verpleegkundigen al een training gehad op het gebied van chemseks, is er nog steeds een grote behoefte aan training. Voornamelijk over:

- Problematisch chemseks herkennen: 68%
- Gezondheidsrisico's van chemseks: 68%
- Strategieën om gezondheidsrisico's te beperken: 60%

Wat is er geregeld in de CSG op het gebied van chemseks?

Drie van de twintig CSG hebben een werkspraak/protocol op het gebied van chemseks. Drie CSG hebben een standaard contact persoon bij regionale verslavingszorg voor doorverwijzing van MSM die problemen ervaren met chemseks. Eén CSG heeft een gespecialiseerde chemseks service, dit is een chemseks spreekuur waarbij getrainde ervaringsdeskundigen aanwezig zijn.

PROBLEMATISCHE CHEMSEKS HERKENNEN

Of iemand chemseks als een probleem in zijn dagelijks leven ervaart blijft natuurlijk iets persoonlijks. We hebben in ons onderzoek gezien dat een aantal signalen samenhangen met een hulpvraag. Het stellen van de volgende vragen kan daarom helpen om erachter te komen of hulp gewenst is:

MOGELIJKE VRAGEN

**SIGNALEN DAT
MOGELIJK
AANVULLENDE
HULP NODIG IS!**

- Hoe vaak gebruik je drugs tijdens de seks? -----> *Minstens twee keer per maand.*
- Hoe lang is het geleden dat je seks zonder drugs hebt gehad? -----> *Langer dan drie maanden geen seks gehad zonder drugs.*
- Welke voor- en nadelen ervaar je? -----> *Ervaren nadelen groter dan voordelen.*
- Hoe beïnvloedt drugsgebruik tijdens de seks je dagelijks leven? -----> *Negatieve invloed op dagelijks leven.*
- Wil je verandering in je drugsgebruik tijdens de seks? -----> *Intentie om drugsgebruik tijdens de seks te veranderen.*

SCHADEBEPERKENDE STRATEGIEËN

De volgende schadebeperkende strategieën kunnen geadviseerd worden aan MSM die chemseks hebben.

Hoe kunnen MSM hun seksuele gezondheid verbeteren?

De gebruikelijke methoden om seksuele gezondheid te verbeteren blijven belangrijk in de doelgroep:

- Pre-exposure profylaxe (PrEP)
- Post-exposure profylaxe (PEP)
- Condoomgebruik
- Regelmatig testen op SOA en HIV
- Gebruik van schone naalden en materialen (stericups, sterifilters)
- Geen naalden delen
- Aanbod hulp bij ongewenste seksuele ervaringen

Hoe kunnen MSM zorgen voor preventie van schade door drugs?

De volgende algemene strategieën kunnen geadviseerd worden aan MSM die chemseks hebben:

- Informeer jezelf. <https://www.drugsinfo.nl/publiek/drugs-abc>
- Laat je drugs testen. <https://www.drugs-test.nl/waar-testen->
- Denk na over welke drugs je gebruikt want sommige drugs

hebben een hoger verslavingspotentieel: cocaïne, crystal meth, GHB/GBL en speed.

- Vermijd het combineren van drugs vanwege onvoorspelbare gevolgen. Vooral onderstaande combinaties.

Combinaties die negatieve effecten veroorzaken	
Stimulerend + stimulerend	Groter risico op hart- en vaatproblemen
Verdovend + verdovend + alcohol en benzodiazepinen	Groter risico op overdosering en bewusteloosheid (out gaan)
Stimulerend + verdovend	Verminderde waarneming van verdoving, groter risico op overdosering
Poppers + erectiemiddelen	Groter risico op bewusteloosheid, hart- en nierproblemen

- Stimulerende drugs in combinatie met seks verhogen de kans op oververhitting. Zorg dat je regelmatig afkoelt.
- Drink voldoende water, maar pas op met de combinatie XTC/MDMA en te veel water. Maximaal één glas water per uur is een goede richtlijn.
- Beperk chemseks-sessies en heb tussendoor ook seks zonder drugs om afhankelijkheid te voorkomen.
- Acute onthouding van GHB of GBL is riskant als er sprake is van afhankelijkheid.

SCHADEBEPERKENDE STRATEGIEËN

Hoe kunnen MSM zelf-controle vergroten?

Bespreek samen met de cliënt mogelijke risico's van chemseks en stel samen doelen op om deze risico's te verminderen met behulp van action en coping planning:

- **Action planning**

Stel samen met de cliënt op maat gemaakte doelen op voor de volgende keer chemseks, bijvoorbeeld:

'Volgende keer als ik drugs gebruik tijdens de seks, gebruik ik PrEP en neem ik gekleurde naalden mee'

'Volgende keer als ik drugs gebruik tijdens de seks, gebruik ik één soort drug en bepaal ik vooraf de hoeveelheid (grammen, aantal pillen) die ik ga gebruiken'

- **Coping planning**

Bespreek samen met de cliënt welke barrières hij kan tegenkomen om deze doelen te behalen, bijvoorbeeld ervaren druk van sekspartners of vrienden, en hoe hij daar het best mee om kan gaan.

INFORMATIE- EN HULPAANBOD IN NEDERLAND

Aanbod specifiek gericht op chemseks

Informatie en training voor professionals

- *SOAIDS Nederland:*

Online training met informatie over chemseks voor professionals op het gebied van SOA- en HIV-zorg.

- *Mainline:*

Op maat gemaakte trainingen over chemseks, al dan niet met inzet van een ervaringsdeskundige.

Informatie en hulp voor MSM

- *Mainline:*

- Anonieme chatfunctie voor MSM die informatie, advies of hulp rond chemseks zoeken: di. en wo. van 15.00 -18.00 uur.
- Een-op-een (telefonisch) contact over zelf-controle en/of stoppen met chemseks.

- Chemseks-meetings op kantoor Mainline (Amsterdam).

Elke eerste woensdag van de maand voor mannen die met chemseks zijn gestopt of willen stoppen: informatie, advies en support.

Elke derde woensdag van de maand voor mannen die chemseks hebben: informatie en advies over gecontroleerd gebruik, support en spuitomruil.

- *GGD Amsterdam:*

Wekelijks chemseks spreekuur met getrainde ervaringsdeskundigen.

- *COC Rotterdam Café & Stichting Hiv Portaal Rotterdam:*

Maandelijke chemseks-meeting in COC-Café (Rotterdam).

- *David Stuart:*

Online zelfhulpprogramma

- *Jellinek:*

- Telefonisch advies van het Jellinek Expert Team: 088 - 5051220.
- Behandeling bij Jellinek met een behandelaar gespecialiseerd in chemseks (Cognitieve Gedrags Therapie of Acceptance and Commitment Therapy).

- Hulp via het Jellinek Outreachend Team.

- *Crystal meth anonymous:*

- Wekelijks bijeenkomsten voor personen die kampen met een crystal meth verslaving.
- 12 stappen programma.

- *Sextina:*

Informatie over crystal meth en een zorgkaart per regio in Nederland.

INFORMATIE- EN HULPAANBOD IN NEDERLAND

Algemene doorverwijsmogelijkheden

Op het moment dat iemand hulp nodig heeft bij afhankelijkheid van drugs, kan het best doorverwezen worden naar regionale verslavingszorginstellingen.

Een kaart met deze instellingen is beschikbaar op:
<https://www.alcoholinfo.nl/publiek/minderen-of-stoppen/waarvind-ik-hulp-/professionele-hulp>

Het is verstandig om bij aanmelding te vermelden dat het gaat om chemseks, zodat op maat gemaakt hulp geboden kan worden.

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DEELNEMENDE CSG

Negen deelnemende CSG aan het vragenlijstonderzoek onder MSM:

GGD Zuid-Limburg, GGD Limburg-Noord, GGD Twente, GGD Brabant Zuid-Oost, GGD Hart voor Brabant, GGD Gelderland Midden, GGD Gelderland-Zuid, GGD Haaglanden, GGD IJsselland.

Twintig deelnemende CSG aan het vragenlijstonderzoek onder verpleegkundigen:

GGD Zuid-Limburg, GGD Limburg-Noord, GGD Gelderland-Zuid, GGD Hollands Noorden, GGD regio Utrecht, GGD Twente, GGD Haaglanden, GGD Noord- en Oost-Gelderland, GGD IJsselland, GGD Gelderland-Midden, GGD Amsterdam, GGD Drenthe, GGD Flevoland, GGD Fryslân, GGD Hart voor Brabant, GGD Hollands Midden, GGD Kennemerland, GGD Rotterdam-Rijnmond, GGD West-Brabant en GGD Gooi & Vechtstreek.

COLOFON

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