Maastricht University

Alcohol and drug use during sex and its association with sexually transmitted infections: a retrospective cohort study among young people aged under 25 years visiting Dutch STI clinics

Citation for published version (APA):

Evers, Y. J., op den Camp, K. P. L., Lenaers, M., Dukers-Muijrers, N. H. T. M., & Hoebe, C. J. P. A. (2023). Alcohol and drug use during sex and its association with sexually transmitted infections: a retrospective cohort study among young people aged under 25 years visiting Dutch STI clinics. *Sexually Transmitted Infections*, *99*(2), 97-103. https://doi.org/10.1136/sextrans-2021-055355

Document status and date:
Published: 01/03/2023

DOI:
10.1136/sextrans-2021-055355

Document Version:
Publisher's PDF, also known as Version of record

Document license:
Taverne

Please check the document version of this publication:

• A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
• The final author version and the galley proof are versions of the publication after peer review.
• The final published version features the final layout of the paper including the volume, issue and page numbers.

Link to publication

General rights
Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

• Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
• You may not further distribute the material or use it for any profit-making activity or commercial gain
• You may freely distribute the URL identifying the publication in the public portal.

If the publication is distributed under the terms of Article 25fa of the Dutch Copyright Act, indicated by the “Taverne” license above, please follow below link for the End User Agreement:

www.umlib.nl/taverne-license

Take down policy
If you believe that this document breaches copyright please contact us at:

repository@maastrichtuniversity.nl

providing details and we will investigate your claim.

Download date: 03 May. 2024

Alcohol and drug use during sex and its association with sexually transmitted infections: a retrospective cohort study among young people aged under 25 years visiting Dutch STI clinics

Ymke J Evers ,[1,2] Kiki P L op den Camp,[1,2] Mischa Lenaers,[1,2] Nicole H T M Dukers-Muijrers ,[1,3] Christian J P A Hoebe[1,2]

[1]Sexual Health, Infectious Diseases and Environmental Health, Public Health Service South Limburg, Heerlen, The Netherlands
[2]Social Medicine and Medical Microbiology, School of Public Health and Primary Care (CAPHRI), Maastricht University Medical Centre (MUMC+), Maastricht, The Netherlands
[3]Health Promotion, School of Public Health and Primary Care (CAPHRI), Maastricht University Medical Centre (MUMC+), Maastricht, The Netherlands

Correspondence to
Dr Ymke J Evers, Sexual Health, Infectious Diseases, and Environmental Health, Public Health Service South Limburg, 6411 TE Heerlen, The Netherlands; ymke.evers@ggdzl.nl

Received 1 November 2021
Accepted 15 April 2022
Published Online First 6 May 2022

Check for updates

© Author(s) (or their employer(s)) 2023. No commercial re-use. See rights and permissions. Published by BMJ.

To cite: Evers YJ, op den Camp KPL, Lenaers M, *et al*. *Sex Transm Infect* 2023;**99**:97–103.

ABSTRACT

Introduction Alcohol use and drug use are common behaviours among young people. STI positivity is higher in young people than in people aged above 25 years. While there is an increasing amount of knowledge about drug use during sex among men who have sex with men (MSM), data on this behaviour among young women and heterosexual men are scarce. Therefore, this study aims to assess the proportion and characteristics of women and heterosexual men aged under 25 years reporting alcohol and/or drug use during sex and its association with STI positivity.

Methods Surveillance data of heterosexual individuals younger than 25 years visiting two Dutch STI clinics between 2016 and 2019 were assessed (n=11 714). We used multivariable logistic regression analyses to assess associations between alcohol and drug use during sex and STI positivity (*Chlamydia trachomatis* and/or *Neisseria gonorrhoeae* diagnosis), adjusting for sociodemographic characteristics (sex, age, ethnicity, educational level, socioeconomic status and urbanisation) and sexual behaviour (condom use, number of sex partners).

Results Alcohol use during sex was reported by 45.3% (5311/11 714; 49.5% in men vs 43.2% in women, p<0.001) and drug use during sex by 22.0% (2580/11 714; 30.7% in men vs 17.6% in women, p<0.001). The most reported drugs were cannabis (17.9%), ecstasy (XTC)/methylenedioxymethamphetamine (MDMA) (6.9%) and cocaine (4.7%). The use of at least one of the following drugs (XTC/MDMA, cocaine, speed, ketamine, gamma-hydroxybutyrate (GHB)/gamma-butyrolactone (GBL), heroin, crystal meth and/or designer drugs) was significantly associated with STI positivity after adjustment for sociodemographic characteristics (adjusted OR (aOR): 1.3, 95% CI 1.1 to 1.4), but this association did not remain significant after adjustment for sexual behaviour (aOR: 1.12, 95% CI 0.94 to 1.34). Significant associations between drug use during sex and inconsistent condom (aOR: 2.5, 95% CI 1.9 to 3.2) use and having four or more sex partners (aOR: 3.2, 95% CI 2.8 to 3.6) in the past 6 months were assessed.

Discussion Alcohol and drug use during sex was highly prevalent among young women and heterosexual men visiting the STI clinic and drug use during sex was associated with an increased risk for STI, probably mediated by sexual behaviour. This indicates that a holistic health promotion strategy, addressing STI prevention and alcohol and drug use-related harm reduction, is important in this group. STI clinics should address this behaviour not only among MSM, but also among young women and heterosexual men.

INTRODUCTION

Adolescence is a period often characterised by more risk behaviour than in adulthood.[1 2] This is reflected in higher positivity rates of STIs[3] and more frequent alcohol and drug use.[4] Young people aged under 25 years are regarded as a high-risk group for STIs, and those aged 16–24 years account for more than half of *Chlamydia trachomatis* (CT) infections in the Netherlands.[3] The two most often diagnosed STI among young people are CT and *Neisseria gonorrhoeae* (NG) and these are causes of pelvic inflammatory disease and subsequently reproductive morbidity. The highest rates of excessive alcohol use (20%), ever cannabis use (26%) and ever ecstasy (XTC) use (15%) have been observed among young people.[4 5]

Alcohol and drug use might have direct impact on decision-making processes whereby an individual may engage in certain sexual risk behaviour that was not intended prior to the consumption of alcohol or drugs.[6 7] Several cohort and cross-sectional studies in young people in Europe and South America have shown associations between alcohol and drug use and sexual risk behaviours, such as condomless sex and multiple sex partners,[8–12] but these studies have not assessed STI positivity as an outcome. Moreover, these studies have not looked specifically at alcohol and drug use during sex. Alcohol and drugs are often strategically used for different sexual purposes, including facilitating sexual encounters and enhancing sexual sensations and arousal.[9] In men who have sex with men (MSM), there is an increasing amount of knowledge about 'chemsex' and its association with sexual risk behaviour and STI.[13–16] However, knowledge in heterosexual young people is scarce. One cross-sectional study among heterosexual women visiting a Dutch STI clinic has shown an association between the use of ecstasy (XTC)/methylenedioxymethamphetamine (MDMA) and gamma-hydroxybutyrate (GHB)/gamma-butyrolactone (GBL) during sex and STI.[17] This study also has shown an association between drug use during sex and condomless anal sex and

Sex Transm Infect: first published as 10.1136/sextrans-2021-055355 on 6 May 2022. Downloaded from http://sti.bmj.com/ on February 20, 2024 at University of Maastricht Consortia. Protected by copyright.

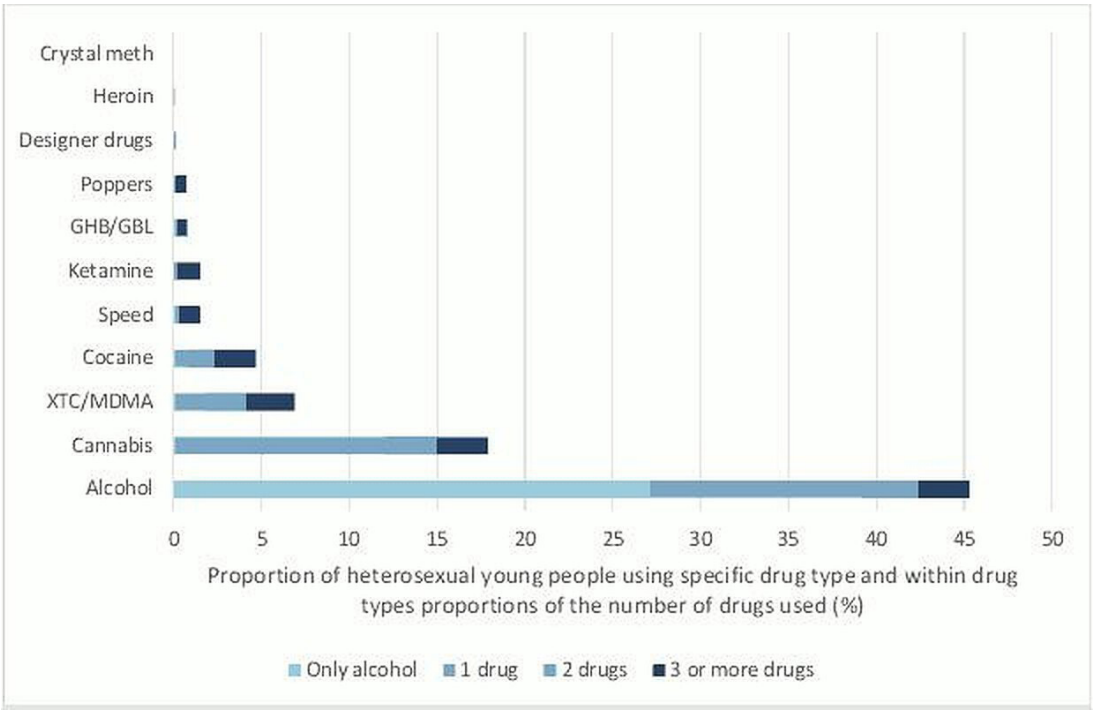

Figure 1 Alcohol and drug use during sex among heterosexual young people visiting the STI clinic. Groups 1 drug, 2 drugs and 3 or more drugs do not include alcohol. GHB, gamma-hydroxybutyrate. GBL, gamma-butyrolactone. XTC, ecstasy. MDMA, methylenedioxymethamphetamine.

having multiple sex partners in both heterosexual women and men.[17]

Potential benefits of an integrated approach to health promotion, addressing the co-occurrence of sexual, drug and alcohol use behaviours, are increasingly recognised in health policies and prevention strategies. Knowledge about the prevalence and characteristics of drug and alcohol use during sex among women and heterosexual men aged under 25 years and the association with STI is needed to inform policies and strategies for action. Therefore, this study aims to assess (1) the proportion and characteristics of women and heterosexual men aged under 25 years reporting alcohol and drug use during sex and (2) associations with CT and NG.

METHODS

Study design

In this retrospective study, coded surveillance consultations of women and heterosexual men aged under 25 years were used from the outpatient Public Health Service STI clinics in the region Limburg, the Netherlands. Coded data were submitted to the National Institute for Public Health and Environment via an electronic patient registry. Reporting of data to this national institute is standardised and mandatory for all STI clinics. The publicly funded Dutch STI clinics serve high-risk groups, including individuals aged under 25 years. We extracted data from 2016 to 2019 on sociodemographic characteristics, sexual behaviour in the past 6 months, alcohol and drug use during sex in the past 6 months and STI diagnoses. From 2016, a personal identifier and data on alcohol and drug use during sex were available. Of young clients who visited the STI clinic multiple times during this period, only the most recent consultation of each client was included in this study. Exclusion criteria were missing data on alcohol and drug use during sex and having had zero sex partners in the past 6 months.

Standard STI clinic testing procedures

All women and heterosexual men aged under 25 years were routinely tested for urogenital CT and NG. In women, CT and NG tests were performed on self-collected vaginal swabs, and in men, tests were performed on urine samples. Additional pharyngeal and/or anorectal swabs were collected when indicated. Indications for pharyngeal testing were being notified for any STI, report of commercial sex work or report of protected anogenital sex in combination with unprotected oral sex. Indications for anorectal testing were being notified for any STI, report of commercial sex work or report of anorectal sex. Specimens were processed at the regional medical microbiology laboratory of Maastricht University Medical Centre using nucleic acid amplification tests (Cobas 4800, Roche, California) according to the manufacturer's protocol.

Definitions

The outcome STI positivity was defined by a positive CT test and/or a positive NG test on at least one anatomical site. Alcohol use and drug use during sex were the main determinants. Alcohol use during sex was defined as having used alcohol before or during sex in the previous 6 months. Drug use during sex was defined as having used drugs (excluding alcohol) before or during sex in the previous 6 months. Polydrug use was defined as the use of two or more drugs in the previous 6 months (excluding alcohol). Alcohol and drug use during sex was divided into four groups based on the types of drugs used. Group 0 (no alcohol or drugs) included the reference group. Group 1 (alcohol) included the use of alcohol and no other drugs. Group 2 (cannabis) included the use of cannabis and none of the following drugs: XTC/MDMA, cocaine, speed, ketamine, GHB/GBL, designer drugs, heroin or crystal meth. Group 3 included the use of at least one of the following drugs: XTC/MDMA, cocaine, speed, ketamine, GHB/GBL, designer drugs, heroin or crystal meth. Heterosexual men

Sex Transm Infect: first published as 10.1136/sextrans-2021-055355 on 6 May 2022. Downloaded from http://sti.bmj.com/ on February 20, 2024 at University of Maastricht Consortia. Protected by copyright.

Table 1 Characteristics of study population and comparison of characteristics between groups of alcohol or drug use during sex

	All young people n=11 714	Group 1 (alcohol and no other drugs) n=3184	Group 2 (cannabis, alcohol and no other drugs) n=1427	Group 3 (XTC/MDMA, cocaine, speed, ketamine, GHB/GBL, designer drugs, heroin or crystal meth) n=1133	Group 0 (no alcohol/ drugs) n=5970
	% of total (n)	% of total (n)	% of total (n)	% of total (n)	% of total (n)
Sociodemographic characteristics					
Sex					
Men	33.7 (3953)	30.0 (956)	47.9 (683)	46.3 (525)	30.0 (1789)
Women	66.3 (7761)	70.0 (2228)	52.1 (744)	53.7 (608)	70.0 (4181)
Age (years)					
<20	15.9 (1866)	14.3 (454)	18.4 (263)	9.1 (103)	17.5 (1046)
20–24	84.1 (9948)	85.7 (2730)	81.6 (1164)	90.9 (1030)	82.5 (4924)
Ethnicity*					
Non-western	9.0 (1052)	5.3 (169)	12.3 (175)	6.8 (77)	10.6 (631)
Western	91.0 (10 662)	94.7 (3015)	87.7 (1252)	93.2 (1056)	89.4 (5339)
Educational level*					
Unknown	2.2 (256)	1.4 (45)	1.7 (24)	1.5 (17)	2.8 (170)
Lower	30.2 (3540)	18.8 (598)	32.4 (463)	32.6 (369)	35.3 (2110)
Higher	67.6 (7918)	79.8 (2541)	65.9 (940)	65.9 (747)	61.8 (3690)
SES†					
Unknown	1.7 (204)	1.4 (44)	2.2 (31)	1.6 (18)	1.9 (111)
Low	32.9 (3850)	32.5 (1034)	38.1 (543)	31.4 (356)	32.1 (1917)
Medium	32.6 (3823)	32.3 (1027)	29.1 (415)	32.2 (365)	33.8 (2016)
High	32.8 (3837)	33.9 (1079)	30.7 (438)	34.8 (394)	32.3 (1926)
Urbanisation†					
Unknown	1.6 (189)	1.3 (41)	2.1 (30)	1.2 (14)	1.7 (104)
Not urban	45.9 (5372)	40.7 (1296)	39.3 (561)	44.8 (508)	50.4 (3007)
Urban	52.5 (6153)	58.0 (1847)	58.6 (836)	53.9 (611)	47.9 (2859)
Sexual behaviour					
Condom use during vaginal/anal sex					
Unknown	18.4 (2151)	13.3 (424)	13.7 (195)	12.7 (144)	23.2 (1388)
Not applicable (no vaginal/anal sex reported)	1.2 (146)	0.6 (19)	1.1 (15)	0.4 (5)	1.8 (107)
Inconsistent (not always)	75.2 (8813)	80.7 (2571)	81.9 (1169)	84.5 (957)	68.9 (4116)
Consistent (always)	5.2 (604)	5.3 (170)	3.4 (48)	2.4 (27)	6.0 (359)
Number of sex partners <6 months					
1	35.2 (4118)	27.4 (871)	26.2 (379)	19.6 (222)	44.3 (2646)
2 or 3	44.4 (5202)	50.2 (1597)	44.0 (628)	40.6 (460)	42.2 (2517)
4 or more	19.0 (2227)	21.9 (696)	28.5 (407)	38.4 (435)	11.5 (689)
Unknown	1.4 (167)	0.6 (20)	0.9 (13)	1.4 (16)	2.0 (118)

*Ethnicity and educational level were based on definitions of Statistics Netherlands (www.cbs.nl). Western ethnicity included persons who were born in Europe (Turkey excluded), North America, Oceania, Indonesia or Japan. Non-western ethnicity included persons who were born or at least whose one parent was born in Africa, Latin America (with the exception of Indonesia and Japan) or Turkey, as defined by Statistics Netherlands. Educational level was measured as current education or highest level of education completed and was categorised into lower educated (prevocational secondary education, secondary vocational education) and higher educated (university, higher professional education, preuniversity/senior general secondary education).
†Postal codes were used to calculate socioeconomic status (SES) (www.scp.nl) and urbanisation (www.cbs.nl). Urbanisation was categorised into urban (≥1500 addresses/m^2) and non-urban (<1500 addresses/m^2).
GBL, gamma-butyrolactone; GHB, gamma-hydroxybutyrate; MDMA, methylenedioxymethamphetamine; XTC, ecstasy.

were defined as men who reported sex with only women in the past 6 months. Data of all women were included in this study.

Statistical analyses

Descriptive statistics (n and %) were used to describe the proportion of alcohol and drug use during sex, the most used drugs and the number of drugs used. Sociodemographic characteristics and sexual risk behaviour were compared between young people reporting alcohol and drug use during sex and young people reporting no alcohol and drug use during sex using χ^2 tests.

Univariable logistic regression analyses were used to examine associations between STI positivity (outcome) and alcohol and drug use during sex and the four groups (main determinants). First, associations between the outcome and main determinants were adjusted for sociodemographic characteristics, including age, sex, ethnicity, educational level, socioeconomic status (SES) and level of urbanisation in multivariable logistic regression models. Second, associations between the outcome and main determinants were adjusted for the sexual risk behaviour variables, condom use during vaginal and/or anal sex and number of sex partners in addition to the sociodemographic characteristics. Interaction effects between the main determinants and sex were assessed. In case of a significant interaction effect, the analyses were stratified for men and women.

The sexual risk behaviour variables are theoretically considered mediators in the association between alcohol and drug use during sex and STI positivity. To confirm mediation in our data, we assessed in sensitivity analyses associations between (1) the

Sex Transm Infect: first published as 10.1136/sextrans-2021-055355 on 6 May 2022. Downloaded from http://sti.bmj.com/ on February 20, 2024 at University of Maastricht Consortia. Protected by copyright.

Table 2 Associations between drug and alcohol use during sex and STI positivity

	All participants (n=11 174)	STI positivity: positive CT and/or NG test (n=1690)			
	% of total (n)	% within groups (n)	OR (95% CI)	aOR† (95% CI)	aOR‡ (95% CI)
Alcohol use during sex					
Yes	45.3 (5311)	14.6 (776)	1.03 (0.93 to 1.14)	1.08 (0.97 to 1.20)	1.0 (0.90 to 1.12)
No	54.7 (6403)	14.3 (914)	1 (ref)	1 (ref)	1 (ref)
Drug use during sex					
Yes	22.0 (2580)	16.2 (418)	1.20 (1.06 to 1.35)**	1.15 (1.02 to 1.30)*	1.06 (0.93 to 1.20)
No	78.0 (9134)	13.9 (1,272)	1 (ref)	1 (ref)	1 (ref)
Groups in sexualised drug/alcohol use					
Group 0 (no alcohol/drugs)	51.0 (5970)	13.8 (825)	1 (ref)	1 (ref)	1 (ref)
Group 1 (alcohol, no other drugs)	27.2 (3184)	14.2 (452)	1.03 (0.91 to 1.17)	1.12 (0.98 to 1.27)	1.05 (0.92 to 1.20)
Group 2 (cannabis, alcohol, no other drugs)	12.2 (1427)	15.6 (223)	1.16 (0.98 to 1.36)	1.12 (0.95 to 1.32)	1.03 (0.87 to 1.21)
Group 3 (XTC/MDMA, cocaine, speed, ketamine, GHB/GBL, designer drugs, heroin or crystal meth)	9.7 (1133)	16.8 (190)	1.26 (1.06 to 1.49)**	1.27 (1.14 to 1.42)**	1.12 (0.94 to 1.34)

*p<0.05; **p<0.01; ***p<0.001.
†Adjusted for age, sex, ethnicity, educational level, socioeconomic status (SES) and urbanisation.
‡Adjusted for age, sex, ethnicity, educational level, SES, urbanisation, condom use during vaginal/anal sex and number of sex partners.
aOR, adjusted OR; CT, *Chlamydia trachomatis*; GBL, gamma-butyrolactone; GHB, gamma-hydroxybutyrate; MDMA, methylenedioxymethamphetamine; NG, *Neisseria gonorrhoeae*; XTC, ecstasy.

outcome STI positivity and sexual risk behaviour variables and (2) alcohol and drug use during sex as outcome and sexual risk behaviour variables by multivariable logistic regression analyses. In all multivariable analyses, p values <0.05 were considered statistically significant. IBM SPSS Statistics V.26 was used for all statistical analyses.

RESULTS

A total of 12 512 women and heterosexual men aged under 25 years visited the STI clinic between 1 January 2016 and 31 December 2019 for a CT/NG test, of which n=11 714 (94%) were included in this study. Six hundred and seventy-eight young people were excluded because of lacking data on alcohol and drug use during sex and 120 young people were excluded because they had 0 sex partner in the past 6 months. Of the included young people, the median age was 22 years (IQR: 20–23), 66.3% (7761/11 714) were women, 91.0% (10 662/11 714) had a western ethnicity and 30.2% (3540/11 714) had a practical educational level. The median number of sex partners was 2 (IQR: 1–3) and 5.2% (604/11 714) reported consistent condom use during vaginal and/or anal sex. STI positivity was 14.4% (1690/11 174), 13.9% (1627/11 714) for CT and 0.9% (107/11 174) for NG.

Alcohol and drug use during sex

Alcohol and/or drug use during sex was reported by 49.1% (5751/11 714): alcohol use during sex was reported by 45.3% (5311/11 714; 49.5% in men vs 43.2% in women, p<0.001) and drug use during sex by 22.0% (2580/11 714; 30.7% in men vs 17.6% in women, p<0.001). The most reported drugs were cannabis (17.9%; 2097/11 714), XTC/MDMA (6.9%; 806/11 714) and cocaine (4.7%; 550/11 714) (figure 1). Of young people reporting alcohol use during sex, 59.7% only used alcohol (3171/5311), 26.7% used one other drug (1419/5311), 7.0% (372/5311) used two other drugs and 6.6% (349/5311) used at least three other drugs. Of young people reporting drug use during sex, 68.4% (1764/2580) used one drug in the past 6 months, 17.2% (444/2580) used two drugs and 14.4% (372/2580) used three or more drugs (figure 1).

The use of alcohol during sex and no other drugs (group 1) was higher among women (28.7%) than men (24.2%; p<0.001). The use of cannabis (group 2) and use of XTC/

Table 3 Sensitivity analyses to assess mediation by sexual behaviours between the associations of alcohol and drug use during sex and STI positivity

	Outcome: STI positivity		Outcome: alcohol use during sex		Outcome: drug use during sex	
	% within group (n)	aOR† (95% CI)	% within groups (n)	aOR† (95% CI)	% within groups (n)	aOR† (95% CI)
Condom use‡						
Consistent	5.6 (34)	1 (ref)	38.4 (232)	1 (ref)	12.4 (75)	1 (ref)
Inconsistent (not always)	14.6 (1283)	2.90 (1.16 to 1.49)***	50.0 (4408)	1.78 (1.50 to 1.56)***	24.3 (2139)	2.48 (1.93 to 3.19)***
Number of sex partners						
1	11.5 (472)	1 (ref)	32.3 (1332)	1 (ref)	14.8 (609)	1 (ref)
2 or 3	15.1 (786)	1.43 (1.26 to 1.61)***	48.2 (2509)	1.54 (1.38 to 1.71)***	21.1 (1099)	1.54 (1.38 to 1.71)***
4 or more	18.1 (402)	1.73 (1.50 to 2.01)***	64.3 (1431)	1.81 (1.65 to 2.00)***	37.9 (843)	3.15 (2.79 to 3.57)***

*p<0.05; **p<0.01; ***p<0.001.
†Adjusted for age, sex, ethnicity, educational level, socioeconomic status (SES) and urbanisation.
‡People with unknown and not applicable on condom use were excluded from these analyses.
aOR, adjusted OR.

Sex Transm Infect: first published as 10.1136/sextrans-2021-055355 on 6 May 2022. Downloaded from http://sti.bmj.com/ on February 20, 2024 at University of Maastricht Consortia. Protected by copyright.

MDMA, cocaine, speed, ketamine, GHB/GBL, designer drugs, heroin or crystal meth (group 3) was higher among men (17.3% and 13.3%, respectively) than women (9.6% and 7.8%, respectively; p<0.001). The use of alcohol during sex and no other drugs (group 1) and the use of XTC/MDMA, cocaine, speed, ketamine, GHB/GBL, designer drugs, heroin or crystal meth (group 3) was higher in the age group above 20 years (27.7% and 10.5%, respectively) than in the age group under 20 years (24.3% and 5.5%, respectively; p<0.001). The use of cannabis (group 2) was higher in the age group under 20 years (14.1%) than in the age group above 20 years (11.8%; p<0.001). The use of alcohol during sex was higher among higher educated (32.1%) than lower educated (16.1%; p<0.001) young people. The report of four or more sex partners in the past 6 months and inconsistent condom use was higher in people reporting use of alcohol and/or drugs than in people reporting no alcohol and/or drug use (table 1).

Alcohol and drug use during sex and its association with STI positivity

Young people reporting drug use during sex were more often diagnosed with CT and/or NG than young people reporting no drug use during sex (16.2% vs 13.9%; p=0.004). The association between drug use during sex and STI positivity remained significant after adjustment for age, sex, ethnicity, educational level, SES and urbanisation (table 2). No associations were assessed between group 1 (alcohol use during sex and no use of other drugs), group 2 (cannabis or alcohol use during sex and no use of other drugs) and STI positivity. Group 3 (use of XTC/MDMA, cocaine, speed, ketamine, GHB/GBL, designer drugs, heroin or crystal meth) was significantly associated with STI positivity, also after adjustment for sociodemographic characteristics. After adjustment for sexual risk behaviour, that is, condom use and number of sex partners, the association between drug use during sex and STI positivity and between group 3 and STI positivity did not remain significant (table 2). No significant interactions between the main determinants and sex were assessed (all p values between 0.38 and 0.65). The sexual behaviour variables condom use and number of sex partners were shown to be mediators in the associations between drug and alcohol use during sex and STI positivity (table 3).

DISCUSSION

This large study with over 10.000 women and heterosexual men aged under 25 years visiting STI clinics provides an overview of alcohol and drug use during sex. We show an association between drug use during sex and laboratory-confirmed STI positivity among young people. Alcohol use during sex was prevalent in 45% and drug use during sex in 22%. Cannabis (18%), XTC/MDMA (7%) and cocaine (5%) were the most reported drugs. Whereas the use of alcohol alone during sex was higher among women than men, drug use during sex was higher among men than women. Drug use during sex, and specifically the use of XTC/MDMA, cocaine, speed, ketamine, GHB/GBL, designer drugs, heroin or crystal meth during sex, was significantly associated with an increased risk for STI, mediated by sexual risk behaviour.

In line with previous reports indicating high prevalence of alcohol and drug use among young people, our study showed that alcohol and drug use during sex was highly prevalent in women and heterosexual men aged under 25 years visiting an STI clinic. The higher proportion of drug use during sex among men compared with women is in line with general drug use reports.[4 5] Alcohol use during sex was higher in higher educated than lower educated young people and drug use was comparable between both educational levels. This could be explained by a higher prevalence of alcohol and drug use among university students.[18] Previous studies in young people in Europe and the USA have shown that alcohol and drugs are often strategically used to enhance sexual experiences.[9 19] Alcohol is often used to facilitate sexual encounters, and drugs such as cocaine and XTC/MDMA are often used to prolong sex and enhance sexual sensation and arousal.[9] However, alcohol use and drug use during sex have been associated with several adverse health outcomes. In our study, we showed a significant association between drug use during sex and being diagnosed with CT or NG after adjustment for sociodemographic characteristics. The association is probably mediated by sexual behaviours, such as having multiple sex partners and inconsistent condom use. The association between drug use during sex and being diagnosed with CT or NG did not remain significant after adjustment for sexual behaviour. We assessed significant associations between these sexual behaviours and STI positivity and between these sexual behaviours and alcohol and drug use during sex. This was consistent with previous cohort and cross-sectional studies in young people in Europe and South America showing associations between drug use during sex and sexual risk behaviours.[8–12] These associations could be explained by the known disinhibiting effects of alcohol and drugs on sexual decision-making.[20] Another explanation for the higher STI positivity in young people reporting drug use could be that young people using drugs are also more likely to engage in sexual risk behaviour. STI positivity was especially high in people reporting use of XTC/MDMA, cocaine, speed, ketamine, GHB/GBL, designer drugs, heroin or crystal meth during sex. People reporting the use of one of these drugs mostly used at least one other drug in the past 6 months. The widespread pattern of multiple drug use in this group makes it difficult to relate findings to one specific drug. Nevertheless, it should be noted that the impact of the assessed drugs in this study on sexual behaviour and STI risk could be different based on diverse physiological effects, combining drugs and dose used, which could not be identified in our study. Aside from STI risk, in a US longitudinal survey of young people, alcohol use and drug use during sex have also been associated with unintended pregnancies in young people aged under 20 years.[21] Furthermore, alcohol and drug use during sex could cause acute intoxications and in the long term negative psychosocial outcomes.[22 23] Although most alcohol and drug use includes recreational use that does not have to be framed as 'problematic',[24] the high prevalence of this behaviour and its association with a variety of negative health outcomes call for a holistic health promotion approach. In a holistic health promotion approach for this group, attention should be given to STI prevention, testing and treatment as well as harm reduction strategies and psychosocial support related to alcohol and drug use. As a first step, awareness in STI clinics should be created in that alcohol and drug use during sex should be addressed among MSM and in women and heterosexual men aged under 25 years. Drug use patterns between MSM and heterosexual young people differ, for example, the use of GHB/GBL during sex is more common in MSM[13] than in heterosexual young people. Further, the context in which drug use during sex takes place might be different between MSM and young people and should be studied further. Although the used drugs and context might differ for different target groups and also within target groups, health promotion focused on STI prevention and treatment and drug use-related harm reduction are highly relevant in both groups. STI clinics should be informed about the most used drugs among

Sex Transm Infect: first published as 10.1136/sextrans-2021-055355 on 6 May 2022. Downloaded from http://sti.bmj.com/ on February 20, 2024 at University of Maastricht Consortia. Protected by copyright.

heterosexual young people and the higher risk of being diagnosed with CT/NG among young people using XTC/MDMA, cocaine, speed, ketamine, GHB/GBL, designer drugs, heroin or crystal meth during sex. Second, connections between STI clinics and regional mental and addiction healthcare organisations should be strengthened to provide this holistic health promotion approach. More research is needed into tailored addiction treatment programmes for dependency on drugs and/or alcohol related to sex for young people.

Our study should be viewed in light of some limitations. Because of the cross-sectional design, we were unable to assess causal relationships between alcohol and drug use during sex and STI positivity. Moreover, the reported drug use during sex might not have occurred at the same time of acquiring an STI. The assessed proportion of young people using alcohol and drugs during sex among heterosexual young people visiting the STI clinic might not be representative to all heterosexual young people in the Netherlands, as the STI clinic population generally represents a high-risk group. Therefore, the proportion of people using drugs and alcohol during sex could have been slightly overestimated. As we used routinely collected STI clinic data, all clients are questioned in consistent and systematic way about their drug use during sex. Therefore, a strength of this study is that the data recorded specifically relate to the use of drugs right before or during sex, not just the use of drugs. However, several important variables, such as the dose and frequency in alcohol and drug use, were not available from the surveillance data used in this study. Alcohol use in other studies is often defined as binge drinking or alcohol use disorder and we were not able to make these differentiations. It could have been possible that there would have been an association between binge drinking and STI positivity. These differentiations in dose and frequency of use could also be helpful in identifying recreational and problematic use. Finally, more research is needed into the healthcare needs of heterosexual young people using alcohol and drugs during sex to tailor health promotion and treatment strategies.

In conclusion, alcohol and drug use during sex is highly prevalent among women and heterosexual men aged under 25 years visiting Dutch STI clinics. Drug use during sex was significantly associated with an increased risk of being diagnosed with CT and/or NG, probably mediated by sexual behaviour. STI clinics and other healthcare professionals should be informed that drug use during sex is common among MSM and heterosexual young people. Holistic health promotion strategies, addressing STI prevention and alcohol and drug use-related harm reduction, are important in young people using alcohol and/or drugs during sex.

Key messages

- ⇒ Alcohol use (45%) and drug use (22%) during sex were highly prevalent among women and heterosexual men aged under 25 years visiting Dutch STI clinics.
- ⇒ The most reported drugs during sex among young people were cannabis, ecstasy and cocaine.
- ⇒ Drug use during sex was associated with an increased risk of being diagnosed with chlamydia and/or gonorrhoea.
- ⇒ Holistic health promotion, addressing STI prevention and alcohol and drug use harm reduction, is important in young people using alcohol and/or drugs during sex.

Handling editor Adam Huw Bourne

Contributors All authors were involved in the conception and design of the study. YJE was the guarantor of this study. YJE, KodC and ML produced the database and analysed the data. YJE wrote the first draft of the manuscript. NHTMD-M and CJPAH contributed to writing the paper. All authors were involved in the final manuscript.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Not required.

Ethics approval The Medical Ethics Committee of Maastricht University Medical Centre (MUMC+) exempted this study from official approval under prevailing laws in the Netherlands after official review as all data presented in this paper were retrospectively retrieved from regular STI clinic care activities and were deidentified, coded and analysed anonymously (METC number: 2017-0251).

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available upon reasonable request. Interested researchers may contact the head of the data archiving (Helen Sijstermans: helen.sijstermans@ggdz.nl) to receive the data.

Supplemental material This content has been supplied by the author(s). It has not been vetted by BMJ Publishing Group Limited (BMJ) and may not have been peer-reviewed. Any opinions or recommendations discussed are solely those of the author(s) and are not endorsed by BMJ. BMJ disclaims all liability and responsibility arising from any reliance placed on the content. Where the content includes any translated material, BMJ does not warrant the accuracy and reliability of the translations (including but not limited to local regulations, clinical guidelines, terminology, drug names and drug dosages), and is not responsible for any error and/or omissions arising from translation and adaptation or otherwise.

ORCID iDs
Ymke J Evers http://orcid.org/0000-0003-3859-0168
Nicole H T M Dukers-Muijrers http://orcid.org/0000-0003-4896-758X

REFERENCES

1 Spear LP. Effects of adolescent alcohol consumption on the brain and behaviour. *Nat Rev Neurosci* 2018;19:197–214.
2 Casey B, Jones RM, Somerville LH. Braking and accelerating of the adolescent brain. *J Res Adolesc* 2011;21:21–33.
3 National Institute for Public Health. Sexually transmitted infections in the Netherlands, 2019. Available: https://www.rivm.nl/bibliotheek/rapporten/2020-0052.pdf at 05-10-2022 [Accessed 05 Sep 2021].
4 European Monitoring Centre for Drugs and Drug Addiction. European drug report, trends and developments. Available: https://www.emcdda.europa.eu/system/files/publications/13236/TDAT20001ENN_web.pdf [Accessed 05 Sep 2021].
5 Trimbos Institute. National drug monitor. Available: https://www.trimbos.nl/docs/423b9c4b-a389-4bfd-aa33-0c914438f1f9.pdf [Accessed 05 Sep 2021].
6 Lomba L, Apóstolo J, Mendes F. Drugs and alcohol consumption and sexual behaviours in night recreational settings in Portugal. *Adicciones* 2009;21:309-25.
7 Johnson MW, Herrmann ES, Sweeney MM, *et al*. Cocaine administration dose-dependently increases sexual desire and decreases condom use likelihood: the role of delay and probability discounting in connecting cocaine with HIV. *Psychopharmacology* 2017;234:599–612.
8 Jackson C, Sweeting H, Haw S. Clustering of substance use and sexual risk behaviour in adolescence: analysis of two cohort studies. *BMJ Open* 2012;2:e000661.
9 Bellis MA, Hughes K, Calafat A, *et al*. Sexual uses of alcohol and drugs and the associated health risks: a cross sectional study of young people in nine European cities. *BMC Public Health* 2008;8:155.
10 Strandberg A, Skoglund C, Gripenberg J, *et al*. Alcohol and illicit drug consumption and the association with risky sexual behaviour among Swedish youths visiting youth health clinics. *Nordisk Alkohol Nark* 2019;36:442–59.
11 Sanchez ZM, Nappo SA, Cruz JI, *et al*. Sexual behavior among high school students in Brazil: alcohol consumption and legal and illegal drug use associated with unprotected sex. *Clinics* 2013;68:489–94.
12 Khadr SN, Jones KG, Mann S, *et al*. Investigating the relationship between substance use and sexual behaviour in young people in Britain: findings from a national probability survey. *BMJ Open* 2016;6:e011961.
13 Maxwell S, Shahmanesh M, Gafos M. Chemsex behaviours among men who have sex with men: a systematic review of the literature. *Int J Drug Policy* 2019;63:74–89.
14 Evers YJ, Van Liere GAFS, Hoebe CJPA, *et al*. 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. *PLoS One* 2019;14:e0216732.
15 Hibbert MP, Brett CE, Porcellato LA, *et al*. Psychosocial and sexual characteristics associated with sexualised drug use and chemsex among men who have sex with men (MSM) in the UK. *Sex Transm Infect* 2019;95:342–50.

Sex Transm Infect: first published as 10.1136/sextrans-2021-055355 on 6 May 2022. Downloaded from http://sti.bmj.com/ on February 20, 2024 at University of Maastricht Consortia. Protected by copyright.

16 Sewell J, Miltz A, Lampe FC, *et al*. Poly drug use, chemsex drug use, and associations with sexual risk behaviour in HIV-negative men who have sex with men attending sexual health clinics. *Int J Drug Policy* 2017;43:33–43.
17 Heiligenberg M, Wermeling PR, van Rooijen MS, *et al*. Recreational drug use during sex and sexually transmitted infections among clients of a City sexually transmitted infections clinic in Amsterdam, the Netherlands. *Sex Transm Dis* 2012;39:518–27.
18 Kypri K, Cronin M, Wright CS. Do university students drink more hazardously than their non-student Peers? *Addiction* 2005;100:713–4.
19 Weatherburn P, Hickson F, Reid D, *et al*. Motivations and values associated with combining sex and illicit drugs ('chemsex') among gay men in South London: findings from a qualitative study. *Sex Transm Infect* 2017;93:203–6.
20 Yan AF, Chiu Y-W, Stoesen CA, *et al*. STD-/HIV-related sexual risk behaviors and substance use among U.S. rural adolescents. *J Natl Med Assoc* 2007;99:1386.
21 Reardon DC, Coleman PK, Cougle JR. Substance use associated with unintended pregnancy outcomes in the National longitudinal survey of youth. *Am J Drug Alcohol Abuse* 2004;30:369–83.
22 Dawson DA, Goldstein RB, Chou SP, *et al*. Age at first drink and the first incidence of adult-onset DSM-IV alcohol use disorders. *Alcohol Clin Exp Res* 2008;32:2149–60.
23 Gates PJ, Sabioni P, Copeland J, *et al*. Psychosocial interventions for cannabis use disorder. *Cochrane Database Syst Rev* 2016:CD005336.
24 Holt M, Sex HM. Sex, drugs, and HIV: let's avoid panic. *Lancet HIV* 2014;1:e4–5.

Sex Transm Infect: first published as 10.1136/sextrans-2021-055355 on 6 May 2022. Downloaded from http://sti.bmj.com/ on February 20, 2024 at University of Maastricht Consortia. Protected by copyright.