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# Impact of COVID-19 Pandemic on Men Who Have Sex With Men That Practice Chemsex in France: Results From the National ERAS Web Survey

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## Abstract

Chemsex—the use of drugs in a sexual context—has been associated with more at-risk sexual practices and substance-related complications in men who have sex with men (MSM). To date, no study has focused on the impact of France's first coronavirus disease 2019 (COVID-19)-related lockdown on the mental health and drug/alcohol use of MSM who practice chemsex. We implemented a web-based survey of 9,488 MSM living in France in June 2020 (after the country's first COVID-19 lockdown). Specifically, we first compared the subpopulation of MSM who self-reported practicing chemsex during their most recent sexual intercourse (defined as “chemsexers”) with other MSM, using five outcomes: increased 1/tobacco use, 2/alcohol use, and 3/other psychoactive drug use. 4/using psychotropic medication during the lockdown, and finally 5/psychological distress. We then analyzed the outcomes' associations with the main explanatory variable “chemsexer,” after adjusting for all relevant variables. Among 7,195 MSM who had sexual intercourse with a man during the previous 6 months, 359 participants (5%) were identified as “chemsexers.” Multivariable analyses showed that during the first lockdown period, chemsexers were significantly more likely than non-chemsexers to have increased their use of tobacco, alcohol, and other psychoactive substances. Chemsexers were also more likely to have used psychotropic medication and to have experienced psychological distress during the previous month. Given the ongoing COVID-19 pandemic in France and worldwide, this finding highlights the need to develop psychosocial interventions and harm reduction services for MSM chemsexers, potentially via mobile health.

## Keywords

chemsex, COVID-19, gay, mental health, drug use, web survey

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## Introduction

Chemsex, or sexualized drug use, is the use of psychoactive substances in a sexual context (Bourne & Weatherburn, 2017; McCall et al., 2015). It is characterized by the use—sometimes injected (Bui et al., 2018)—of “classic” drugs (e.g., cocaine and ketamine), mephedrone and derivatives, methamphetamine, and g-hydroxybutyrate/g-butylolactone (GHB/GBL) (Maxwell et al., 2019), and the risk of more at-risk sexual practices (Charre et al., 2018; Marcellin et al., 2015). Although chemsex comprises multiple dimensions (sex, drugs, number of people involved), care providers are primarily concerned about practices that place individuals at risk of health complications (infectious diseases, overdoses, mental health disorders, etc.)

(Donnadieu-Rigole et al., 2020; Tomkins et al., 2019). Research into chemsex is continuously growing, especially in men who have sex with men (MSM), because of a higher risk of associated consequences (Maxwell et al.,

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2019; Tomkins et al., 2019), including HIV and/or hepatitis C virus (HCV) transmission or infection (Guerras et al., 2021; Ramière et al., 2019), and other somatic, psychologic and psychiatric complications (Prestage et al., 2018). These complications are not only due to risks associated with drug use and sexual practices, independently, chemsex may generate synergic risks due to the effects of drug on sexual practices in terms of hardness and long-acting practices. Although MSM chemsexers are at higher risk of HIV transmission and infection than non-chemsexers, it has also been reported that they are more likely to use appropriate prevention tools such as pre-exposure prophylaxis (PrEP; Roux et al., 2018) and other prevention services (Sexually transmitted infections and HIV testing; Frankis et al., 2018).

The ongoing global coronavirus disease 2019 (COVID-19) pandemic caused by the spread of the SARS-CoV-2 virus, the associated reorganization of public health systems, lockdown measures, and other reduced social contact measures, have all led to some parts of the general population experiencing a deterioration in their socioeconomic situation, (greater) social isolation and poorer mental health (Gloster et al., 2020). In France, the first lockdown ran from March 17, 2020 to May 11, 2020 and was followed by the closure of bars and restaurants until June 2, 2020. Previous data on health crises and preliminary results from COVID-19 studies suggest that existing vulnerabilities, such as drug use and associated stigmatization, may exacerbate the negative health and social consequences of this pandemic (Jenkins et al., 2021). In France, concerns for people who use drugs (PWUD) and HIV-exposed populations arose following preliminary results from qualitative surveys, drug addiction monitoring system reports, and community alerts (Gérome & Gandilhon, 2020; Izambert et al., 2021; Lapeyre-Mestre et al., 2020) suggesting fear of anxiety, associated drug use and stocking drugs to palliate risk of rationing. These data were confirmed by several studies showing the negative impact of the pandemic on access to drug use-associated prevention and care for PWUD (Jacka et al., 2021; Russell et al., 2021). Some studies on MSM investigating the risks associated with lockdown measures and other COVID-19-related consequences highlighted a reduction in HIV consultations and interruption in PrEP and HIV testing (Santos et al., 2021). Unsurprisingly, others highlighted reductions in sexual intercourse by MSM in many countries; more specifically reductions ranged from 2.6 fewer sexual partners in patients interviewed in a PrEP clinic in the United States (Rogers et al., 2022) to a sixfold decrease in sexual intercourse with steady partners participating in an online survey conducted in more than 100 countries (Holloway et al., 2021). The latter study also demonstrated that social distancing negatively affected both the quality of sexual life of some MSM and anxiety levels. Finally, a

large online survey of MSM conducted in 103 countries revealed that COVID-19 had a substantial negative economic and mental health impact on this population (Santos et al., 2021). The above-mentioned studies investigated either MSM or drug users. While two studies reported that MSM who practice chemsex were more likely to use PrEP during the COVID-19 pandemic (Ringshall et al., 2021; Sousa et al., 2020), no data have yet been published on the pandemic's impact on MSM who practice chemsex. Given the greater risk of psychosocial vulnerabilities of MSM who engage in chemsex (Lafortune et al., 2021) than in those who do not, it is likely that this population has experienced greater health and social problems during the COVID pandemic. As a result, we used the special COVID-19 edition of the periodic French national Rapport au Sexe (ERAS) survey, conducted in a large sample of MSM, to explore the impact of the country's first lockdown on MSM chemsexers, by comparing them with non-chemsexer MSM in terms of mental health and psychoactive substance use.

## Method

### Study Design

The Rapport au Sexe (ERAS) special COVID-19 edition is a large French national cross-sectional survey of MSM using data collected via online questionnaires between June 30, 2020 (i.e., 1 month after the end of France's first lockdown) and July 15, 2020. Social media, online gay magazines, dating websites and applications as well as programmatic advertising were all used to advertise the survey and encourage participation. Consent was required before potential respondents could access the questionnaire. Collected data were anonymous (no IP addresses were collected) and no financial incentives were given. Inclusion criteria were being an MSM and being 18 years old or above. The study conformed with the ethical guidelines set out in the 1975 Helsinki Declaration. The survey protocol was evaluated and approved by the Collegial Project Evaluation Committee of Santé Publique France in Saint Maurice. All procedures performed were in accordance with the 1964 Helsinki declaration and later amendments.

### Data Collection and Outcomes

The main explanatory variable concerned practicing chemsex. Specifically, participants were asked when their most recent sexual intercourse with a man had taken place. Response options ranged from "never" to "within the last 24 hours." Details about intercourse, including information about chemsex (see below), were collected for all those who did not reply "never." The main explanatory variable was built using the following questionnaire

item: “During your most recent sexual intercourse—and not considering alcohol, cannabis or poppers—did you use at least one psychoactive substance (e.g., cocaine, ketamine, mephedrone and derivatives, methamphetamine, and GHB/GBL)?” Participants who replied “yes” to this question were classified as reporting chemsex during their most recent sexual intercourse with a man. To simplify the language of the manuscript and facilitate understanding of the results, we defined these persons as “chemsexers.” Those who replied “no” to the chemsex question were defined “non-chemsexers.”

We built the following five study outcomes, all related to mental health status and substance use during France’s first lockdown period.

- **Psychotropic medication:** Using (i.e., continuing or starting) medication to sleep or relieve stress during the lockdown, for example, sleeping pills and antidepressants.
- **Increased tobacco/alcohol/other psychoactive substance use:** Participants were asked three separate questions about changes in tobacco, alcohol, and other psychoactive substance (cannabis, poppers, cocaine, etc.) use between before and during the lockdown period. For example, participants were classified in the “yes” group for the “increased tobacco use” outcome if they increased, started, or re-started tobacco use during the lockdown. They were classified in the “no” group if they did not use tobacco before or during lockdown, if they did not change their consumption, if they decreased their consumption, or if they stopped tobacco use during lockdown. The same classification was applied for the alcohol and other psychoactive substance outcomes.
- **Psychological distress in the previous month:** The MH5 subscale was used to collect information about respondents’ mental health in the month prior to the study (i.e., the month after the first lockdown ended). This scale comprises five questions, each with a maximum score of four, about respondents’ feelings during the previous 4 weeks. The total score (maximum 20, with a lower score indicating poorer mental health) was converted into a score out of 100. Participants with a total score  $\leq 55$  were considered to have psychological distress (Saias et al., 2014).

We used four (i–iv) types of data as adjustment variables for the analyses: (i) *socio-demographic*: age, born outside France (two categories: yes vs. no), education level  $\geq$  university master’s or doctorate degree (vs. university bachelor’s degree or less) (yes vs. no), living in a large town (with more than 100,000 inhabitants) (yes vs. no),

married/in a couple (yes vs. no), employment status before lockdown—four categories: (a) employed; (b) self-employed; (c) unemployed, receiving an active solidarity income (i.e., state-provided support to complement existing income to guarantee a minimum revenue threshold), retired, or inactive for other reasons; and (d) student—deterioration in employment situation during lockdown: yes (partial unemployment, sick leave, forced to take annual leave and job loss) versus no (no change, teleworking, change for another reason), poorer financial situation because of COVID-19 (yes vs. no), outdoor space in accommodation during lockdown (terrace, garden) (yes vs. no), lived alone during lockdown (yes vs. no); (ii) *sexual behaviors and drug use*: two variables describing the use of gay meeting places for sex before lockdown (dating sites/geo-localized apps [yes vs. no] and sex parties [yes vs. no]), sexual intercourse with a stable partner during lockdown (yes vs. no), number of casual partners during lockdown—three categories: (a) none, (b) one, and (c) more than one, several variables describing the most recent sexual intercourse with a man—partner type with three categories: (a) stable, (b) casual, and (c) did not know; HIV status of partner with three categories: (a) HIV seronegative, (b) HIV seropositive, and (c) unknown HIV status, fist-fucking, or BDSM (bondage, discipline, dominance-submission and sadomasochism) (yes vs. no); anal sex with three categories: (a) no anal sex, (b) insertive or receptive anal sex, (c) both; protection during anal sex with five categories: (a) no prevention, (b) condoms only, (c) at least, that is, combined with (an)other prevention tool(s), treatment as prevention (TasP), (d) at least PrEP, (e) postexposure prophylaxis treatment only; (iii) *mental health issues*: Generalized Anxiety Syndrome (GAD-7 score  $\geq 10$ ) (Spitzer et al., 2006) (yes vs. no) (Leplège et al., 1998); (iv) *health status*: Having had COVID-19 disease: yes (whether diagnosed or not, i.e., based on symptoms experienced) versus no (answering “no” or “do not know”), having a chronic disease other than HIV: “yes” versus “no” or “do not know,” being HIV positive: yes versus no (a negative HIV test in the previous 12 months) or “do not know” (no HIV test in the previous 12 months or never tested for HIV), HIV testing during the previous 12 months (among those who self-reported they were seronegative) (yes vs. no), and finally, PrEP use (among those HIV seronegative) before (yes vs. no) and during (yes vs. no) the lockdown.

### Statistical Analyses

First, we compared chemsexers with non-chemsexers in terms of sociodemographic characteristics, sexual behaviors and drug use, mental health issues, and health status. We then compared percentages of those classified “yes”

and those classified “no” for the five health and substance use outcomes between chemsexers and non-chemsexers, using the chi-square test  $p$  values for categorical variables, and the Wilcoxon rank sum test  $p$  value for age (continuous variable). Finally, we ran five logistic regression models on the five separate outcomes to assess the impact of chemsex on each outcome after adjustment.

The following adjustment variables were used to ensure the estimated effect of chemsex on the outcomes would be accurate: age (continuous), born outside France, living in a large town, pre-lockdown employment situation, deterioration in employment situation during lockdown, lived alone during the lockdown, poorer financial situation because of COVID-19, having an outdoor space in accommodation during the lockdown (terrace, garden), had COVID-19, HIV status, chronic disease other than HIV, and number of casual sex partners during the lockdown. The GAD-7 score during the lockdown (where  $\geq 10$  indicates moderate or severe anxiety) was only included in the four analyses on medication and changes in substance use, but not in the last regression on psychological distress during the previous month, because of the strong correlation between the two variables.

The same variable selection method was used for each model: first, we ran univariable models to estimate the link between the chosen outcome and each explanatory variable. We then selected variables significantly associated at the 20% threshold (i.e.,  $p < .20$ ) and the “chemsexer” main explanatory variable to be entered in a multivariable model. Finally, we employed a backward selection, which consisted in removing variables with larger  $p$  values until all the remaining variables were significantly associated with the outcome ( $p < .05$ ).

We also tested a logistic nonordinal multinomial regression for the “psychotropic medication during lockdown” outcome model, to separately test the effect of continuing medication and the effect of starting medication during the lockdown (vs. “no psychotropic medication”), to see whether chemsexers had a greater risk of starting this kind of medication during the lockdown. As relative risk ratios were equivalent between the two categories (results not shown), we decided to keep a simple logistic regression (analyzing the probability of “continuing or starting psychotropic medication” vs. the probability of “no psychotropic medication”).

## Results

**Sample Description.** Between June 30, 2021 and July 15, 2021, 9,606,758 impressions were posted, and 40,341 clicks were recorded. Furthermore 17,403 questionnaires were started of which 9,488 were fully completed (i.e., completion rate 54.5%). The average time to complete

the questionnaire was 15 min. Of the 9,488 questionnaires completed, only 7,195 (study sample) lived in France, reported that their most recent sexual intercourse with a man had occurred in the previous 6 months and provided information for the “chemsexer” variable (see Figure 1).

Table 1 shows the descriptive results comparing chemsexers during their most recent intercourse with non-chemsexers, as well as total frequencies and percentages.

Median age of the study sample was 31 years, and 32% had an advanced university degree (i.e., master's or doctorate degree). Forty-five percent lived in a town with more than 100,000 inhabitants and 58% were married or in a couple. Before lockdown, 72% of the study sample were employed (63% were employees and 9% were self-employed), 21% were students, and the rest (more than 7%) were unemployed or inactive.

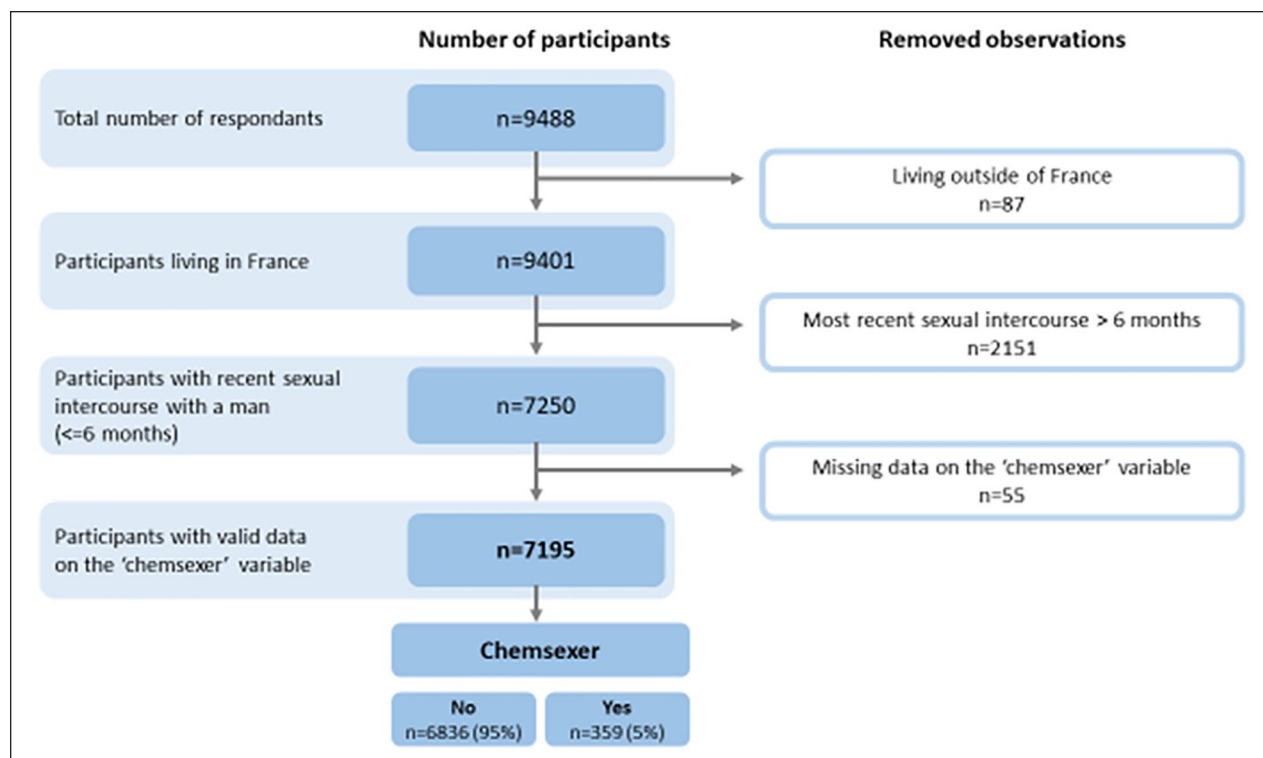
With regard to the lockdown, 23% of participants reported a deterioration in their work situation (partial unemployment, sick leave, or job loss), 75% lived in accommodation with a terrace or a garden during the lockdown period, and 26% lived alone.

In terms of health, 6% were living with HIV; among those who self-reported they were seronegative, 14% had used PrEP before lockdown.

**Comparison Between Chemsexers and Non-Chemsexers.** Of the 7,195 respondents comprising the study sample, 359 were classified chemsexers (5%). They were older, more likely to live in a large town (i.e., more than 100,000 inhabitants), and less likely to have lived in a home with an outdoor area during the first lockdown than non-chemsexers. Moreover, they were less likely to be students (11% vs. 22%,  $p < .001$ ), more likely to use gay meeting places for sex (dating sites/geo-localized apps: 93% vs. 75%,  $p < .001$ , and sex parties: 68% vs. 14%,  $p < .001$ ), and more likely to declare that their financial situation deteriorated due to the COVID-19 pandemic (31% vs. 22%,  $p < .001$ ). They were also more likely to have lived alone during the first lockdown (36% vs. 25%,  $p < .001$ ).

In terms of HIV, chemsexers were more likely to be seropositive (21% vs. 5%,  $p < .001$ ). Among respondents in the study sample who self-reported being seronegative, chemsexers were more likely to have taken PrEP during the lockdown (45% vs. 12%,  $p < .001$ ) and to have been tested within the previous 12 months (80% vs. 55%,  $p < .001$ ). Among respondents who declared taking PrEP pre-lockdown, chemsexers were less likely to have discontinued it during the lockdown (44% vs. 61%,  $p < .001$ ).

Compared with non-chemsexers, chemsexers were significantly less likely to report sexual activity with a stable partner in the previous 6 months (38% vs. 50%,



**Figure 1.** Flow Chart, ERAS 2020 Study (n = 9,488).

$p < .001$ ), but more likely to report more than one casual partner during the lockdown (47% vs. 15%,  $p < .001$ ).

With regard to their most recent sexual intercourse with a man, several different findings were found, as follows: Chemsexers mostly reported that it was with a casual or unknown sexual partner (42% and 31%, respectively), whereas a majority (52%) of non-chemsexers reported it was with their stable partner ( $p < .001$ ). The sexual partner was more likely to be HIV seropositive for chemsexers (10% vs. 3%) and have an unknown serological status (36% vs. 26%,  $p < .001$ ). More than a third of chemsexers reported rough sex practices (fist-fucking or BDSM) (34% vs. 5%,  $p < .001$ ) and more than one third practiced both active and passive anal sex (vs. 14% for non-chemsexers,  $p < .001$ ). Chemsexers who practiced anal sex (insertive/receptive) were more likely to have used TasP (10% vs. 2%;  $p < .001$ ) and PrEP (35% vs. 10%;  $p < .001$ ). Moreover, chemsexers were less likely to have used a condom exclusively (16% vs. 32%;  $p < .001$ ) and less likely to have not used any prevention tool (39% vs. 56%;  $p < .001$ ).

#### *Associations Between Five Study Outcomes and Chemsex.*

Across both groups, 18% of respondents declared using psychotropic medication during France's first lockdown. Furthermore, 21%, 27%, and 8% declared having

increased their tobacco, alcohol, and other psychoactive drug use during the lockdown, respectively. Finally, 33% of the study sample reported psychological distress during the previous month.

Figure 2 presents the distribution of the five outcomes between both chemsexers and non-chemsexers. All outcomes differed significantly between both groups at the 5% level. Chemsexers were significantly more likely to have taken medication during the lockdown to relieve stress (33% vs. 17%). With regard to changes in psychoactive substance use between pre-lockdown and during the lockdown, chemsexers were more likely to have increased their use of tobacco (34% vs. 21%), alcohol (39% vs. 26%), and other psychoactive substances (37% vs. 6%). Finally, they were also more likely to have experienced psychological distress during the previous month (41% vs. 32%).

Univariable and multivariable (adjusted) regression results are presented in Table 2. Only associations (univariable and multivariable) between the "chemsexer" variable and each outcome are shown; the complete multivariable models are available in the Appendix (see Table A1). All models confirmed the results illustrated in Figure 2. During France's first lockdown, chemsexers were significantly more likely to use medication to sleep or relieve stress (adjusted odds ratio [aOR] = 2.19, 95%

**Table 1.** Characteristics of Participants According to Chemsex Group, n (%), ERAS 2020 study (n = 7,195).

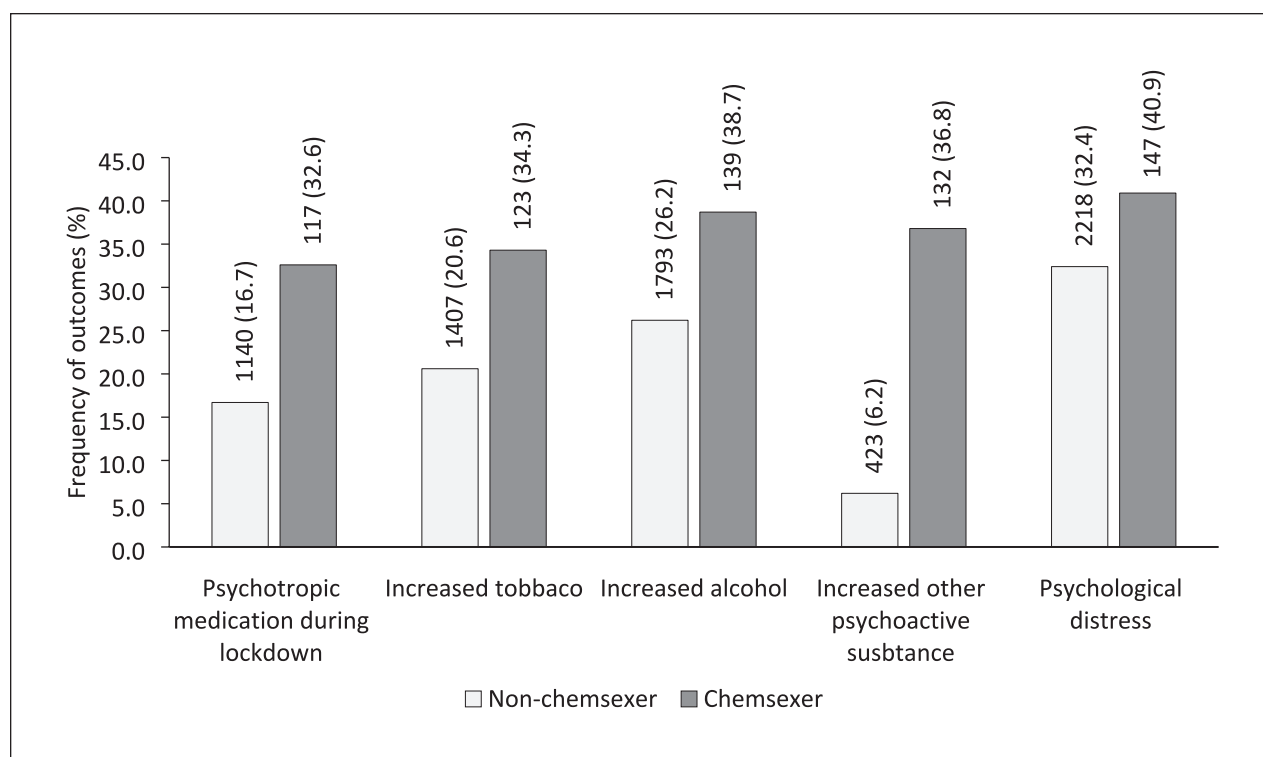
Variables	Non-chemsexers n = 6,836 (95.0%)	Chemsexers n = 359 (5.0%)	Total n = 7,195 (100.0%)	p value
<b>Sociodemographics</b>				
Median age (years)	31 (24–40)	35 (27–44)	31 (24–40)	<.001
Born outside France	450 (6.6)	30 (8.4)	480 (6.7)	.189
Education level $\geq$ university master's or doctorate degree	2,177 (31.8)	114 (31.8)	2,291 (31.8)	.971
Living in a large town <sup>a</sup>	3,022 (44.2)	208 (57.9)	3,230 (44.9)	<.001
Married/in a couple	4,046 (59.2)	149 (41.5)	4,195 (58.3)	<.001
<b>Pre-lockdown employment status</b>				
Employed	4,293 (62.8)	237 (66.0)	4,530 (63.0)	<.001
Self-employed	574 (8.4)	37 (10.3)	611 (8.5)	
Unemployed, receiving active solidarity income, retired or other inactive status	499 (7.3)	44 (12.3)	543 (7.5)	
Student	1,470 (21.5)	41 (11.4)	1,511 (21.0)	
<b>Frequented gay meeting places for sex before lockdown<sup>b</sup></b>				
Dating sites/geo-localized apps	5,131 (75.1)	334 (93.0)	5,465 (76.0)	<.001
Sex parties	987 (14.4)	243 (67.7)	1,230 (17.1)	<.001
<b>Health</b>				
HIV seropositive	344 (5.0)	76 (21.2)	420 (5.8)	<.001
HIV testing during the previous 12 months <sup>c</sup>	3,550 (54.7)	227 (80.2)	3,777 (55.7)	<.001
PrEP use before lockdown <sup>c</sup>	801 (12.3)	128 (45.2)	929 (13.7)	<.001
Stopped PrEP during lockdown <sup>d</sup>	489 (61.0)	57 (44.5)	546 (58.8)	<.001
Chronic disease (other than HIV)	868 (12.7)	51 (14.2)	919 (12.8)	.404
Had COVID-19 (whether diagnosed or not, i.e., based on symptoms suggestive of COVID-19)	998 (14.6)	60 (16.7)	1,058 (14.7)	.270
Generalized anxiety disorder syndrome (GAD-7 score $\geq$ 10)	1,392 (20.4)	82 (22.8)	1,474 (20.5)	.257
<b>Sexual activity during lockdown</b>				
With stable partner	3,390 (49.6)	138 (38.4)	3,528 (49.0)	<.001
Number of casual sex partners				<.001
None	5,228 (79.5)	169 (47.1)	5,397 (75.0)	
One	608 (8.9)	23 (6.4)	631 (8.8)	
More than one	1,000 (14.6)	167 (46.5)	1,167 (16.2)	
<b>Most recent sexual intercourse with a man (&lt;6 months)</b>				
Type of partner				<.001
Stable	3,570 (52.2)	98 (27.3)	3,668 (51.0)	
Casual	1,811 (26.5)	150 (41.8)	1,961 (27.3)	
Did not know	1,455 (21.3)	111 (30.9)	1,566 (21.8)	
HIV status of partner				<.001
Seronegative	4,872 (71.3)	193 (53.8)	5,065 (70.4)	
Seropositive	191 (2.8)	36 (10.0)	227 (3.2)	
Unknown	1,773 (25.9)	130 (36.2)	1,903 (26.4)	
<b>Sexual practices<sup>b</sup></b>				
Fisting or BDSM	370 (5.4)	124 (34.5)	494 (6.9)	<.001
Anal sex				<.001
No	2,142 (31.3)	64 (17.8)	2,206 (30.7)	
Insertive or receptive	3,708 (54.2)	171 (47.6)	3,879 (53.9)	
Both	986 (14.4)	124 (34.5)	1,110 (15.4)	

(continued)

**Table 1. (continued)**

Variables	Non-chemsexers	Chemsexers	Total	p value
	n = 6,836 (95.0%)	n = 359 (5.0%)	n = 7,195 (100.0%)	
Protected anal sex <sup>e</sup>				<.001
No protection	2,623 (55.9)	114 (38.6)	2,737 (54.9)	
Condoms exclusively	1,490 (31.7)	48 (16.3)	1,538 (30.8)	
At least <sup>f</sup> treatment as prevention	99 (2.1)	28 (9.5)	127 (2.6)	
At least PrEP	471 (10.0)	103 (34.9)	574 (11.5)	
Postexposure prophylaxis treatment exclusively	11 (0.2)	2 (0.7)	13 (0.3)	
Lockdown-related variables				
Deterioration in employment situation during lockdown	1,552 (22.7)	94 (26.2)	1,646 (22.9)	.126
Poorer financial situation because of COVID-19	1,504 (22.0)	112 (31.2)	1,616 (22.5)	<.001
Lived alone during lockdown	1,728 (25.3)	129 (35.9)	1,857 (25.8)	<.001
Outdoor space in accommodation during lockdown (terrace, garden)	5,146 (75.3)	229 (63.8)	5,375 (74.7)	<.001

<sup>a</sup>Size of >100,000 inhabitants. <sup>b</sup>Several answers. <sup>c</sup>For 6,675 nonseropositive participants (i.e., seronegative or unknown status). <sup>d</sup>For 929 participants using PrEP. <sup>e</sup>For 4,989 participants who had anal sex during their most recent intercourse. <sup>f</sup>Combined with one or more other prevention tools. COVID-19 = coronavirus disease 2019; PrEP = pre-exposure prophylaxis.



**Figure 2.** Psychotropic Medication Use, Changes in Psychoactive Substance Use, and Psychological Distress According to the “Chemsexer” Variable, ERAS 2020 Study (n = 7,195)

Note. All differences between chemsexers and non-chemsexers were significant at 5%.



**Table 2.** Associations Between Chemsex and Each of the Five Study Outcomes: Univariable and Multivariable Logistic Regression Models, ERAS 2020 Study (n = 7,195).

Outcomes/ Models	Outcome 1		Outcome 2		Outcome 3		Outcome 4		Outcome 5	
	Psychotropic medication for sleep or stress relief during lockdown <sup>a</sup>	p	Increased tobacco use during lockdown <sup>b</sup>	p	Increased alcohol use during lockdown <sup>c</sup>	p	Increase in other psychoactive substance use during lockdown <sup>d</sup>	p	Psychological distress in the previous month <sup>e</sup>	p
	OR [95% CI]		OR [95% CI]		OR [95% CI]		OR [95% CI]		OR [95% CI]	
<b>Univariable models</b>										
Non-chemsexer	Ref		Ref		Ref		Ref		Ref	
Chemsexer	2.42 [1.92, 3.04]	<.001	2.01 [1.60, 2.52]	<.001	1.78 [1.43, 2.21]	<.001	8.82 [6.96, 11.16]	<.001	1.44 [1.16, 1.79]	.001
<b>Multivariable models</b>										
Non-chemsexer	Ref		Ref		Ref		Ref		Ref	
Chemsexer	2.19 [1.72, 2.80]	<.001	1.66 [1.31, 2.11]	<.001	1.60 [1.28, 2.01]	<.001	6.71 [5.19, 8.68]	<.001	1.39 [1.11, 1.74]	.004

Notes. <sup>a,b,c,d,e</sup>Models adjusted for age and poorer COVID-19-related financial situation. <sup>a,b,c,d</sup>Models adjusted for size of place of residence and generalized anxiety disorder. <sup>b,c,d</sup>Models adjusted for education level. <sup>a</sup>Models adjusted for pre-lockdown employment situation, having COVID-19, and having a chronic pathology (excluding HIV). <sup>b</sup>Models adjusted for pre-lockdown employment situation, being HIV seropositive, and number of casual sex partners during lockdown. <sup>c</sup>Models adjusted for pre-lockdown employment situation, having lived alone during lockdown, and being HIV seropositive. <sup>d</sup>Models adjusted for outdoor space in accommodation during lockdown, having COVID-19, being HIV seropositive, and number of casual sex partners during lockdown. <sup>e</sup>Models adjusted for pre-lockdown employment situation, living alone during lockdown, outdoor space in accommodation during lockdown, having had COVID-19, and having a chronic pathology (excluding HIV). COVID-19 = coronavirus disease 2019; OR = odds ratio; aOR = adjusted OR; 95% CI = 95% confidence interval; p = p value.

confidence interval [95% CI] = [1.72, 2.80]), and more likely to increase both tobacco (aOR = 1.66, 95% CI = [1.31, 2.11]) and alcohol (aOR = 1.60, 95% CI = [1.28, 2.01]) use. Furthermore, they were more than seven times more likely than non-chemsexers to have increased other psychoactive substance use during this period (aOR = 6.71, 95% CI = [5.19, 8.68]). Finally, they were more likely to have experienced psychological distress during the previous month (aOR = 1.39, 95% CI = [1.11, 1.74]).

## Discussion

The Rapport au Sexe (ERAS) special COVID-19 edition survey, conducted in a large population of MSM just after the end of the first COVID-19 lockdown in France is the first study to show the impact of this period on MSM who recently practiced chemsex. The lockdown had a more deleterious impact on chemsexers than non-chemsexers. Specifically, the former were more likely to have increased their tobacco and alcohol use and were more than seven times more likely to have increased other psychoactive substance use during this period. They also were more likely to report psychological distress and to have used psychotropic medications during the lockdown. This is in line with findings from three other studies: one conducted in 21 European countries among substance users showing an increase in tobacco and cannabis use (Manthey et al., 2021), one conducted in the general population in France showing the negative impact of the COVID-19 period on mental health (Ramiz et al., 2021), and finally a large study in 38 countries showing the deleterious impact of the socio-economic consequences of COVID-19 on mental health (Gloster et al., 2020).

To better understand these results and to propose public health perspectives, we shall describe our findings in greater detail and in light of recent literature (although not conducted in the French context). First, we found that 5% of our total study sample reported practicing chemsex during their most recent sexual intercourse. This is lower than the results—from 10% to 25%—identified in other large studies which focused on chemsex in MSM before the COVID period began (Blomquist et al., 2020; Bohn et al., 2020; Brogan et al., 2019; Guerras et al., 2021). There are two possible explanations for this difference; the first is that we asked about chemsex practice only during the most recent intercourse with a man; this may have led to the proportion of chemsexers being underestimated. The second is related to the period covered by our survey (i.e., first French lockdown) where sexual practices decreased considerably (Holloway et al., 2021; Rogers et al., 2022).

In our study, chemsexers were older and less likely to be students. These findings corroborate other studies reporting that chemsex practice is more frequent among older MSM (Blomquist et al., 2020; Hibbert et al., 2019). In addition, consistently with other studies, we found that participants who lived in urban areas with large towns (Achterbergh et al., 2020; Hibbert et al., 2019), those who used gay meeting places for sex and used applications more frequently, those who reported sex parties more frequently, and those who did not live in a couple, were all more likely to be chemsexers. In terms of HIV status, chemsexers were also more likely to report being HIV positive than non-chemsexers, reflecting previous findings (Blomquist et al., 2020).

With respect to the impact of COVID on chemsexer MSM, the main findings of this survey are that they were more likely to report a higher level of psychological distress and increased use of psychotropic medication, and more likely to increase psychoactive substance during France's first lockdown than non-chemsexer MSM. Specifically, chemsexers increased their tobacco and alcohol use by 21% and 27%, respectively. These increases reflect the findings for the French general population for the same period, where significant increases of 27% and 11%, respectively, were identified (Guignard et al., 2021). It would be interesting to understand whether the large increase in psychoactive substance use reported by chemsexers was related to more frequent chemsex practice since the beginning of the first lockdown, or to a general increase in drug use. Further studies are needed to better explain the impact of the pandemic on chemsex practice dynamics.

In terms of mental health, chemsexers were more negatively affected by the lockdown period than non-chemsexers. They were twice as likely to use psychotropic medications and to have psychological distress, which might possibly be explained—at least in part—by a deterioration in living conditions caused by the lockdown period (poorer financial situation, greater isolation, weakening of community bonds and not having an outdoor space in their accommodation). Sociological literature suggests that many MSM choose to live in an urban environment to live their homosexuality more freely and to create gay and gay-friendly networks (Abraham, 2009). The lockdown restriction measures, therefore, had very negative consequences for this population.

Although chemsexers were more likely to report at-risk sexual behaviors (sex parties, rough sex, and anal intercourse with casual partners), a higher number of partners, and condomless anal intercourse, they were also more likely to report HIV testing within the previous 12 months and PrEP use than non-chemsexers. These findings also corroborate previous work reporting that MSM

who practice chemsex adequately adopted PrEP as a harm reduction tool (Hibbert et al., 2019; Roux et al., 2018). They also corroborate other findings demonstrating that MSM who reported chemsex were more likely to use PrEP during the lockdown period (Hyndman et al., 2021). This highlights the importance of maintaining access to PrEP and adapting prevention and care interventions for this subpopulation during the ongoing pandemic. For example, in terms of prevention related to psychoactive substance use, tailored harm reduction interventions (i.e., sex-positive, LGBT-friendly) are needed. Furthermore, the deterioration in mental health in this subpopulation calls for more specific mental health services. More specifically, referrals to a psychologist or psychiatrist should be proposed within structures providing PrEP and/or harm reduction (HR) services (sterile equipment, information on drugs, drug testing, . . .), and should take into account the psychological and interpersonal factors associated with chemsex (Lafortune et al., 2021). Several studies have suggested that web-based mobile health tools could be a pathway to better MSM engagement in HIV prevention and care (Goedel et al., 2017; Huang et al., 2016; Phillips et al., 2015), which suggests that MSM chemsexers are capable of adequately using telemedicine and other web-based tools, and adopting harm reduction tools.

A large proportion of the study population (whether chemsexers or not, as per our definitions) experienced a large increase in psychological distress, as well as increased use of tobacco, alcohol and psychotropic medication. This finding highlights the need for adequate associated interventions.

Some study limitations must be acknowledged. First, despite the national and web-based dimensions of the survey, it was not representative. Only MSM with access to the web who had clicked on the invitation to participate were reached. Second, in terms of how we defined chemsexers, it is possible that persons who practiced chemsex

infrequently were placed in the same category as those who practiced it very frequently. However, it is more probable that this method selected the latter group. Third, it is possible that some participants had their last sexual intercourse at the beginning of the 6-month period and therefore just before the lockdown period. Having said that, this limitation would only have led to an underestimation of the effect of COVID-19 on chemsexer MSM. Fourth, we defined at-risk sexual practices in terms of HIV transmission but did not collect any data on sexually transmitted infections during the previous 6 months; accordingly, we were not able to concretely assess at-risk practices. In addition, data reflect past 6-month behaviors while the COVID lockdown only occurred during three of those months. However, we can hypothesize that lockdown effects may have lasted after the end of the lockdown. Fourth, we were not able to identify chemsexers who injected drugs (slamming) during sex. Finally, self-reports are known to be subject to desirability bias. However, the fact that this was a web-based survey and that MSM acceptability of web-based tools is generally very high (Goedel et al., 2017) would suggest that it was easier for them to answer sensitive questions online than face to face. Moreover, self-reported data on drug use have already been validated in another context (Darke, 1998).

## Conclusion

Our survey showed that MSM who reported chemsex during their most recent sexual intercourse with a man were more negatively affected by the first French lockdown than non-chemsexer MSM, especially in terms of drug and alcohol use and psychological distress. During this most difficult period in terms of social and physical distancing, psychosocial interventions and adapted HR services for chemsexers should be developed using web tools.

## Appendix

**Table A1.** Factors Associated With Each of the Five Outcomes: Multivariable Logistic Regression Models, ERAS 2020 Study (n = 7,195).

Variables	Outcome 1		Outcome 2		Outcome 3		Outcome 4		Outcome 5	
	aOR [95% CI]	p	aOR [95% CI]	p	aOR [95% CI]	p	aOR [95% CI]	p	aOR [95% CI]	p
Psychotropic medication for sleep or stress relief during lockdown										
Chemsexer	2.19 [1.72, 2.80]	<.001	1.66 [1.31, 2.11]	<.001	1.60 [1.28, 2.01]	<.001	6.71 [5.19, 8.68]	<.001	1.39 [1.11, 1.74]	.004
Age (continuous)	1.02 [1.01, 1.03]	<.001	0.98 [0.97, 0.99]	<.001	1.01 [1.00, 1.01]	.024	0.98 [0.97, 0.99]	<.001	0.98 [0.98, 0.99]	<.001
Born outside France										
Education level $\geq$ university			0.73 [0.64, 0.84]	<.001	1.14 [1.01, 1.28]	.033	0.81 [0.65, 0.99]	.045		
Master's or doctorate degree			1.22 [1.08, 1.38]	.001	1.21 [1.08, 1.35]	.001	1.32 [1.09, 1.60]	.004		
Living in a large town <sup>a</sup>	1.20 [1.05, 1.36]	.007								
Pre-lockdown employment situation										
Employed	Ref		Ref		Ref		Ref		Ref	
Self-employed	0.85 [0.67, 1.08]	.193	0.91 [0.73, 1.12]	.373	0.93 [0.77, 1.13]	.479			0.71 [0.58, 0.87]	.001
Unemployed, receiving active solidarity income, retired or other inactive status	1.69 [1.36, 2.09]	<.001	0.95 [0.77, 1.18]	.660	0.67 [0.54, 0.83]	<.001			1.80 [1.49, 2.17]	<.001
Student	0.86 [0.71, 1.05]	.151	0.48 [0.40, 0.57]	<.001	0.61 [0.52, 0.72]	<.001			1.63 [1.41, 1.89]	<.001
Deterioration in employment situation during lockdown										
Lived alone during lockdown										
Poorer financial situation because of COVID-19	1.29 [1.11, 1.49]	.001	1.74 [1.52, 1.98]	<.001	1.43 [1.26, 1.62]	<.001	1.67 [1.37, 2.04]	<.001	1.34 [1.19, 1.51]	<.001
Outdoor space at accommodation during lockdown (terrace, garden)									1.96 [1.74, 2.21]	<.001
Had COVID-19 (whether diagnosed or not, i.e., based on symptoms suggestive of COVID-19)	1.27 [1.07, 1.51]	.006					0.74 [0.60, 0.90]	.003	0.84 [0.75, 0.95]	.005
HIV seropositive			1.50 [1.19, 1.91]	.001	1.26 [1.01, 1.57]	.039			1.33 [1.15, 1.52]	<.001
Chronic disease (excluding HIV)	2.22 [1.88, 2.62]	<.001					1.61 [1.15, 2.25]	.005	1.56 [1.35, 1.82]	<.001
Number of casual sex partners during lockdown										
None			Ref		Ref		Ref			
One			1.37 [1.13, 1.67]	.002			1.49 [1.10, 2.03]	.011		
More than one			1.20 [1.02, 1.40]	.025			2.07 [1.67, 2.56]	<.001		
Generalized anxiety disorder syndrome (GAD-7 score $\geq$ 10)	3.67 [3.19, 4.22]	<.001	1.80 [1.58, 2.06]	<.001	1.34 [1.18, 1.53]	<.001	1.35 [1.09, 1.66]	.005		

Notes. aOR = adjusted odds ratio; COVID-19 = coronavirus disease 2019; 95% CI = 95% confidence interval; p = p value.

<sup>a</sup>Size of > 100,000 inhabitants.

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## Author Contributions

A.V. contributed to the study's conception and design. A.V. participated in the data collection while P.R., C.D., G.G., B.S., and C. conducted the analyses. P.R., C.P., and A.V. conducted the literature review, and P.R. drafted the first version of the manuscript. All authors revised the final manuscript and agree to be responsible for all aspects of the study.

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