



UvA-DARE (Digital Academic Repository)

Sexual Distancing During 5 Periods Around and During the COVID-19 Pandemic, Amsterdam, the Netherlands

de Vries, D.C.; Jongen, V.W.; Zimmermann, H.M.L.; Davidovich, U.; Hoornenborg, E.; de Vries, H.J.C.

DOI

[10.1097/OLQ.0000000000001888](https://doi.org/10.1097/OLQ.0000000000001888)

Publication date

2024

Document Version

Final published version

Published in

Sexually Transmitted Diseases

License

CC BY-NC-ND

[Link to publication](#)

Citation for published version (APA):

de Vries, D. C., Jongen, V. W., Zimmermann, H. M. L., Davidovich, U., Hoornenborg, E., & de Vries, H. J. C. (2024). Sexual Distancing During 5 Periods Around and During the COVID-19 Pandemic, Amsterdam, the Netherlands. *Sexually Transmitted Diseases*, 51(1), 72-80. <https://doi.org/10.1097/OLQ.0000000000001888>

General rights

It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

Disclaimer/Complaints regulations

If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: <https://uba.uva.nl/en/contact>, or a letter to: Library of the University of Amsterdam, Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.

UvA-DARE is a service provided by the library of the University of Amsterdam (<https://dare.uva.nl>)

OPEN

Sexual Distancing During 5 Periods Around and During the COVID-19 Pandemic, Amsterdam, the Netherlands

Dominique C. de Vries, MD,* Vita W. Jongen, PhD,* Hanne M.L. Zimmermann, PhD,*†
 Udi Davidovich, PhD,*‡
 Elske Hoornenborg, PhD, MD,*§||¶ and Henry J.C. de Vries, PhD, MD*‡¶**

Background: Social and sexual distancing (ie, abstaining from sex with persons outside one's household) was important in the control of the COVID-19 pandemic. Compliance to distancing measures can change over time. We assessed changes in compliance to the sexual distancing measures during five periods of the COVID-19 pandemic in the Netherlands.

Methods: Between November 2021 and March 2022, we used a structured questionnaire containing questions about sexual behavior and factors that could have influenced compliance with sexual distancing. Variables related to sexual behavior were measured for 5 periods, before and during the pandemic, delineated by imposition and relaxation of lockdown measures.

Results: Eight hundred seventy participants (predominantly MSM) completed the questionnaire. We found that compliance to the sexual distancing measures decreased over time. The number of casual partners was highest after the lockdown measures were relaxed for the second time (April 2021 to March 2022), and even higher than before the first lockdown. Factors positively associated with sexual distancing compliance were: having confidence in the information provided by the government and experiencing less or similar need for physical contact compared with before the pandemic. Factors that lowered compliance over time were: previously having had COVID-19, perceiving the lockdown measures as overstated, having sex with casual partners and similar drug use during the pandemic as before.

Conclusions: Our findings suggest that sexual distancing measures are difficult to maintain for a long period. Other measures, such as confinement to a small network of known partners, might be more effective for longer pandemics in minimizing the spread of infectious diseases.

In December 2019, the first COVID-19 patients were reported in Wuhan, China. Soon after, COVID-19 impacted the whole world with numerous hospitalized patients, deaths and health measures. On the 27th of February 2020, the first COVID-19 patient

was reported in the Netherlands.¹ Since the devastating effect of COVID-19 had already impacted other countries, nationally implemented health measures to control the pandemic in the Netherlands followed quickly. One of the most important measures was social distancing (ie, keeping 1.5 m distance from persons outside one's household) imposed on the 15th of March 2020. Apart from a ban on sex work, sexual distancing (ie, abstaining from sex with persons outside one's household) was not specifically mentioned, even though citizens were asked to comply with social distancing measures, which includes sexual distancing, until February 2022. From May 14, 2020, official government communication stated that it was acceptable to have one sexual partner (sex buddy) outside one's household.² Although the measures related to sexual distancing were not mandatory, they were strongly encouraged.

In a previous qualitative study we elucidated motives and barriers for both social and sexual distancing among men who have sex with men (MSM).³ We concluded that governmental information on distancing measures should be more explicit, accessible, understandable, inclusive and related to key populations (e.g., singles, MSM) to be more effective. Although there are more studies evaluating determinants for compliance with (social- and) sexual distancing,^{4–7} we found that none looked at sexual compliance over time and the effect of alternating lock down and relaxation periods on distancing measures during the pandemic.

Understanding sexual distancing compliance over time is highly relevant due to the high probability of future outbreaks of infectious diseases requiring social and sexual distancing measures with substantial impact on all aspects of life. The mpox outbreak of 2022 is one example.⁸ The mpox outbreak emerged soon after the COVID-19 lockdown measures were lifted across Europe which likely contributed to the rapid spread of mpox across the continent.⁹

From the *Department of Infectious Diseases, Public Health Service Amsterdam, Amsterdam, The Netherlands †Department of Work and Social Psychology, Maastricht University, Maastricht, The Netherlands ‡Department of Social Psychology, University of Amsterdam, Amsterdam, The Netherlands §Amsterdam UMC location University of Amsterdam, Department of Internal Medicine, Meibergdreef 9, Amsterdam, The Netherlands ¶Amsterdam Public Health Research Institute (APH), Amsterdam, The Netherlands ||Amsterdam Institute for Infection and Immunity (AII), Amsterdam, The Netherlands **Amsterdam UMC location University of Amsterdam, Department of Dermatology, Meibergdreef 9, Amsterdam, The Netherlands
 Acknowledgments: The authors would like to thank Dr. Anders Boyd, Dr. Susanne Drückler and Prof. Dr. Maarten Schim van der Loeff for their invaluable contribution to this study.

Conflict of Interest: None declared.

Sources of Funding: Funding from the GGD research funds (grant number not applicable).

Ethics Approval: The Amsterdam University Medical Centre ethics committee approved the study and deemed a full review not necessary according to the Medical Research Involving Human Subjects Act (reference letter: W21_432, # 21.481, delivery date: 21 October 2021).

Correspondence: Henry J C de Vries, PhD, MD, Public Health Service of Amsterdam, Department of Infectious Diseases, STI clinic, P.O. Box 2200, 1000 CE Amsterdam, the Netherlands. E-mail: h.j.devries@amsterdamumc.nl; Elske Hoornenborg, PhD, MD, Public Health Service of Amsterdam, Department of Infectious Diseases, STI clinic, P.O. Box 2200, 1000 CE Amsterdam, the Netherlands. E-mail: ehoornenborg@ggd.amsterdam.nl.

Received for publication July 3, 2023, and accepted September 6, 2023. Supplemental digital content is available for this article. Direct URL citations appear in the printed text, and links to the digital files are provided in the HTML text of this article on the journal's Web site (<http://www.stdjournal.com>).

DOI: 10.1097/OLQ.0000000000001888

Copyright © 2023 The Author(s). Published by Wolters Kluwer Health, Inc. on behalf of the American Sexually Transmitted Diseases Association. This is an open-access article distributed under the terms of the Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 (CCBY-NC-ND), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal.

BOX 1. Different periods of the COVID-19 pandemic each of which is briefly explained below with a summary of the most important measures

P1: Pre-pandemic	Before the Pandemic
P2: First lockdown	During the first lockdown in the Netherlands (March – May 2020) - Keep 1.5 m distance from persons outside one's household - Abstaining from sex with persons outside one's household
P3: First relaxation	Between the first and the second lockdown (June – October 2020) - Keep 1.5 m distance from persons outside one's household - Acceptable to have one sexual partner outside one's household
P4: Second lockdown	During the second lockdown (November 2020 – March 2021) - Keep 1.5 m distance from persons outside one's household - Acceptable to have one sexual partner outside one's household
P5: Second relaxation	After the second lockdown (April 2021 – March 2022) - Keep 1.5 m distance from persons outside one's household - Acceptable to have one sexual partner outside one's household

To improve future social and sexual distancing measures during outbreaks of infectious diseases, we explored compliance to social and sexual distancing measures of participants during five distinct periods of the pandemic delineated by imposition and relaxation of lockdown measures while also examining changes in the type of sex partners.

MATERIALS AND METHODS

Study Site and Population

We performed a quantitative study using a structured online questionnaire in which participants retrospectively reported on sexual and social distancing during five subsequent lockdown periods during the COVID-19 pandemic, each demarcated by major changes in imposing and relaxation of lockdown measures (Box 1). Individuals were recruited through advertisements at the Center for Sexual Health of the Public Health Service in Amsterdam, the Netherlands, Grindr (a dating app designed for male same sex dating used across the Netherlands), and Instagram (@MEIJT). All individuals 18 years of age or older were eligible for inclusion. The Center for Sexual Health in Amsterdam is an expertise center for sexual transmitted infections (STI) and offers free of charge STI and sexual health care to several key populations (e.g., individuals under the age of 25 years old, MSM, sex workers, individuals with STI related symptoms).

The Amsterdam University Medical Centre ethics committee examined the study provided exemption from a full review for Medical Research Involving Human Subjects Act (reference letter: W21_432, # 21.481, delivery date: 21 October 2021)

Data Collection

Data were collected between 25 November 2021 and 3 March 2022. The questionnaire was developed using the findings from our previous qualitative study on sexual distancing³; items were translated into quantifiable items on a 5-point Likert scales. The questionnaire was available in Dutch and English and piloted by three people who were unrelated to the Center for Sexual Health in Amsterdam and the current study. The questionnaire was administered once in P5 and contained both questions related to P5 (e.g., age and vaccination status) and questions where behavior and opinions were retrospectively assessed for all time periods (Box 1). It was possible to skip questions while completing the questionnaire. The complete questionnaire is available in Appendix 1 (<http://links.lww.com/OLQ/B7>).

Items were:

- (1) socio-demographics (ie, age, country of birth, country of birth of both parents, COVID-19 vaccination status (yes/no), history of COVID-19 (yes/no), home situation (housemate yes/no), work situation (at home/not at home) and relationship status (yes/no)

- (2) Socio-psychological and behavioral determinants, asked on 5-point Likert Scale (ie, compliance to the measures, concern about getting infected with COVID-19, perceptions of the government, the measures and the information provision around the measures, the way of gathering information about COVID-19, the estimated COVID-19 exposure risk during sex, sexual satisfaction, the need for sexual and/or physical contact, regret for (non)compliance, drug use, and feelings of loneliness or boredom during the COVID-19 pandemic).

- (3) Sexual behavior (ie, number and type of sex partners)

The type of sex partners was divided into steady partners, known casual partners and anonymous casual partners. Steady partners refer to an individual or group of individuals with whom a perceived enduring relationship exists, irrespective of the duration of the relationship. Known casual partners refer to an individual or group of individuals of whom the participant had contact details and with whom they occasionally meet for sex, yet are not regarded as enduring partners. Anonymous casual partners represent unfamiliar individuals without prior sexual engagement or contact details, including those encountered through apps such as Grindr.

P1 (prepandemic): the period before the COVID-19 pandemic, without measures. P2 (first lockdown): The period when COVID-19 had just arrived in the Netherlands ('the first wave') and the first measures were announced. Measures included the basic measures (washing hands regularly, keeping 1.5 m away, etc.), but also closing shops, catering, schools and nurseries, close-contact professions and the advice to stay at home and work from home as much as possible. P3 (first relaxation): Most measures were lifted. Most close-contact professions were possible again, schools and the catering industry opened and there was no limit to the number of people who could meet inside and outside. However, the basic measures remained in force. P4 (second lockdown): the number of infections rose again ("second wave") and measures were announced again, including closing catering, events, schools, close-contact professions. The maximum group size for indoor and outdoor activities was significantly reduced again and curfews were imposed in January. There were also restrictions on sports and the additional public. P5 (second relaxation): There was no longer a curfew and the schools, shops, catering, close-contact professions, discotheques and clubs were open again. The measures regarding group size and audience (to events such as weddings and other social gatherings) were lifted. The basic measures were still in force.

Outcomes

Our main outcome was self-reported compliance to the sexual distancing measures for each of the four periods during the

pandemic. Since period 1 corresponds to the pre-pandemic period, no questions regarding compliance were included during this period. A participant was labeled as compliant if their self-reported compliance was either very good or good (ie, 4 or 5 on the 5-point Likert scale). A participant was labeled non-compliant if their self-reported compliance was neutral, not very good or not good at all (ie, 1, 2, or 3 on the Likert scale). The same approach was used to assess compliance to the social distancing measures.

Statistical Analysis

Participants who did not complete the questions related to sexual distancing or who completed less than one third of the questions were excluded from the analyses. We described the number of individuals who were sexually compliant and those who were not, over the five subsequent periods using descriptive statistics. We also described sexual and social distancing compliance during the five different time periods, as well as changes in the main partner type (ie, steady partners, known casual partners and unknown casual partners). We compared the main partner type between periods using Pearson χ^2 test.

Poisson regression (with logit link) with a robust standard error was used to assess determinants for compliance to the sexual distancing measures.¹⁰ We used generalized estimation equation (GEE) to account for clustered data (with exchangeable within-group correlation structure). The univariable logistic regression analysis included socio-demographics, sociopsychological determinants and sexual behavior. We included all variables associated at $P < 0.2$ (Wald test) from the univariable logistic regression analysis in the multivariable analyses. Variables were considered significantly associated if the P value was < 0.05 . Statistical analyses were performed using Stata (v15.1, StataCorp, College Station, TX).

RESULTS

Between November 25, 2021, and 3 March 3, 2022, 930 participants completed the questionnaire. A total of 870 participants answered more than two-thirds of the questions and answered the questions about sexual compliance and were thus included in our analyses. Seven hundred nineteen participants were recruited via the dating app Grindr (83%), 29 participants were recruited via social media (the Instagram page @MEIJT) (3%) and the other 122 participants were recruited through the Center for Sexual Health in Amsterdam (14%). The median age of the participants was 33 years (interquartile range [IQR] 27–44) (Table 1). Most participants were born in the Netherlands, were able to understand the Dutch language, and were fully vaccinated for COVID-19 at the time of completing the questionnaire. Before the COVID-19 pandemic (P1), almost half of the participants were in a steady relationship (which could be either monogamous or non-monogamous) the majority of participants had >1 different sex partners every month. During the first lockdown (P2) over 40% of participants did not have any sex partners. Only during the second relaxation period P5, the number of sex partners was comparable again with before the pandemic.

Sexual Distancing

The number of participants compliant to sexual distancing decreased from 503 participants (57.8%) in P2, to 368 participants (42.3%) in P3, 325 participants (37.4%) in P4, and 214 participants (24.6%) in P5 (Table 1, Fig. 1).

We found that the number of participants who were socially and sexually compliant decreased from 424 participants (49.3%) in P2, to 274 participants (31.9%) in P3, to 234 participants (27.2%) in P4, to 135 participants (15.7%) in P5. The number of participants that were solely socially compliant (and sexually noncompliant) and

solely sexually compliant (and socially non-compliant) was relatively stable throughout the four periods (Fig. 3).

One hundred eleven participants (12.8%) regretted non-compliance to sexual distancing measures, whereas 160 participants (18.4%) regretted compliance to sexual distancing measures.

Results from univariable and multivariable analyses are shown in Table 2. Sexual distancing compliance was higher among those having confidence in governmental information (adjusted risk ratio [aRR], 1.09; 95% confidence interval [CI], 1.03–1.16) and those who had the same (aRR, 1.15; 95% CI, 1.00–1.31) or less (aRR, 1.75; 95% CI, 1.49–2.07) need for physical contact compared with before the COVID-19 pandemic. Compared with P1, sexual distancing compliance was lower in P3 (aRR, 0.87; 95% CI, 0.80–0.95), P4 (aRR, 0.80; 95% CI, 0.72–0.87), and P5 (aRR, 0.62; 95% CI, 0.54–0.71). In addition, compliance was lower among those who previously had COVID-19 (aRR, 0.81; 95% CI, 0.66–0.99), found the government measures to be overstated (aRR, 0.92; 95% CI, 0.87–0.97), and those who had known casual partners (aRR, 0.73; 95% CI, 0.62–0.86) and unknown casual partners (aRR, 0.59; 95% CI, 0.48–0.72) as their main partner type, compared with those with steady partners. Similarly, similar drug use during the pandemic compared with before (aRR, 0.72; 95% CI, 0.56–0.92) was associated with lower compliance.

Sexual Partners

The most mentioned sexual partner type differed from mostly unknown casual partners ($n = 269$, 34.0%) in P1 to mostly steady partners ($n = 291$, 43.7%) in P2, and to mostly known casual partners in P3 ($n = 272$, 36.4%), P4 ($n = 293$, 38.7%) and P5 ($n = 300$, 37.3%) (Fig. 2). We observed significant differences in partner types between the different periods. In P2 a higher proportion of participants reported steady partners as main partner type compared with P1 ($P < 0.001$). However, in P3 no significant difference was found in the distribution of partner types compared with P1. In P4, there was an increase in participants reporting known casual partners as main partner type compared with P1 ($P = 0.029$). Lastly, in P5 a greater number of participants reported both known and unknown casual partners as their main partner type compared with P1 ($P = 0.004$).

DISCUSSION

In this study, we assessed changes in compliance to the sexual distancing measures before and during subsequent periods of imposing and relaxation of lockdown measures during the COVID-19 pandemic in the Netherlands. Compared with the first lockdown period (P2), we found that compliance to the sexual distancing measures decreased during the following periods, even in the period when a lockdown was reimposed. Known and unknown casual sex partners were the most frequently mentioned partner type in the second (and last) relaxation and this was even higher than before the COVID-19 pandemic. Unknown casual partners were the least mentioned partner type during both lockdown periods. We also found that participants who had confidence in the information provided by the government and had less need for physical contact compared with before the COVID-19 pandemic were more likely to comply with sexual distancing, whereas participants who found the measures overstated, who had sex with casual partners and who did not change their drug use during the pandemic were more likely to report noncompliance with sexual distancing. We also found that during the first relaxation (P3), the second lockdown (P4) and the second relaxation (P5) participants were more likely to not comply to the sexual distancing measures.

TABLE 1. Sociodemographic Characteristics, Mental Well-Being, Sexual Behavior, and Compliance to Sexual Distancing Measures During Five Periods Around and During the COVID-19 Lockdown of Survey Participants, Amsterdam, the Netherlands

	Period 1		Period 2		Period 3		Period 4		Period 5	
	Pre-Pandemic		First		First		Second		Second	
	(n = 870)		(n = 870)		(n = 870)		(n = 870)		(n = 870)	
	n ^a	% ^a	n ^a	% ^a	n ^a	% ^a	n ^a	% ^a	n ^a	% ^a
Age, y										
Median [IQR]	b		b		b		b		33	[27–44]
<30	b		b		b		b		297	34.2%
30–39	b		b		b		b		285	32.8%
>39	b		b		b		b		286	33.0%
Born in the Netherlands	b		b		b		b		532	61.8%
Fully vaccinated	b		b		b		b		783	93.4%
Cumulative number of participants who previously had COVID-19	118	14.1%	147	18.0%	176	21.4%	218	26.4%	293	35.3%
Living with 1 or more roommate(s)	544	63.0%	529	61.9%	528	61.6%	527	61.6%	507	59.2%
Sex with roommate(s)	286	38.1%	254	34.3%	258	35.0%	258	35.0%	266	36.1%
In a relationship	389	45.7%	360	43.0%	349	41.8%	356	42.3%	341	40.7%
No. sexual partners per month										
0	118	13.6%	375	43.4%	201	23.3%	228	26.4%	110	12.7%
1–5	535	61.6%	388	44.9%	481	55.7%	467	54.0%	515	59.4%
>5	215	24.8%	101	11.7%	182	21.1%	170	19.7%	242	27.9%
Main sex partner type										
Steady partner (s)	262	33.1%	291	34.9%	249	29.6%	248	29.3%	205	24.1%
Known casual partner (s)	261	33.0%	227	27.2%	272	32.3%	293	34.6%	300	35.3%
Unknown casual partner (s)	269	34.0%	148	17.8%	227	27.0%	217	25.6%	299	35.1%
Asked their sex partners about COVID-19 symptoms (Likert scale: 1 = Never, 5 = always)										
Median [IQR]	c	c	3	[1–5]	3	[1–4]	3	[1–4]	3	[1–4]
Compliance with sexual distancing (Likert scale: 1 = not good at all, 5 = very good)										
Median [IQR]	c	c	4	[2–5]	3	[2–4]	3	[1–4]	2	[1–3]
Compliance with social distancing (Likert scale: 1 = not good at all, 5 = very good)										
Median [IQR]	c	c	4	[3–5]	4	[2–4]	3	[2–4]	3	[2–4]
Understanding COVID-19 related information provided by the government (Likert scale: 1 = Not easy at all, 5 = very easy)										
Median [IQR]	b		b		b		b		4	[3,4]
Used social media as their main source for COVID-19 related information	b		b		b		b		39	4.5%
Trust in COVID-19 related information provided by the government (Likert scale: 1 = strongly untrustful, 5 = strongly trustful)										
Median [IQR]	c	c	4	[3–5]	3	[3,4]	3	[2–4]	3	[1–4]
Opinion on the lock down measures (Likert scale: 1 = much too mild, 5 = much too exaggerated)										
Median [IQR]	c	c	3	[2,3]	3	[2–4]	3	[3,4]	3	[2–5]
Perceived inclusivity of the lockdown measures ^d (Likert scale: 1 = not inclusive at all, 5 = very inclusive)										
Median [IQR]	b				b		b		3	[2–4]
Perceived inclusivity of the communication of the lockdown measures ^d (Likert scale: 1 = not inclusive at all, 5 = very inclusive)										
Median [IQR]	b				b		b		3	[2–4]
Drug use (compared with before COVID-19)										
More	c	c	78	9.2%	89	10.5%	123	14.6%	141	16.7%
Same	c	c	147	17.4%	175	20.7%	160	19.0%	165	19.5%
Less	c	c	128	15.2%	100	11.8%	97	11.5%	83	9.8%
I don't use drugs	c	c	491	58.2%	483	57.0%	464	55.0%	456	54.0%
Loneliness (Likert scale: 1 = very lonely, 5 = not lonely at all)										
Median [IQR]	4	[2–5]	3	[2–4]	3	[2–4]	3	[2–4]	3	[2–4]
Boredom (Likert scale: 1 = very bored, 5 = not bored at all)										
Median [IQR]	4	[3–5]	3	[1–4]	3	[2–4]	3	[2–4]	3	[2–4]

Continued next page

TABLE 1. (Continued)

	Period 1 Pre-Pandemic (n = 870)		Period 2 First Lockdown (n = 870)		Period 3 First Relaxation (n = 870)		Period 4 Second Lockdown (n = 870)		Period 5 Second Relaxation (n = 870)	
	n ^a	% ^a	n ^a	% ^a	n ^a	% ^a	n ^a	% ^a	n ^a	% ^a
	Need for physical contact (Likert scale: 1 = more, 2 = same, 3 = less) Median [IQR]	c	c	2	[1,2]	2	[1,2]	1	[1,2]	1
Need for sexual contact (Likert scale: 1 = more, 3 = less) Median [IQR]	c	c	2	[1–3]	2	[1,2]	2	[1,2]	2	[1,2]

Of note: The questionnaire was administered once in P5.

a: Unless otherwise indicated.

b: This question was only asked once.

c: Since period 1 corresponds to the pre-pandemic period, this question was not asked in period 1.

d: Inclusivity refers to ensuring that the needs, circumstances and viewpoints of all individuals and groups within society, such as the LGBTIQ+ community and singles, are considered and accommodated.

Periods: period 1 (before the pandemic), period 2 (During the first lockdown in the Netherlands (March–May 2020), period 3 (between the first and the second lockdown (June–October 2020)), period 4 (during the second lockdown (November 2020–March 2021)), period 5 (after the second lockdown (April 2021–March 2022)).

Data were missing for: age (n = 2), born in the Netherlands (n = 9), fully vaccinated (n = 32), previously had COVID-19 (P1 n = 31, P2 n = 50, P3 n = 46, P4 n = 44, P5 n = 41), living with 1 or more roommate(s) (P1 n = 6, P2 n = 16, P3 n = 13, P4 n = 14, P5 n = 13), sex with roommate(s) (P1 n = 119, P2 n = 129, P3 n = 133, P4 n = 132, P5 n = 134), in a relationship (P1 n = 18, P2 n = 32, P3 n = 35, P4 n = 28, P5 n = 33), number of sexual partners (P1 n = 2, P2 n = 6, P3 n = 6, P4 n = 5, P5 n = 3), main partner type (P1 n = 78, P2 n = 204, P3 n = 122, P4 n = 112, P5 n = 66), asked their sex partners for COVID-19 symptoms (P2 n = 164, P3 n = 87, P4 n = 93, P5 n = 50), compliance with social distancing (P2 n = 9, P3 n = 12, P4 n = 11, P5 n = 11), understanding COVID-19 related information provided by the government (n = 12), trust in information provided by the government (P2 n = 12, P3 n = 15, P4 n = 15, P5 n = 12), opinion on the measures (P2 n = 12, P3 n = 18, P4 n = 16, P5 n = 17), inclusivity of the measures (n = 80), inclusivity of the reporting of the measures (n = 78), drug use (compared with before COVID-19) (P2 n = 26, P3 n = 23, P4 n = 26, P5 n = 25), loneliness (P1 n = 8, P2 n = 13, P3 n = 13, P4 n = 15, P5 n = 12), boredom (P1 n = 13, P2 n = 10, P3 n = 13, P4 n = 13, P5 n = 15), need for physical contact (P2 n = 35, P3 n = 36, P4 n = 30, P5 n = 31), need for sexual contact (P2 n = 36, P3 n = 30, P4 n = 27, P5 n = 30).

More people were socially compliant than sexually compliant. This is in line with a study by Holt et al.¹¹ who found that 88.1% of their 6533 participants complied with social distancing, but that only 52.1% of their participants had fewer sex partners during the COVID-19 pandemic. These findings underscore the importance of focusing campaigns not only on social distancing, but also explicitly on sexual distancing, for a more effective prevention of disease transmission. This is supported by our previous qualitative study where we found that some participants were not aware that sexual distancing is part of social distancing.³ We also found that the number of participants that were solely socially or sexually compliant was relatively stable throughout the four periods. This finding underscores the perceived differences in

individual perceptions regarding the two types of distancing. Some individuals may assign greater importance or meaning to the one over the other. This may be the result of personal beliefs, risk perceptions, or pre-existing habits. Such factors can outweigh the influence of changing circumstances or imposed measures. We observed that just over 10% regretted non-compliance to the sexual distancing measures. Similarly, Hyndman et al.¹² found that 20% of their participants reported feelings of guilt for not complying with the sexual distancing measures.

Similar to our study, previous studies found a drop in the number of casual sex partners in the first period of the COVID-19 pandemic.^{13–15} We, however, found that this decrease was only temporary, since we found an increase during the second

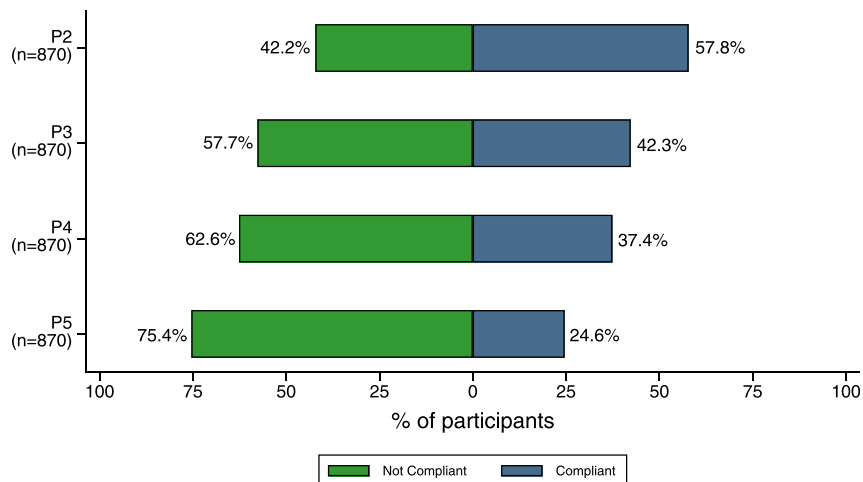


Figure 1. Sexual distancing compliance over 4 different periods during the COVID-19 pandemic among survey participants from Amsterdam, the Netherlands. P2: period 2 (during the first lockdown in the Netherlands [March to May 2020]), P3: period 3 (between the first and the second lockdowns [June to October 2020]), P4: period 4 (during the second lockdown [November 2020 to March 2021]), P5: period 5 (after the second lockdown [April 2021 to March 2022]).

TABLE 2. Univariable and Multivariable Analysis of Determinants for Sexual Distancing Compliance During the COVID-19 Pandemic Period Among Survey Participants, Amsterdam, the Netherlands

	Univariable Logistic Regression			Multivariable Logistic Regression		
	RR	(95% CI)	P	aRR ^a	(95% CI)	P
Period						
2 (First lockdown)	Reference			Reference		
3 (First relaxation)	0.73	(0.69–0.78)	<0.001	0.87	(0.80–0.95)	0.002
4 (Second lockdown)	0.65	(0.60–0.70)	<0.001	0.80	(0.72–0.87)	<0.001
5 (Second relaxation)	0.43	(0.38–0.48)	<0.001	0.62	(0.54–0.71)	<0.001
Age						
<30	Reference					
30–39	1.13	(0.97–1.31)	0.127			
>40	1.13	(0.96–1.32)	0.139			
Born in the Netherlands						
No	Reference					
Yes	0.99	(0.86–1.12)	0.822			
Fully vaccinated						
No	Reference			Reference		
Yes	1.41	(0.99–1.99)	0.054	1.16	(0.76–1.78)	0.482
Previously had COVID-19						
No	Reference			Reference		
Yes	0.52	(0.43–0.63)	<0.001	0.81	(0.66–0.99)	0.043
Living with 1 or more roommate(s)						
No	Reference		Reference			
Yes	1.05	(0.92–1.19)	0.480			
Sex with roommate						
No	Reference		Reference			
Yes	0.92	(0.80–1.07)	0.284			
In a relationship						
No	Reference			Reference		
Yes	1.11	(0.98–1.25)	0.097	1.10	(0.94–1.29)	0.239
Main partner type						
Steady partner	Reference			Reference		
Known casual partner	0.59	(0.51–0.68)	<0.001	0.73	(0.62–0.86)	<0.001
Unknown casual partner	0.41	(0.34–0.49)	<0.001	0.59	(0.48–0.72)	<0.001
Understanding COVID-19 related information provided by the government (Likert scale: 1 = Not easy at all, 5 = very easy)						
	1.09	(1.01–1.17)	0.019	1.03	(0.93–1.13)	0.587
Used social media as their main source for COVID-19 related information						
No	Reference			Reference		
Yes	0.69	(0.46–1.01)	0.058	0.78	(0.46–1.31)	0.342
Trust in COVID-19 related information provided by the government (Likert scale: 1 = strongly untrustful, 5 = strongly trustful)						
	1.23	(1.18–1.29)	<0.001	1.09	(1.03–1.16)	0.002
Opinion on the lock down measures (Likert scale: 1 = much too mild, 5 = much too exaggerated)						
	0.90	(0.86–0.94)	<0.001	0.92	(0.87–0.97)	0.002
Perceived inclusivity of the lock down measures (Likert scale: 1 = not inclusive at all, 5 = very inclusive)						
	1.11	(1.05–1.17)	<0.001	1.01	(0.95–1.08)	0.704
Drug use (compared with before COVID-19)						
Less	Reference			Reference		
Same	0.55	(0.44–0.70)	<0.001	0.72	(0.56–0.92)	0.008
More	0.55	(0.43–0.71)	<0.001	0.81	(0.63–1.04)	0.100
I don't use drugs	1.09	(0.92–1.30)	0.326	1.11	(0.91–1.36)	0.316
Loneliness (Likert scale: 1 = very lonely, 5 = not lonely at all)						
	0.90	(0.86–0.94)	<0.001	0.95	(0.90–1.00)	0.062
Boredom (Likert scale: 1 = very bored, 5 = not bored at all)						
	0.92	(0.88–0.95)	<0.001	0.98	(0.93–1.03)	0.353
Need for physical contact						
More	Reference			Reference		
Same	1.28	(1.13–1.45)	<0.001	1.15	(1.00–1.31)	0.046
Less	2.19	(1.93–2.49)	<0.001	1.75	(1.49–2.07)	<0.001

^aMultivariable logistic regression model bases on 650 participants.

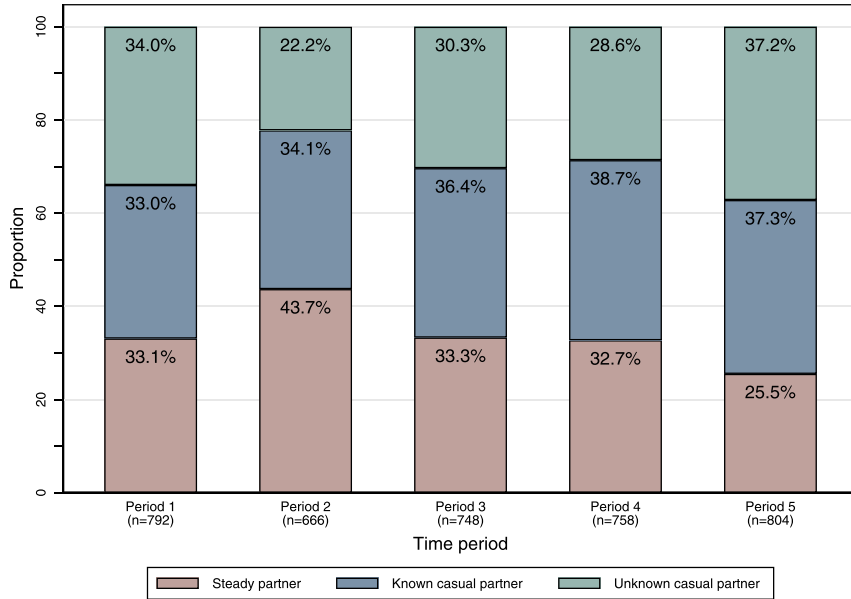


Figure 2. Main partner type proportions during 5 periods before and during the COVID-19 pandemic among survey participants from Amsterdam, the Netherlands. Period 1 (before the pandemic), period 2 (During the first lockdown in the Netherlands [March to May 2020]), period 3 (between the first and the second lockdowns [June to October 2020]), period 4 (during the second lockdown [November 2020 to March 2021]), period 5 (after the second lockdown [April 2021 to March 2022]).

lockdown period, which was also seen in a previous study among PrEP users in Amsterdam.¹⁶ During the second relaxation the number of unknown casual partners was even higher than during the pre-pandemic period. Gleason et al¹³ found that less than half of their participants who had sex with casual sex partners prior to the COVID-19 pandemic completely stopped having sex with casual sex partners once the lockdown started and waited around 6 to 7 weeks (postinitiation of the lockdown period) before re-engaging in casual sex. The return to casual sex as the lockdown progressed was also mentioned by Williams et al.¹⁷ The

above mentioned findings imply that it is possible to abstain from sex with partners outside one's household for a short period of time (several weeks), but that it is difficult to maintain this behavior for months. These findings have implications for future (re)surges of infectious diseases (eg, mpox) in the coming years.¹⁸ We therefore suggest to focus sexual behavior campaigns on harm reduction rather than sexual abstinence, which can still be effective as was shown in the control of mpox. During the mpox epidemic in the fall and winter months of 2022, a key strategy that likely had a significant impact on mpox transmission was limiting the number of

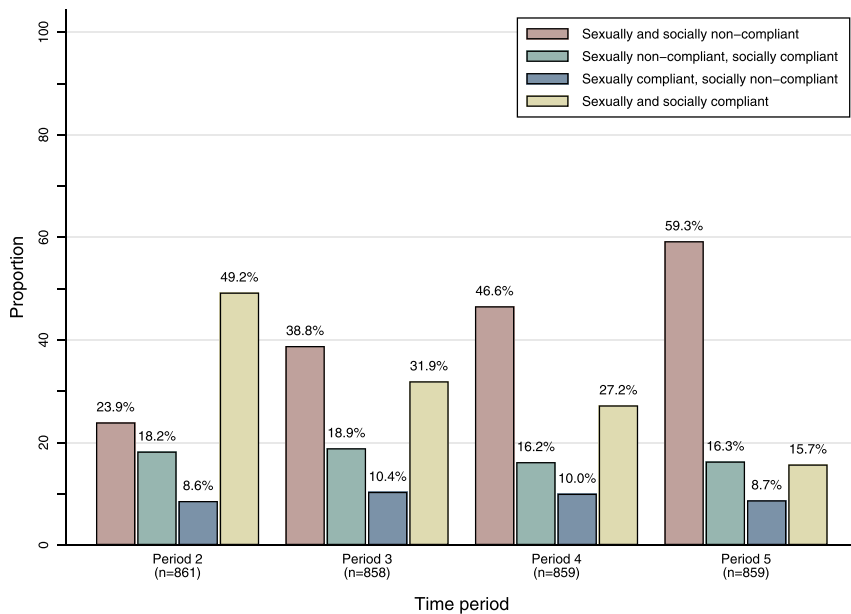


Figure 3. Sexual and social compliance among participants over 4 different periods during the COVID-19 pandemic among survey participants from Amsterdam, the Netherlands. Period 2 (during the first lockdown in the Netherlands [March to May 2020]), period 3 (between the first and the second lockdowns [June to October 2020]), period 4 (during the second lockdown).

anonymous partners and instead confining to a small network of known partners (a bubble).¹⁸ Also the Dutch 'one sex buddy measure' was an example of a more realistic measure to limit Sars-Cov-2 transmission during sex.² This measure was introduced as an alternative to completely refraining from sex outside one's household. However, compliance still decreased over time even after the introduction of this measure.

Ettman et al¹⁹ found that depression rates increased during the COVID-19 pandemic. Similarly, Sotiropoulou et al²⁰ found increased feelings of anxiety and deficient moods in participants with no access to their steady partner during the lockdown. These increased feelings of anxiety and deficient moods could lead to non-compliance to sexual distancing measures. Accordingly, Shilo et al⁷ found that participants who experienced higher levels of mental distress were more likely to have casual sex during the COVID-19 pandemic. To be successful and truly effective in minimizing the spread of COVID-19 and other infectious diseases, the effect of distancing measures on mental well-being should be taken into account.

We also found that confidence in governmental information and the lockdown measures were associated with sexual distancing compliance. This is supported by previous studies that also found a significant association between having confidence in the government and a higher adoption of health behaviors and practicing COVID-19 preventive measures.^{21–23} This suggests that, to achieve better compliance in future infectious disease outbreaks in which social distancing is imposed, the government should pay attention to the communication of the measures, and how messages are perceived in a population with diverse needs.²⁴

The strength of our study is that we looked at the different periods of governmental restrictions during the pandemic, through which we were able to assess how and why behavior changed as the COVID-19 pandemic continued. Our study also has some limitations. First, since the survey was administered in retrospect, recall bias could play a role when answering the questions. Undesirable behavior tends to be underreported.²⁵ This could have caused an underestimation of the actual noncompliance. Given the anticipated systematic underestimation over the distinct time periods, this underestimation is not likely to have an effect on the observed differences. Second, we did not measure the participants gender. We, however, assume that the vast majority of participants were men who have sex with men, since the majority of our participants were recruited through the dating app Grindr, which is designed for male same sex dating, through the Center for Sexual Health in Amsterdam, which is more accessible to MSM, and via the Instagram page @MEIJT, who targets MSM. Third, some participants reported having had COVID-19 in P1 (the period before March 2020). Although COVID-19 was already present in the Netherlands before March 2020 with 330 confirmed cases,²⁶ we deem it unlikely that 118 participants had already had COVID-19 before March 2020. Fourth, the recall period before the COVID-19 pandemic (P1) was not specified and may have been interpreted differently by participants. Last, because the pandemic and the lockdown periods were country specific, findings may not be generalizable to other countries.

Concluding, as sexual abstinence is difficult to maintain, more realistic measures such as limiting the number of anonymous partners might be more effective to prevent onward transmission during future outbreaks of infectious diseases in which social and sexual distancing is recommended. Since there is a discrepancy between social and sexual distancing compliance, we believe that campaigns should focus more on sexual distancing, besides social distancing. This would involve emphasizing the risks associated with sexual contact and promoting safer sexual practices. To achieve better compliance future measures should also address

mental well-being since increased feelings of anxiety as deficient moods could lead to non-compliance to sexual distancing measures.

REFERENCES

1. Rijksoverheid. Coronavirus tijdlijn. Available at: <https://www.rijksoverheid.nl/onderwerpen/coronavirus-tijdlijn/2020>. Accessed January 13, 2023.
2. Bontjes A. RIVM past advies singles aan: knuffelmaatje of seksbuddy mag. NRC 2020.
3. de Vries DC, Zimmermann HML, Drückler S, et al. Barriers and motives for complying with "sexual distancing" among men who have sex with men during the first COVID-19 pandemic lockdown in Amsterdam: A qualitative study. *Sex Transm Dis* 2022; 49:497–503.
4. Levy I, Michael S, Olmer L, et al. The impact of COVID-19 lockdown on men having sex with men (MSM). *AIDS Care* 2022; 34:1400–1404.
5. Maxwell KJ, Bosó Pérez R, Reid D, et al. Balancing risk, intimacy and (non)compliance: A qualitative study of sex across household during COVID-19 social restrictions. *Cult Health Sex* 2023; 25:582–598.
6. Sonnenberg P, Menezes D, Freeman L, et al. Intimate physical contact between people from different households during the COVID-19 pandemic: A mixed-methods study from a large, quasi-representative survey (Natsal-COVID). *BMJ Open* 2022; 12:e055284.
7. Shilo G, Mor Z. COVID-19 and the changes in the sexual behavior of men who have sex with men: Results of an online survey. *J Sex Med* 2020; 17:1827–1834.
8. Siegenbeek van Heukelom ML, Jongen VW, Schouten J, et al. Characteristics of mpox positive, versus mpox negative, and mpox unsuspected clients from the Centre of Sexual Health, Public Health Service of Amsterdam, 20 May to 15 September 2022. *J Eur Acad Dermatol Venereol* 2023; 37:1891–1896.
9. de Vries HJ, Götz HM, Bruisten S, et al. Mpox outbreak among men who have sex with men in Amsterdam and Rotterdam, the Netherlands: no evidence for undetected transmission prior to May 2022, a retrospective study. *Euro Surveill* 2023; 28:2200869.
10. Zou G. A modified Poisson regression approach to prospective studies with binary data. *Am J Epidemiol* 2004; 159:702–706.
11. Holt M, Chan C, Broady TR, et al. Adjusting Behavioural surveillance and assessing disparities in the impact of COVID-19 on gay and bisexual men's HIV-related behaviour in Australia. *AIDS Behav* 2023; 27:518–534.
12. Hyndman I, Nugent D, Whitlock GG, et al. COVID-19 restrictions and changing sexual behaviours in HIV-negative MSM at high risk of HIV infection in London, UK. *Sex Transm Infect* 2021; 97:521–524.
13. Gleason N, Banik S, Braverman J, et al. The impact of the COVID-19 pandemic on sexual behaviors: Findings from a National Survey in the United States. *J Sex Med* 2021; 18:1851–1862.
14. Mollaioli D, Sansone A, Ciocca G, et al. Benefits of sexual activity on psychological, relational, and sexual health during the COVID-19 breakout. *J Sex Med* 2021; 18:35–49.
15. van Bilsen WPH, Zimmermann HML, Boyd A, et al. Sexual behavior and its determinants during COVID-19 restrictions among men who have sex with men in Amsterdam. *J Acquir Immune Defic Syndr* 2021; 86:288–296.
16. Jongen VW, Zimmermann HML, Boyd A, et al. Transient changes in preexposure prophylaxis use and daily sexual behavior after the implementation of COVID-19 restrictions among men who have sex with men. *J Acquir Immune Defic Syndr* 2021; 87:1111–1118.
17. Williams A, Gillespie D, Couzens Z, et al. Changing sexual behaviours amongst MSM during the COVID-19 restrictions in Wales: A mixed methods study. *BMC Public Health* 2022; 22:396.
18. European Centre for Disease Prevention and Control. Monkeypox multi-country outbreak 2022. Available from: <https://www.ecdc.europa.eu/sites/default/files/documents/Monkeypox-multi-country-outbreak-second-update.pdf>.
19. Ettman CK, Abdalla SM, Cohen GH, et al. Prevalence of depression symptoms in US adults before and during the COVID-19 pandemic. *JAMA Netw Open* 2020; 3:e2019686.
20. Sotiropoulou P, Ferenidou F, Owens D, et al. The impact of social distancing measures due to COVID-19 pandemic on sexual function and relationship quality of couples in Greece. *Sex Med* 2021; 9:100364.

21. Fridman I, Lucas N, Henke D, et al. Association between public knowledge about COVID-19, Trust in Information Sources, and adherence to social distancing: Cross-sectional survey. *JMIR Public Health Surveill* 2020; 6:e22060.
22. Gotanda H, Miyawaki A, Tabuchi T, et al. Association between Trust in Government and Practice of preventive measures during the COVID-19 pandemic in Japan. *J Gen Intern Med* 2021; 36: 3471–3477.
23. Han Q, Zheng B, Cristea M, et al. Trust in government regarding COVID-19 and its associations with preventive health behaviour and prosocial behaviour during the pandemic: a cross-sectional and longitudinal study. *Psychol Med* 2023; 53:149–159.
24. Hyland-Wood B, Gardner J, Leask J, et al. Toward effective government communication strategies in the era of COVID-19. *Humanities and Social Sciences Communications* 2021; 8:30.
25. Bandura A. *Social foundations of thought and action*. Englewood Cliffs, NJ. 1986;1986(23–28).
26. World Health Organization. WHO Coronavirus (COVID-19) Dashboard. Available at: <https://covid19.who.int/region/euro/country/nl>. Accessed August 28, 2023.