

COVID-19

How the COVID-19 Pandemic Affects Sexual Behavior of Hetero-, Homo-, and Bisexual Males in Germany



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ABSTRACT

Introduction: The COVID-19 pandemic drastically altered the way of life around the world. Due to social distancing measures, contact restrictions and fears of infection, social life has changed significantly. These measures along with the stressors associated with the current worldwide situation, will inevitably have an effect on people's interpersonal and personal behaviors.

Aim: This study evaluates the effect the COVID-19 pandemic and nationwide German lockdown had on the sexual behavior of cis men.

Methods: An anonymous nationwide web-based questionnaire was conducted among cis men in Germany during the first COVID-19 home isolation (April 20, 2020–July 20, 2020). The questionnaire was distributed via e-mail, online chats and social-media platforms.

Main Outcome Measures: Data was collected on general characteristics including demographics and socio-economic backgrounds. To evaluate sexual health, questions from the Sexual Behavior Questionnaire were included.

Results: 523 cis male participated. 414 met the inclusion criteria. Most were heterosexual (n = 248, 59.9%; vs homosexual n = 97, 23.4%; vs bisexual n = 69, 16.7%). 243 (59%) were employed, 153 (37.1%) were students and 16 (3.9%) were unemployed. Most of the participants reported an annual income lower than 75.000€. During the lockdown, average weekly frequency of sexual intercourse and masturbation was increased in all groups. Consistently, a significant rise of higher satisfaction with the frequency of sexual contacts during the quarantine was observed ($P < .05$). Furthermore, the level of sexual arousal increased significantly in all groups ($P < .0005$). Capability to enjoy sexual intercourse or masturbation increased significantly in heterosexual ($P < .0005$) and homosexual men ($P < .005$). Bisexual participants showed a significant increase in general satisfaction with sexual life ($P < .05$) and a significant decrease in satisfaction in relationship or single life ($P < .05$). Positive confounders in the changing of sexual behavior during the COVID-19 pandemic were: Being in a relationship or being single, parenthood and being employed.

Conclusion: Our study firstly describes how COVID-19 pandemic related restrictions and social distancing measurements altered sexual behavior amongst cis male in Germany. Further studies, including sexual minorities specifically, are needed to clarify if the behavior in the first German nationwide quarantine has persisted or transformed as the pandemic proceeded. **Mumm J-N, Vilsmaier T, Schuetz JM, et al. How the COVID-19 Pandemic Affects Sexual Behavior of Hetero-, Homo-, and Bisexual Males in Germany. Sex Med 2021;9:100380.**

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Key Words: Male Sexual Behavior; COVID-19; Heterosexual; Homosexual; Bisexual; Sexual Relationship

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INTRODUCTION

In the first quarter of 2020 the world, caught off-guard, was alarmed to learn that a novel Corona Virus disease 2019, eventually given the name COVID-19, was causing near total disruption in the Chinese city of Wuhan and that it would come to cause even more death and disruption in the west imminently.¹ COVID-19 led to an unprecedented global health crisis in our

time. Since the Spanish Flu, mankind has not dealt with a pandemic of this magnitude. On the 11th of March 2020, the World Health Organization declared Corona Virus disease 2019 outbreak a pandemic,² just under 3 months after being first described in Wuhan, China. COVID-19 led to an unprecedented global health crisis across all continents. The virus first primarily affects the respiratory system and causes mild to severe flu-like symptoms and sometimes even death.³ Due to its contagious nature, through droplet and aerosol transmissions, many governments enforced restrictions, lockdowns, quarantine and social distancing measures, which suspended everyday life.⁴

These measurements severely changed everyday life and by restricting social gatherings altered people's social and private life. The measures thus significantly changed interpersonal relationships and social behaviors and can be seen as stressors to many people. They will inevitably also have an effect on well-being. As such the COVID-19 lockdown led to a rise in anxiety, depression levels, insomnia, eating disorders and a decline in mental health.⁵ The aforementioned stressors are likely to greatly impact sexual behavior – although studies in this field are still limited. Sexuality and sexual life are highly individual experiences and expressions of physical and mental wellbeing. Sexual reproductive health is strongly linked to psychological, emotional and social wellbeing and the current rise in psychological diseases has likely severely affected it.⁶ Several studies showed that mental health problems like anxiety and depression negatively affect sexual desire and arousal.⁷ On the other hand, Goldenberg et al observed an increase of sexual desire after life-threatening events.⁸ With the increase of mental disorders since the COVID-19 pandemic, sexual wellbeing is likely to be affected by the pandemic. Thus sexual wellbeing can be seen as an indicator for mental wellbeing during the times of the COVID-19 pandemic.⁶ We also hypothesized that wellbeing in private life (partnership or single life) is associated with general wellbeing during times of COVID-19 pandemic. Since the pandemic, singles had reduced opportunities to meet partners. While couples and families were suddenly spending all day together and families with children had to take care of their children's supervision and schooling. For all groups, the new psychological stressors, altered schedules, working arrangements and logistical arrangements had serious implications on sexual desire and activity.⁶ In our study we decided to focus on sexual behavior and satisfaction in sexual and private life as a predictor for sexual health and an indicator for general wellbeing.

Previous studies conducted on the changes in sexuality and quality of relationship during the COVID-19 pandemic. These studies focused on women and couples. However, sexual life of men has not been analyzed to the same extent. In women, one study found that the wish for children and the quality of sexual life decreased. Meanwhile, the overall frequency of sexual intercourse increased.⁹ A recent study from Li et al found that in a cohort of 459 women and men the number of sexual partners dropped by 44% and the frequency of sex by 37% during the

COVID-19 lockdown in China.¹⁰ They also found that younger single participants, those with a higher sexual drive, had higher sexual frequencies.¹⁰ Furthermore, the study also described a decrease in unsafe sexual manners. A study from the United States that concentrated on the sexual behavior of homosexual men included 1,051 participants.¹¹ 50% of the participants decreased their number of sex partners during the COVID-19 social restrictions, whilst numerous experienced adverse consequences on their well-being. Concerningly, the authors found that access to HIV-testing and treatment was limited by the lockdown measurements.¹¹

The COVID-19 global pandemic has severely disrupted the healthcare system, declined income and worsened social life.¹² Further, the psychological implications of the lockdown are just now being analyzed and understood. Despite well-documented vulnerability of sexual minorities, there is no empirical work published that concentrates on the effects of the COVID-19 pandemic on sexual behavior in male sexual minorities in comparison to heterosexual men. Our study aims to evaluate the effect the COVID-19 pandemic and nationwide German lockdown had on the sexual behavior of hetero-, homo- and bisexual male adults. This way, we can improve preparedness for future crises, since it is crucial to act instantly in response to mental health consequences, especially in vulnerable groups such as sexual minorities. Our findings may serve to construe implications for the health care system and for public policy. In relation to demographic statuses, this data could give tremendous insights on the indirect overall psychological health implications of COVID-19.

MATERIALS AND METHODS

Setting, Study Design and Patient Sample

The national anonymous online survey was carried out between the 20th of April and 20th of July 2020, during the nationwide German COVID-19 lockdown. The survey was designed following an initial review of the literature. The questionnaire included 106 items on demographic parameters, physical, mental and sexual health, life satisfaction and family planning aspects. This paper only includes the data on cis male sexual behavior. The questionnaire was conducted according to the Declaration of Helsinki. The Ethics Review Committee of the Faculty of Medicine, LMU Munich, approved for waiver from the Institutional Review Board approval (project number: 20-344 KB).

Inclusion criteria were a minimum participating age of 18 years and sufficient German language skills. The online questionnaire was in German, generated using SoSci Survey (Leiner, D. J. (2019); Version 3.2.23; SoSci Survey GmbH, Munich, Germany) and was made available to users via www.soscisurvey.de. The survey was shared via online invitations, E-mail distribution lists and social networks (Facebook, Instagram, Twitter and

WhatsApp). Participants could also distribute the survey amongst their social networks. Before starting the questionnaire, questionees were informed about the background and aim of the survey. Individuals consented to voluntarily participate in this anonymous study. Great care was taken in protecting the data gained by the survey. Questionees were told their responses would only be used for research purposes. Individuals were provided with the private and data privacy policies of the study.

Measures

Each participant's demographics were obtained. Demographic factors were: age, residential environment, education, income level, employment, relationship status and parental status. Further, the first 6 items of the Sexual Behavior Questionnaire (SBQ-G) were used to assess the impact of the COVID-19 pandemic on cis male sexual behavior. The SBQ-G evaluates sexual health domains including sexual arousal, sexual desire and satisfaction.¹³ Additionally, the questionnaire contained questions that evaluated the satisfaction of the frequency of sexual intercourse, masturbation and general satisfaction with their relationship or single-life before and during the COVID-19 pandemic.

Gender identity and sexual orientation were assessed with the item "In your opinion, which of the following categories most apply to you?". The following answer categories were provided: heterosexual, homosexual, bisexual, asexual, female, male, cis ("I identify with the gender assigned at birth"), trans* ("I do not identify with the gender assigned at birth") and others. Note that we are aware of the pathologizing nature of the term. In Germany, the term "homosexuell" is still widely used; for reasons of transparency, we report the direct translation as it appeared in the survey question. Multiple answers were possible. For the purpose of the analysis, we divided all participants into groups according to their self-assigned gender identity and sexual orientation: cis-heterosexual women, cis-heterosexual men, cis-homosexual women, cis-homosexual men, cis-bisexual women, cis-bisexual men, cis-asexual women, cis-asexual men, trans* women, trans* men, non-binary gender identities (participants who identify as female and male), and inter* people. The star (*) indicates that the respective terms include further gender identities beyond the expression transgender, transident, transsexual and inter*, respectively. After the conclusion of the questionnaire, 523 cis male participants had participated in the survey. 105 of them did not answer the questions on sexual behavior. The remaining 418 cis males were included and divided according to their sexual orientation: heterosexual, homosexual, bisexual, "others". Due to the few participants in the cohort "Others" (n = 4), we excluded this group to avoid distortion and concentrated on Heterosexuals (n = 248, 59.9%), Homosexuals (n = 97, 23.4%) and Bisexuals (n = 69, 16.7%). Thus, eligible for analysis resulted in N = 414 participants. Metric scores were created to evaluate the differences in sexual behavior, sexual arousal, and capability to enjoy sexual intercourse or masturbation as well as general satisfaction with sexual life and relationship or single-life before and since

COVID-19. Scores for "Frequency of masturbation" and "Frequency of sexual intercourse": (1) *Never*, (2) *Less than once a week*, (3) *One to three times a week*, (4) *Three to five times a week*, (5) *More than five times a week*. Score for "Sexual arousal": (1) *I do not get excited at all*, (2) *I get excited with difficulty*, (3) *I get aroused quite easily*, (4) *I get aroused very easily*. Participants who chose "I never have sexual intercourse or masturbation" were excluded from the score. Score for "Capability to enjoy sexual intercourse or masturbation": (1) *I never enjoy sex*, (2) *I enjoy sex occasionally*, (3) *I enjoy sex often*, (4) *I always enjoy sex*. Participants who chose I never have sexual intercourse or masturbation were excluded from the score. Scores for "General satisfaction with sexual life" and "General satisfaction with relationship or single-life": (1) *No satisfaction at all*, (2) *Moderate satisfaction*, (3) *Average satisfaction*, (4) *Reasonable satisfaction* and (5) *Full satisfaction*.

Statistics

Statistical analysis was performed with SPSS version 26 (IBM Corp. Released 2019. IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY). Levene test was used to test the homogeneity of variances and the distribution of normality was evaluated using Kolmogorov-Smirnov test. Values were computed and reported as mean values (MV) ± standard deviation (SD). Parametric tests (paired and unpaired samples *t*-test, Mann-Whitney *U* test, ANOVA) were used to correlate variables, to compare the averages and percentages and to assess significant difference in responses between "before" and "during" confinement period. A 2-sided *P*value of .05 was used for all tests.

RESULTS

General Characteristics

A total of 414 cis male participants were included in the study. The demographics' overview is seen in [Table 1](#). In brief, the age groups 18–25 years old (n = 135, 32.6%) and 26 to 35 years old (n = 164, 39.6%) contained the majority of participants (together n = 299, 72.2%). Our study included mostly metropolitan participants (n = 270, 65.2%). 51% had a university degree (n = 211) and most were in a relationship (n = 257, 62.1%). Only 20% of all participants (n = 82) had one or more children. Most participants (n = 187, 45.8%) had an annual gross income lower than 25.000 Euro.

14.3% of participants (n = 59) reported a reduction in monthly working hours and income during the COVID-19 lockdown. 44.2% of participants (n = 182) reported that they were in home office. 29.6% (n = 122) continued to work at their workplace location in person. 3.6% of participants (n = 15) had lost their job due to the pandemic.

Frequency of Sexual Intercourse and Masturbation

[Table 2](#) and [Figure 1](#) show the frequency of sexual intercourse and masturbation before and during the pandemic. The average

Table 1. Demographic and socio-economic data of participants (n = 414)

	All participants N = 414 n (%)	Heterosexual n = 248, (59.9%) n (%)	Homosexual n = 97, (23.4%) n (%)	Bisexual n = 69, (16.7%) n (%)
Age, years				
18–25	135 (32.6%)	101 (40.7%)	14 (14.4%)	20 (29%)
26–35	164 (39.6%)	98 (39.5%)	47 (48.5%)	19 (27.5%)
36–45	69 (16.7%)	28 (11.3%)	16 (16.5%)	25 (36.2%)
46 or older	46 (11.1%)	21 (8.5%)	20 (20.6%)	5 (7.2%)
Relationship status				
In a relationship	257 (62.1%)	161 (64.9%)	67 (69.1%)	29 (42%)
Single	157 (37.9%)	87 (35.1%)	30 (30.9%)	40 (58%)
Parenthood				
No child	652 (79.9%)	400 (81.9%)	72 (88.6%)	80 (59.7%)
One or more children	164 (20.1%)	88 (18%)	22 (11.3%)	54 (40.3%)
Residential environment				
Metropolis *	270 (65.2%)	159 (64.1%)	60 (61.9%)	51 (73.9%)
Medium sized town†	51 (12.3%)	33 (13.3%)	12 (12.4%)	6 (8.7%)
Small town‡	63 (15.2%)	35 (14.1%)	19 (19.6%)	9 (13%)
Rural community§	30 (7.2%)	21 (8.5%)	6 (6.2%)	3 (4.3%)
Level of education				
university degree	211 (51%)	125 (50.4%)	46 (47.4%)	40 (58%)
professional degree	61 (14.7%)	27 (10.9%)	28 (28.9%)	6 (8.7%)
High school degree	142 (34.3%)	96 (38.7%)	23 (23.7%)	23 (33.3%)
Employment status				
Employed	243 (59%)	120 (48.4%)	76 (79.2%)	47 (68.1%)
Student	153 (37.1%)	1 (4.7%)	18 (18.8%)	19 (27.5%)
Not employed	16 (3.9%)	11 (4.5%)	2 (2.1%)	3 (4.3%)
Annual gross income				
<25.000 €	187 (45.8%)	132 (53.4%)	29 (31.5%)	26 (37.7%)
25.001–75.000 €	176 (43.1%)	92 (37.2%)	51 (55.4%)	33 (47.8%)
75.001 € or more	45 (10.9%)	23 (9.3%)	12 (13%)	10 (14.5%)

*100.000 or more inhabitants.

†20.000-100.000 inhabitants.

‡5.000-20.000 inhabitants.

§up to 5.000 inhabitants.4-Group comparison of general characteristics: All participants, heterosexual, homosexual, and bisexual cis male.

frequency of sexual intercourse and masturbation increased significantly in all groups during the pandemic (Heterosexual $P < .0005$ vs Homosexual $P < .05$ vs Bisexual $P < .0005$). The percentage of the cohort that masturbated 3 or more times per week during the pandemic increased in heterosexuals from 27.8% (n = 69) to 63.3% (n = 155), in homosexuals from 34% (n = 33) to 68.1% (n = 64) and in bisexuals from 23.1% (n = 16) to 58% (n = 40). Similar increases are observed in the frequency of sexual intercourse. Overall, the percentage of cis men who had sexual intercourse more than 3 times a week increased from 7.8% (n = 32) before the pandemic to 37.5% (n = 154) since the confinement. To be specific, heterosexuals showed an increase from 8.1% (n = 20) vs 37.5% (n = 92) (Before the pandemic vs Since the pandemic); Homosexuals presented a rise from 7.3% (n = 7) to 29.1%; Bisexuals displayed an increase from 7.3% (n = 5) to 49.3% (n = 34). ANOVA with posthoc tests showed no significant difference in “Frequency of

masturbation” or “Frequency of sexual intercourse” since the COVID-19 pandemic comparing the study groups. A multivariate linear regression models (Annex: table 1) with the score “Frequency of sexual contacts” during COVID-19 pandemic as dependent variables revealed that there is a significant positive association between participants over older than 35 years ($P < .01$), being in a relationship ($P < .01$) and having one or more children ($P < .01$), being employed ($P < .05$) and the frequency of sexual intercourse during the pandemic. The frequency of masturbation was significantly positive associated with being single ($P < .01$, Annex: table 2).

The satisfaction level with the frequency of sexual contacts significantly increased in all groups during the COVID-19 pandemic (all groups $P < .05$). 3.9% of participants (n = 16) referred no desire for sexual intercourse before the pandemic. This decreased to 2.2% (n = 9) since the pandemic. Before the lockdown, one (1) participant (0.02%) wanted to have less sexual

Table 2. Frequency of masturbation and sexual intercourse before and since COVID-19 pandemic

	All participants		Heterosexual		Homosexual		Bisexual	
	3–6 months before the pandemic	During the pandemic (04-07/2020)	3–6 months before the pandemic	During the pandemic (04-07/2020)	3–6 months before the pandemic	During the pandemic (04-07/2020)	3–6 months before the pandemic	During the pandemic (04-07/2020)
Frequency of masturbation	MV: 2.92 SD: 1.122	MV: 3.55 SD: 1.017	MV: 2.9 SD: 1.104	MV: 3.52 SD: 1.035	MV: 2.94 SD: 1.23	MV: 3.73 SD: 0.906	MV: 2.96 SD: 1.035	MV: 3.41 SD: 1.075
	$P \leq .001$		$P \leq .001$		$P \leq .001$		$P \leq .001$	
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Never (1)	12 (12.9%)	13 (3.2%)	6 (2.4%)	10 (4.1%)	5 (5.2%)	-	1 (1.4%)	3 (4.3%)
Less than once a week (2)	(44.9%)	65 (15.9%)	115 (46.4%)	39 (15.9%)	45 (46.4%)	12 (12.8%)	26 (37.7%)	14 (20.3%)
One to three times a week (3)	98 (23.7%)	71 (17.4%)	58 (23.4%)	41 (16.7%)	14 (14.4%)	18 (19.1%)	26 (37.7%)	12 (17.4%)
Three to five times a week (4)	61 (14.7%)	203 (49.8%)	37 (14.9%)	124 (50.6%)	17 (17.5%)	47 (50%)	7 (10.1%)	32 (46.4%)
More than five times a week (5)	57 (13.8%)	56 (13.7%)	32 (12.9%)	31 (12.7%)	16 (16.5%)	17 (18.1%)	9 (13%)	8 (11.6%)
Frequency of sexual intercourse	MV: 2.36 SD: 0.878	MV: 2.8 SD: 1.20	MV: 2.31 SD: 0.916	MV: 2.78 SD: 1.199	MV: 2.34 SD: 0.752	MV: 2.64 SD: 1.153	MV: 2.54 SD: 1.08	MV: 3.09 SD: 1.234
	$P \leq .001$		$P \leq .001$		$P \leq .001$		$P \leq .001$	
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Never (1)	65 (15.8%)	83 (20.2%)	49 (19.8%)	52 (21.2%)	7 (7.3%)	18 (18.8%)	9 (13.2%)	13 (18.8%)
Less than once a week (2)	174 (42.3%)	84 (20.5%)	97 (39.3%)	48 (19.6%)	57 (59.4%)	30 (31.3%)	20 (29.4%)	6 (8.7%)
One to three times a week (3)	140 (34.1%)	89 (21.7%)	81 (32.8%)	53 (21.6%)	25 (26%)	20 (20.8%)	34 (50%)	16 (23.2%)
Three to five times a week (4)	25 (6.1%)	142 (34.6%)	16 (6.5%)	87 (35.5%)	6 (6.3%)	25 (26%)	3 (4.4%)	30 (43.5%)
More than five times a week (5)	7 (1.7%)	12 (2.9%)	4 (1.6%)	5 (2%)	1 (1%)	3 (3.1%)	2 (2.9%)	4 (5.8%)

MV= mean value; SD= standard deviation

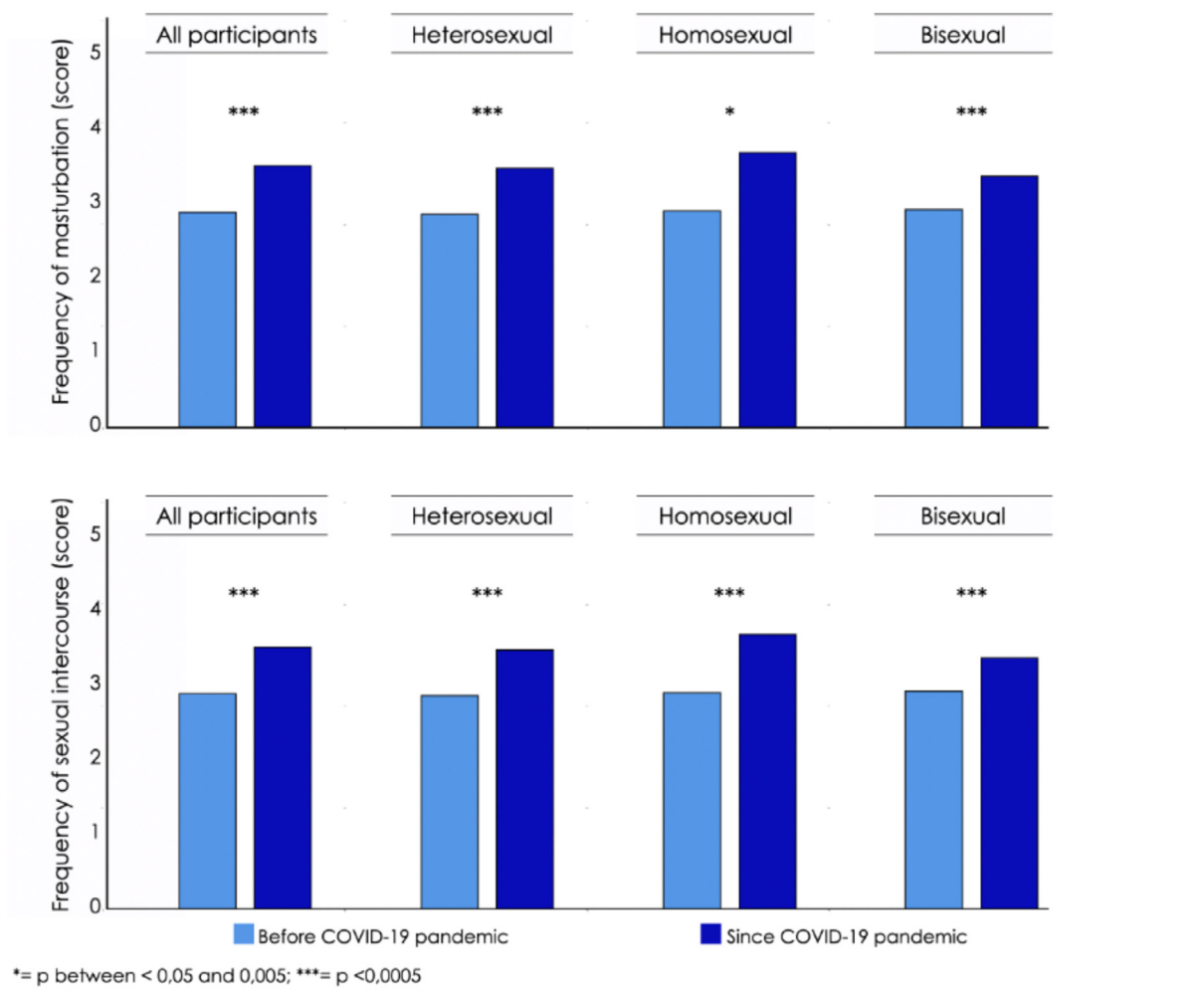


Figure 1. Frequency of masturbation and sexual intercourse before and since the COVID-19 pandemic. Top: Frequency of masturbation before and since the COVID-19 pandemic. Bottom: Frequency of sexual intercourse before and since the COVID-19 pandemic.

intercourse, which increased to 15 participants (3.6%) during the lockdown (Table 3).

Table 3 gives a detailed overview over statistical analyses of the satisfaction with the frequency of sexual contacts and the metric scores of sexual behavior: sexual arousal, capability to enjoy sexual intercourse or masturbation as well as general satisfaction with sexual life and relationship or single-life before and since COVID-19.

Sexual Arousability and Capability to Enjoy Sexual Intercourse or Masturbation

Figure 2 and Table 3 show the level of sexual arousal before and during the COVID-19 pandemic. The three cohorts document a significant increase in mean sexual arousal scores during the quarantine period (all participants: before the pandemic (MV 3.01; SD 0.761) vs during the pandemic (MV 3.52; SD 0.737), $P < .0005$). There was no significant difference between the cohorts. Sexual arousability since the COVID-19 pandemic was

significantly positive associated with being employed ($P < .05$, Annex: table 3).

Heterosexual and homosexual men showed a significant increase in their capability to enjoy sexual intercourse since the COVID-19 pandemic. In bisexual men, no significant difference could be found. Before the pandemic vs since the pandemic: Heterosexuals. $n = 247$, MV 3.37, SD 0.793 vs $n = 245$, MV 3.46, SD 0.781, $P < .0005$; Homosexuals. $n = 96$, MV 3.26, SD 0.729 vs $n = 95$, MV 3.47, SD 0.727, $P < .05$; Bisexuals. $n = 67$, MV 3.27, SD 0.665 vs $n = 69$, MV 3.30, SD 0.713, $P > .05$ (Figure 3, Table 3). Before the pandemic, 3 participants (0.7%) never enjoyed sexual intercourse or masturbation in contrast to 4 participants (1%) during the pandemic. The multivariate linear regression model for “Capability to enjoy sexual intercourse or masturbation during COVID-19 pandemic” was significantly positive associated with being in a relationship ($P < .01$, Annex: table 4).

Table 3. 4-Group comparison of sexual life and relationship characteristics: Before and since COVID-19 pandemic

	All participants		Heterosexual		Homosexual		Bisexual	
	During the pandemic (04-07/2020) n %	3–6 months before the pandemic n %	During the pandemic (04-07/2020) n %	3–6 months before the pandemic n %	During the pandemic (04-07/2020) n %	3–6 months before the pandemic n %	During the pandemic (04-07/2020) n %	
No desire for sex.	16 (3.9%)	9 (2.2%)	12 (4.8%)	7 (2.8%)	2 (2.1%)	2 (2.1%)	2 (2.9%)	-
Satisfaction with frequency.	131 (31.7%)	244 (59.4%)	79 (31.9%)	148 (59.9%)	24 (24.7%)	55 (57.3%)	28 (41.2%)	41 (60.3%)
Wish to have sex more often.	265 (64.2%)	143 (34.8%)	157 (63.3%)	84 (34%)	70 (72.2%)	35 (36.5%)	38 (55.9%)	24 (35.3%)
Wish to have less sex.	1 (0.2%)	15 (3.6%)	-	8 (3.2%)	1 (1%)	4 (4.2%)	-	3 (4.4%)
Sexual arousal	MV: 3.01 SD: 0.761 P: <.001	MV: 3.52 SD: 0.737	MV: 3.06 SD: 0.782 P: <.001	MV: 3.49 SD: 0.740	MV: 2.34 SD: 0.752 P: <.001	MV: 2.64 SD: 1.153	MV: 2.72 SD: 0.770	MV: 3.46 SD: 0.836
I do not get excited at all. (1)	6 (1.5%)	1 (0.2%)	5 (2%)	1 (0.4%)	-	-	1 (1.5%)	-
I get excited with difficulty. (2)	90 (21.8%)	48 (11.7%)	44 (17.7%)	27 (11.1%)	17 (17.5%)	7 (7.2%)	29 (42.6%)	14 (20.6%)
I get aroused quite easily. (3)	222 (53.8%)	108 (26.4%)	138 (55.6%)	73 (29.9%)	58 (59.8%)	25 (25.8%)	26 (38.2%)	10 (14.7%)
I get aroused very easily. (4)	85 (20.6%)	243 (59.4%)	52 (21%)	137 (56.1%)	21 (21.6%)	63 (64.9%)	12 (17.6%)	43 (63.2%)
I never have sexual intercourse or masturbation.*	10 (2.4%)	9 (2.2%)	9 (3.6%)	6 (2.5%)	1 (1%)	2 (2.1%)	-	1 (1.5%)
Capability to enjoy sexual intercourse or masturbation	MV: 3.27 SD: 0.757 P: <.001	MV: 3.44 SD: 0.758	MV: 3.37 SD: 0.793 P: <.001	MV: 3.46 SD: 0.781	MV: 3.26 SD: 0.729 P: .007	MV: 3.47 SD: 0.727	MV: 3.27 SD: 0.665 P: .754	MV: 3.30 SD: 0.713
I never enjoy sex. (1)	3 (0.7%)	4 (1%)	2 (0.8%)	3 (1.2%)	-	-	1 (1.5%)	1 (1.4%)
I enjoy sex occasionally. (2)	64 (15.6%)	48 (11.7%)	43 (17.4%)	29 (11.8%)	16 (16.7%)	13 (13.7%)	5 (7.5%)	6 (8.7%)
I enjoy sex often. (3)	167 (40.7%)	129 (31.5%)	92 (37.2%)	71 (29%)	39 (40.6%)	24 (25.3%)	36 (53.7%)	34 (49.3%)
I always enjoy sex. (4)	172 (42%)	221 (54%)	106 (42.9%)	136 (55.5%)	41 (42.7%)	58 (61.1%)	25 (37.3%)	27 (39.1%)
I never have sexual intercourse or masturbation.*	4 (1%)	7 (1.7%)	4 (1.6%)	6 (2.4%)	-	-	-	1 (1.4%)
General satisfaction with sexual life	MV: 3.38 SD: 1.132 P: .863	MV: 3.37 SD: 1.198	MV: 3.41 SD: 1.142 P: .579	MV: 3.37 SD: 1.212	MV: 3.38 SD: 1.169 P: .813	MV: 3.34 SD: 1.260	MV: 3.29 SD: 1.052 P: .042	MV: 3.41 SD: 1.068
No satisfaction at all. (1)	31 (7.6%)	32 (7.9%)	18 (7.4%)	20 (8.3%)	9 (9.5%)	8 (8.4%)	4 (5.9%)	4 (5.9%)
Moderate satisfaction. (2)	53 (13%)	72 (17.8%)	33 (13.5%)	41 (17%)	13 (13.7%)	20 (21.1%)	7 (10.3%)	11 (16.2%)
Average satisfaction. (3)	118 (29%)	88 (21.8%)	66 (27%)	56 (23.2%)	19 (20%)	19 (20%)	33 (48.5%)	13 (19.1%)
Reasonable satisfaction. (4)	139 (34.2%)	138 (34.2%)	85 (34.8%)	77 (32%)	41 (43.2%)	28 (29.5%)	13 (19.1%)	33 (48.5%)
Full satisfaction. (5)	66 (16.2%)	74 (18.3%)	42 (17.2%)	47 (19.5%)	13 (13.7%)	20 (21.1%)	11 (16.2%)	7 (10.3%)
General satisfaction with partnership or single- life	MV: 3.55 SD: 1.317 P: .561	MV: 3.58 SD: 1.358	MV: 3.62 SD: 1.308 P: .502	MV: 3.67 SD: 1.344	MV: 3.74 SD: 1.242 P: .570	MV: 3.80 SD: 1.318	MV: 3 SD: 1.327 P: .036	MV: 2.94 SD: 1.292
No satisfaction at all. (1)	35 (8.6%)	41 (10.1%)	22 (9%)	25 (10.3%)	7 (7.3%)	10 (10.5%)	6 (8.8%)	6 (8.8%)
Moderate satisfaction. (2)	71 (17.4%)	63 (15.6%)	33 (13.5%)	30 (12.4%)	11 (11.5%)	6 (6.3%)	27 (39.7%)	27 (39.7%)
Average satisfaction. (3)	65 (15.9%)	58 (14.3%)	41 (16.7%)	30 (12.4%)	14 (14.6%)	15 (15.8%)	10 (14.7%)	13 (19.1%)
Reasonable satisfaction. (4)	111 (27.1%)	106 (26.2%)	68 (27.8%)	71 (29.3%)	32 (33.3%)	26 (27.4%)	11 (16.2%)	9 (13.2%)
Full satisfaction. (5)	127 (31.1%)	137 (33.8%)	81 (33.1%)	86 (35.5%)	32 (33.3%)	38 (40%)	14 (20.6%)	13 (19.1%)

*Participants who chose "I never have sexual intercourse or masturbation" were excluded in the scores "Capability to enjoy sexual intercourse or masturbation" and "Sexual arousal".
MV = mean value; SD = standard deviation.

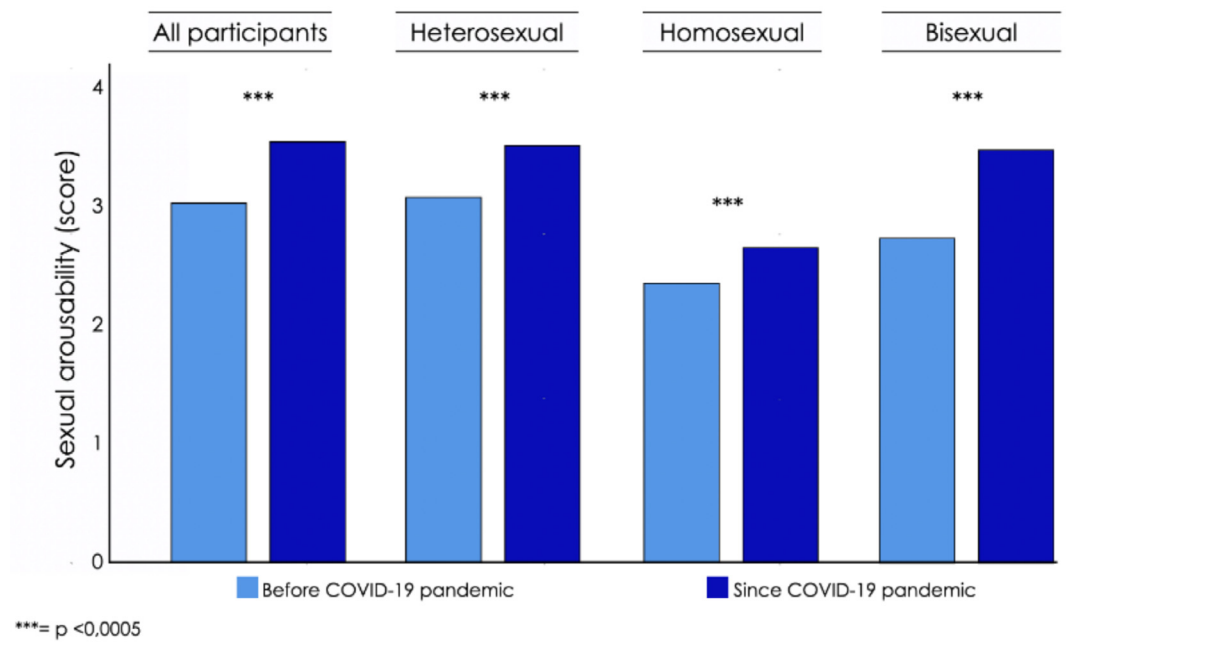


Figure 2. Sexual arousability since COVID-19 pandemic.

General Satisfaction With Sexual and Personal Life

Bisexual cis men indicate a significant increase in the general satisfaction with their sexual life but no significant difference could be seen in heterosexual and homosexual men (before vs since the pandemic: Heterosexuals. $n = 244$, MV 3.41, SD 1.142 vs $n = 241$, MV 3.37, SD 1.212, $P > .05$; Homosexuals. $n = 95$, MV 3.38, SD 1.169 vs $n = 95$, MV 3.34, SD 1.260, $P > .05$; Bisexuals. $n = 68$, MV 3.29, SD 1.052 vs $n = 68$, MV 3.41,

SD 1.068, $P < .05$; Figure 4 and table 3). Furthermore, heterosexual and homosexual cis males reported no significant difference in the general satisfaction with their relationship or single life than before the pandemic. In contrast bisexual men showed a significant decrease in general satisfaction with single- or relationship-life: Before the pandemic vs since the pandemic: Heterosexuals. MV 3.62, SD 1.308 vs MV 3.67, SD 1.344, $P > .05$; Homosexuals. MV 3.74, SD 1.242, $P > .05$ vs MV 3.80, SD

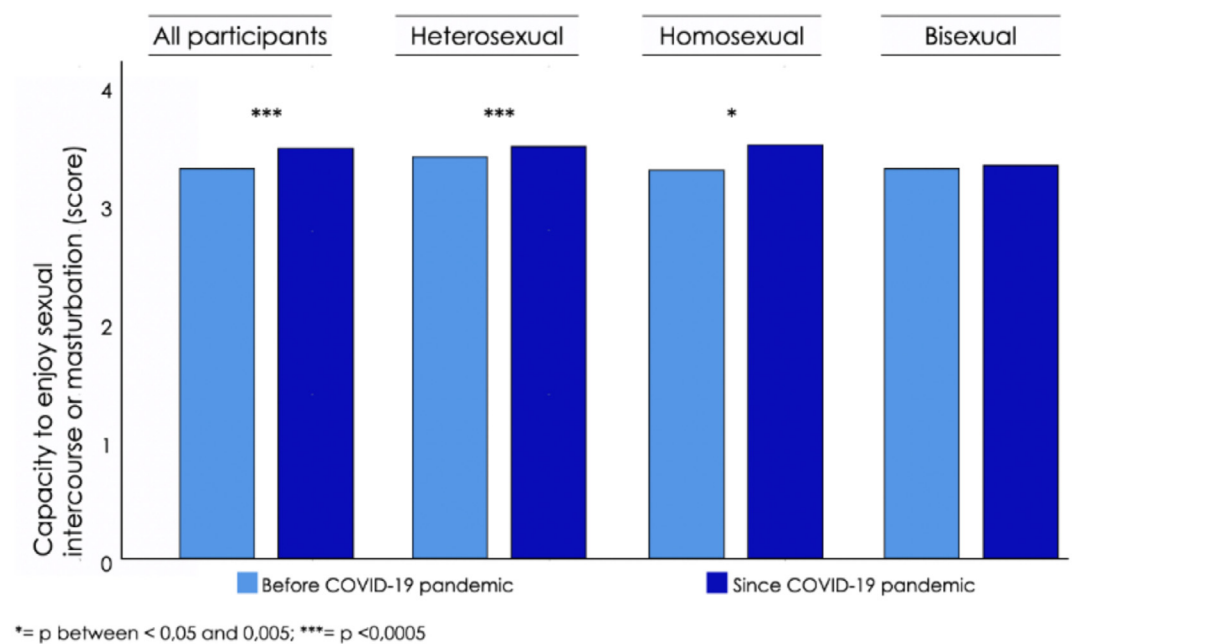


Figure 3. Capacity to enjoy sexual intercourse or masturbation.

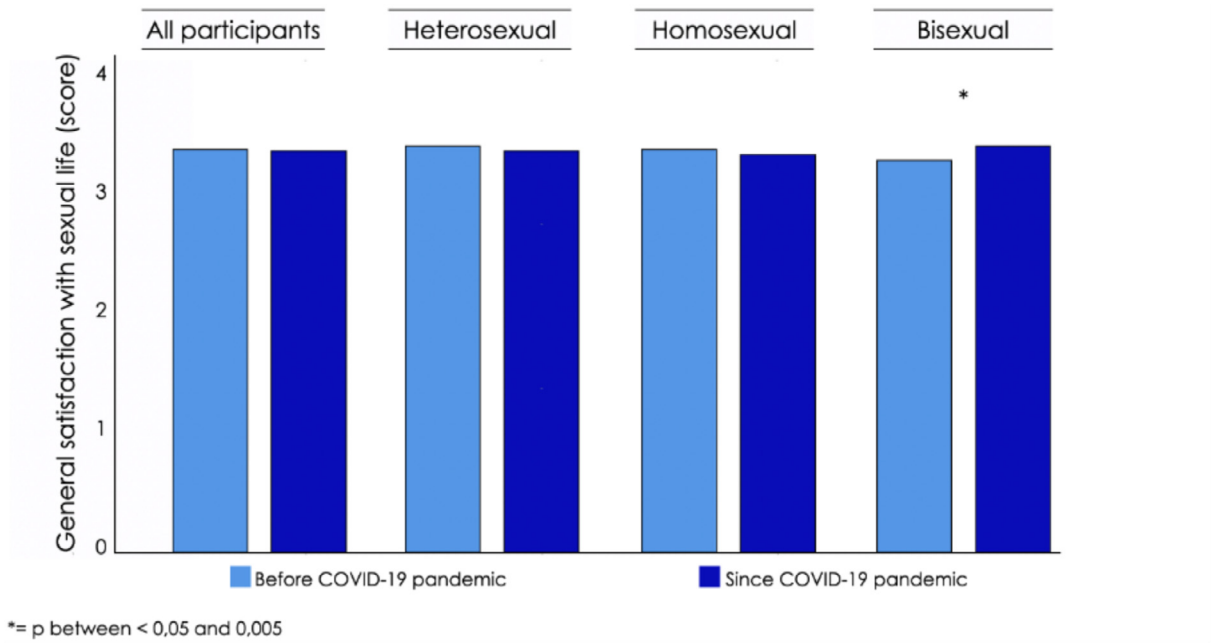


Figure 4. General satisfaction with sexual life.

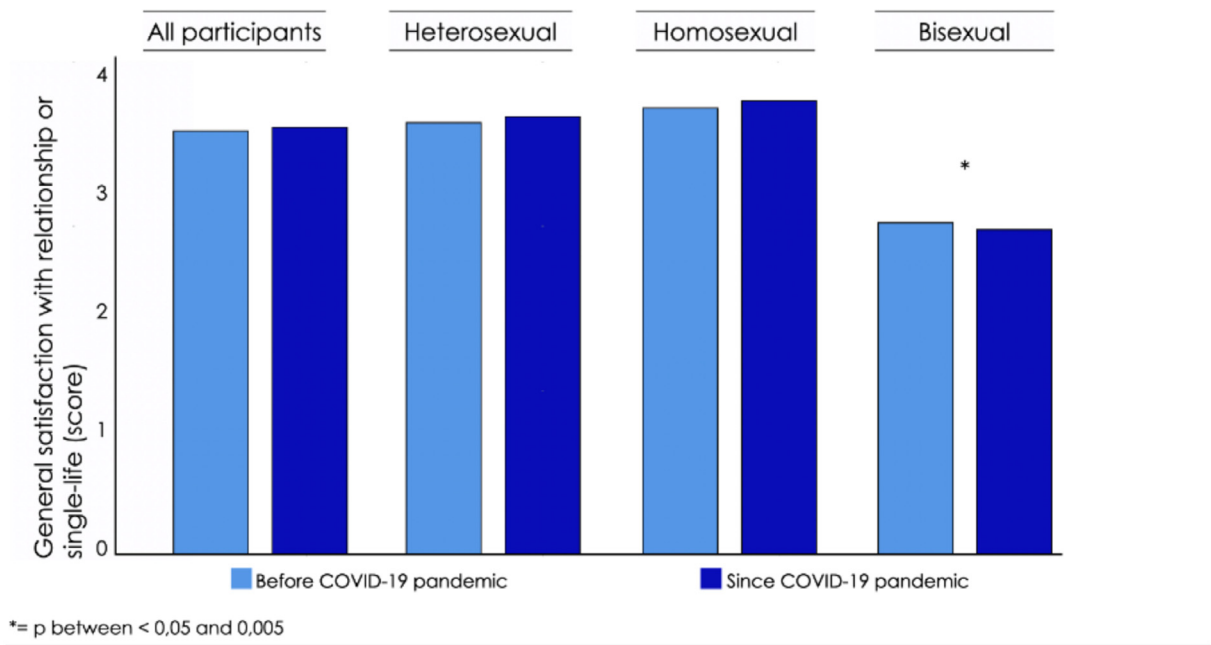


Figure 5. General satisfaction with relationship- or single-life.

1.318; Bisexuals. MV 3, SD 1.327 vs MV 2.94, SD 1.292; $P < .05$ (Figure 5 and Table 3). The multivariate linear regression models (see Annex: Table 5 and 6) with the scores General satisfaction with sexual life and partnership-life during COVID-19 pandemic as dependent variables revealed that there is a significant positive association between being in a relationship ($P < .00$), having one or more children ($P < .05$) and being employed ($P < .05$) and the general satisfaction with sexual life in times of COVID-19 pandemic. General satisfaction with personal life

was significantly associated with being in a relationship ($P < .00$, Annex: Table 6).

DISCUSSION

The COVID-19 pandemic drastically altered the way of life around the world. To this point, there is still limited knowledge available regarding the effects of the COVID-19 pandemic and anti-COVID-19 measures on cis male sexual behavior.

So far, studies conducted on the changes in sexuality and quality of relationship during the COVID-19 pandemic show incongruent findings. A study on female sexual behavior found that the quality of sexual life decreased while the overall frequency of sexual intercourse increased.⁹ A study on the Chinese population discovered a drop of 37% in the frequency of sex during the COVID-19 lockdown.¹⁰ Homosexual and bisexual men in Australia dramatically reduced their sexual contacts with other men since COVID-19.¹⁴ Studying the impact of the COVID-19 quarantine on sexual life in Italy showed unaffected or increased levels of sexual desire during the quarantine while the majority reported a negative impact on the number of sexual intercourses per week.¹⁵ Results from García-Cruz and Peraza showed that sexual intercourse has not been affected in the population of three different countries: Iran, Italy and Spain in the period of March until April 2020.⁶ Our study population significantly increased their frequency of sexual intercourse across all groups (heterosexual, homosexual and bisexual cis males) during the COVID-19 lockdown. Like all the previous studies, our study only focuses on the population of one country. Thus it could be that the effects of the anti-COVID-19 measures on sexual behavior is country specific, perhaps due to varying COVID-19 cases and variations in lockdown measures.¹⁶ The significance of sexuality in different cultures and their opinion on sexual orientation, including monogamy vs polygamy, varies significantly.¹⁷ Previous investigations reveal very different cultural approaches toward sexuality and sexual behaviour, dependent on history around the world.¹⁸ Sexuality does not concentrate on reproduction alone, but is also central to culture.¹⁹ Thus, we hypothesize that cultural and socio-demographic aspects may also act as influencing factors on sexual behavior.

Psychological stressors are known factors that interfere with sexual function through both psychological and physiological mechanisms.²⁰ In particular, chronic stress has been described to have negative effects on sexual function in men.²⁰ Previous studies associated high levels of chronic stress with a decrease in sexual desire.¹² The COVID-19 pandemic and the associated anti-COVID-19 measures could very well be regarded as psychological stressors. Thus, that alone could impact male sexual desire and frequency of intercourse. In response to a natural disaster, this was previously shown by Liu et al, who described a reduction in the frequency of sexual intercourse after an earthquake.²¹ In contrast to natural disasters, there is no loss of living space during the COVID-19 crisis. Thus, we did not find similar findings to Liu et al. Instead, we found a significantly higher frequency of sexual intercourse and arousability during the early COVID-19 pandemic in the hetero-, homo- and bisexual patient cohort. As the anti-COVID-19 measures had many couples spending more time at home - a familiar and safe space - together, we hypothesize a revival of intimacy during the lockdown. During the COVID-19 pandemic, sexual activity has been described to play a protective effect, on the quarantine-related plague of anxiety and mood disorders, and thus could explain the results

obtained.²² Social isolation can have had a direct influence on individuals' physical and psychological health and thus, decrease sexual arousability and frequency of intercourse.²³ Perhaps, for couples at least, the lockdown decreased social isolation from each other and therefore, arousability for sexual intercourse increased.²³ Nevertheless, the significant rise in sexual intercourse could be distorted by the high prevalence of men in a relationship in our sample.

Interestingly, the capability to enjoy sexual intercourse has increased significantly in the heterosexual and homosexual patient cohort. Bisexual cis males, however, showed no significant change in the capability to enjoy sexual intercourse or masturbation. Despite a significant increase in sexual intercourse heterosexual and homosexual cis males confirmed no significant changes in satisfaction levels of their frequency of sexual contacts. Also, no significant difference in general satisfaction with their relationship and sexual life status was identified in heterosexual and homosexual cis males in comparison to before the pandemic. Due to social distancing measures, everyday life has severely changed. The altered schedules, changes in working arrangements, and worries in regards to health and financial issues due to the pandemic are to be expected through the course of the pandemic. We postulate; the aforementioned psychological stressors led to an increase in sexual intercourses. Previous studies associated sexual intercourse with enhanced mental health and correlated it with increased levels of trust and intimacy in a relationship.²⁴ Therefore, our findings can be regarded as an attempt by cis male to promote self-esteem and overall wellbeing.^{6,25} Despite this, the general satisfaction concerning the participant's sexual life and relationship status was not enhanced. Perhaps, the increased sexual intercourse was partly due to pure boredom and resulted as a "way of passing time".²⁶ Nonetheless, It would be of major interest if this behavior persisted or altered again over the course of the pandemic. Theoretically, failing to improve general satisfaction may lead to a decrease in intercourse frequency overtime.

Bisexual cis males, on the other hand, reported a significant decrease in satisfaction with their relationship status, even though, the sexual frequency and arousability increased significantly. The capability to enjoy sexual intercourse or masturbation did not show any significant changes during the COVID-19 pandemic. Since this group is sexually not exclusively attracted to one particular gender, the considerably reduced sexual contacts with partners of another gender due to COVID-19 social restrictions potentially led to a decreased satisfaction and imbalance in the relationship of bisexuals. Moreover, bisexuals may have experienced less connection to the bisexual community during the COVID-19 pandemic.²⁷ The connection to specific sexual orientation communities has previously been described as an important resilience resource for sexual minorities.²⁸ Communities uniting members of a sexual orientation can offer support and is accordingly related to decreased psychological distress²⁹ and better satisfaction.^{27,28} Subsequently, reduced social support

may unfavorably affect their sexual health and satisfaction amongst sexual minorities.^{27,30} However, one thing that must be noted is that our study cohort had significantly more singles in the bisexual group than any of the other groups (Table 1). Nevertheless, the decrease in satisfaction with their relationship status in bisexuals did not correlate to partnerless participants. During the COVID-19 pandemic, social distancing restrictions have been implemented and consequently sexual minorities - including bisexuals - may have less access to their community. Bisexual individuals have previously been described to be at greater risk of poorer mental health than lesbians and gay men due to a greater sexual identity stress experienced by bisexual individuals compared to their gay and lesbian counterparts.³¹ Subsequently, greater vulnerability of bisexual individuals to common mental health problems and the reduced social support may unfavorably affect their sexual health and satisfaction.^{27,30,31} In that sense, homosexual men are described to have a more established and stable community.³² Consequently, this could explain the obtained results in which the sexual minority presented a higher satisfaction in relation to sexual life and relationship. In contrast, previous studies found an association between bisexuality and various forms of psychological suffering.³³ The obtained results could be considered a coping strategy adopted by bisexual participants to facing the anxiety and stress of lockdown restrictions.

Furthermore, the average frequency of masturbation increased significantly in all groups during the pandemic. The increased consumption of pornography mirrors this upsurge and is reflected in the statistics of pornography websites.³⁴ A significant rise in visits to free pornography websites has been described in the United States, regions of Asia, Germany, Spain, and Italy.³⁴ The unusual high amount of time spent at home and the anxiety generated by the pandemic may have led to an increase in masturbation.⁶ The COVID-19 pandemic has triggered social isolation and the negative impact on physical, intellectual and emotional wellbeing may have led to the increase in the use of online pornography and masturbation.³⁵ The effects of the increase in pornography consumptions are unknown but emotional and interpersonal issues could arise.³⁶ The increase in masturbation may cause a reduced interest in real physical sexual practice as it makes men less likely to feel aroused by a real-life partner. This could generate a reduction in sexual desire, leading to potential health problems in relation to paraphilia's and sexual disorders.^{37,38} Nevertheless, it is unknown if masturbation practice were solo masturbation, solo masturbation with pornography use, or mutual partner masturbation. This information would be of interest for future interpretations.

The present study has several limitations. The sample of this study is relatively small as for an online survey and when put in relation to Germany's population. Furthermore, an online questionnaire could have influenced patients' responses without the physical presence of an interviewer. To continue, the study only focused on cis male sexual behavior. Nevertheless, male sexual behavior during a pandemic may be influenced by their partners'

sexual manners. However, there is no information whether the participants were living alone or with a partner. This could also influence the outcome and is a promising area for future research. Furthermore, a well validated instrument studying the sexual enjoyment of the participants could have allowed a more profound insight. The Orgasmometer, a unique psychometric tool exploring the intensity of orgasms, has not been questioned and thus considered as a limitation of this study. Outcomes must be interpreted carefully as COVID-19 related conditions, restrictions and behaviors change fast. A further limitation of the study may be the use of questions from a validated questionnaire to assess COVID-19 related sexual behavior due to the absence of validated scales. The study incorporated a small control group and the SBQ-G is not a validated tool for sexual minorities. The questionnaire could have been better adapted to COVID-19 specific stressors, which were not entirely clear at the time point of creation of our questionnaire. Nonetheless, this study describes the sexual behavior of cis men in the first nationwide quarantine in Germany and gives valuable insights into the sexual life of cis men during this time. Since we did not track responses over the course of the pandemic. Further studies should focus on the longtime impact of COVID-19 on male sex life, especially to clarify if our described behavior persisted or altered over the pandemic. Future studies should develop and incorporate COVID-19 specific associated stressors.

A conclusive strength of this study is that the data was collected in an unprecedented global health crisis in our time. In this extraordinary period, data collected worldwide will help us to identify future potential long-term impacts of COVID-19 on the cis male population.

CONCLUSION

Our study suggests that COVID-19 pandemic related restrictions, lockdowns, quarantine and social distancing measurements have altered sexual behavior amongst cis male in Germany. Interestingly, the bisexual group was the only group showing decreased satisfaction with their relationship status. Sexuality is a multifaceted phenomenon dependent on many influencing factors. The negative impact the pandemic may have caused on the physical, emotional, and sexual behavior of cis male should be investigated in the future to assess the long-term impact that will probably last for years after the return to "normal". Specifically, effects of COVID-19 on the mental health of sexual minorities should in hindsight of our findings be subject of further investigations in order to address the sexual health disparities during and after the COVID-19 pandemic. The negative impact of the pandemic and its associated anti-COVID-19 measures are still unknown and although we do not track participants over the course of the pandemic, our findings imply changes in cis male sexual life during lockdown measures. Further studies have to analyze whether our findings hold up during the pandemic or if cis male's sexual life changes over the pandemic.

STATEMENT OF ETHICS

All human subjects provided written informed consent with guarantees of confidentiality. In lieu of an ethical review board, the authors state that this article does not contain any studies with human participants performed by any of the authors. All local ethics boards contributing to this study permitted the analysis (Reference number: 20-344 KB). Our research was carried out in accordance with the Declaration of Helsinki of the World Medical Association and informed consent was obtained from all patients. All data was collected and analyzed anonymously.

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SUPPLEMENTARY MATERIALS

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