

COVID-19

The Impact of Mental Health and Stress Concerns on Relationship and Sexuality Amidst the COVID-19 Lockdown

Yingfei Zhang, MSc,¹ Conghua Wen, PhD,² Yutong Zhang, MSc,³ Xiaoqin Luo, PhD,⁴ and Zheng Fei Ma, PhD⁵

ABSTRACT

Background: Since January 23, 2020, the Chinese government has imposed restrictive measures including self-isolation, travel restrictions and lockdown of Wuhan city in order to prevent the incoming waves of COVID-19 outbreak in the country. However, the impact of mental health and stress concerns on relationship and sexuality amidst the COVID-19 lockdown was currently unclear.

Aim: The cross-sectional study was designed to determine the changes in health, relationship and sexuality among the Chinese couples who lived together amid the early stages of COVID-19 pandemic in China.

Methods: Participants of Chinese nationality aged ≥ 18 years were asked to complete a self-administered online questionnaire regarding sexuality behaviour and impact of event scale (IES) in March 2020. Nonrandom sampling was used for participant recruitment. Also assessed were sociodemographic data including sex, age, employment, region, sexual dysfunction, and whether participants tested positive for COVID-19.

Outcomes: IES score, frequency of sexual intercourse per week, quality of usual sex life, emotional bonding and duration of relationship were measured.

Results: A total of 1,139 participants (ie, 735 males and 404 females) were included in the study. Mean age and IES of participants was 33.6 ± 9.5 years and 27.4 ± 8.6 , respectively. Being male was significantly associated with increased frequency of sexual intercourse amid the COVID-19 pandemic ($P = .012$). Also, participants with an IES score < 26 were more likely to report that they had increased frequency of sexual intercourse per week ($P < .001$) and the COVID-19 pandemic had positively affected the quality of their usual sex lives ($P < .001$). On the other hand, participants with IES score ≥ 26 were more likely to report that the COVID-19 pandemic had positively affected their emotional bonding ($P < .001$).

Clinical implications: Frequency of sexual intercourse and quality of sex life in participants who experienced high stressful impact were more likely to be affected by the COVID-19 pandemic.

Strengths and limitations: This was one of the first studies to assess sexual behavior during the COVID-19 pandemic in Chinese adults. Since participants were asked to self-report their sexual behavior, this potentially introduced self-reporting and recall bias into our findings.

Conclusions: Our study reported that despite the moderate-to-severe stressful impact due to the COVID-19 pandemic, the majority reported no significant changes in the frequency of their sexual intercourse per week, quality of their usual sexual lives and emotional bonding. **Zhang Y, Wen C, Zhang Y, et al. The Impact of Mental Health and Stress Concerns on Relationship and Sexuality Amidst the COVID-19 Lockdown. J Sex Med 2021;18:1843–1850.**

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KEY WORDS: Relationship; Emotional bonding; Sexuality; COVID-19; China

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¹Mathematics Teaching and Research Office, Public Basic College, Jinzhou Medical University, Jinzhou, Liaoning, China;

²School of Science, Xi'an Jiaotong-Liverpool University, Suzhou, Jiangsu, China;

³Jinzhou Medical University, Jinzhou, Liaoning, China;

⁴Department of Nutrition and Food Safety, School of Public Health, Xi'an Jiaotong University, Xi'an, Shaanxi, China;

⁵Department of Health and Environmental Sciences, Xi'an Jiaotong-Liverpool University, Suzhou, Jiangsu, China

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INTRODUCTION

Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV2) virus, which was first reported in December 2019 in Wuhan, China, has led to a global health emergency.¹ As of August 2020, SARS-CoV-2 had infected more than 23 million people, resulting in more than 800,000 deaths (at <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports/>). SARS-CoV-2 causes an infectious disease called coronavirus disease 2019 (COVID-19).² Therefore, in order to contain the COVID-19 pandemic and stop COVID-19 from spreading rapidly to other parts of the world, many countries have enacted strict measures such as transportation restriction, border closures, and self-isolation.³

In China, the majority of businesses were closed between February and March 2020. In addition, nonemergency elective surgeries and medical care were suspended in order to ease the healthcare system pressure due to the increasing cases of COVID. Following the self-isolation period due to the COVID-19 pandemic, some behaviours including sexual activity may be impacted. Although sexual inactivity might be not an important focus for public health attention except its adverse outcomes such as sexual dysfunction, regular sexual activity has been reported to be associated with greater quality of life and well-being.^{4, 5} Several studies have reported the impact of mass disasters on sexual behaviours.⁶⁻⁸ For example, some individuals who experienced psychological pressure due to the temporary closure of businesses or loss of jobs amidst the COVID-19 pandemic might be more likely to be vulnerable to negative sexual health outcomes because of reduced access to healthcare service. In addition, individuals who were separated with their partner amidst the COVID-19 pandemic might also have increased risk of experiencing negative sexual health outcomes.⁹

To our knowledge, although the COVID-19 has caused huge impact to the public health and social life,¹⁰ there are still limited studies that assessed the impact of the COVID-19 pandemic on sexual behaviour in the general population, particularly in China. Therefore, the aim of the study was to assess the changes in the health, relationship and sexuality behaviours among the Chinese couples who lived together amid the COVID-19 pandemic in China. We hypothesised that the mental health and stress concerns would affect the relationship and sexuality in our study population amidst the COVID-19 pandemic.

METHODS

A cross-sectional study was conducted in March 2020. Inclusion criteria included: nonpregnant adults of Chinese nationality aged ≥ 18 years and were living together with their partners during the COVID-19 pandemic. Exclusion criteria included: those currently not living in mainland China, not willing to provide

informed consent and diagnosed with psychiatric illness. Informed consent was provided by all adults who agreed to participate in the study. No monetary rewards were given to participants who took part in the study. Convenience and snowball sampling techniques were employed for the participant recruitment in the study. Our research team started with inviting their friends to participate. After that, they were asked to invite their friends to participate in the study via online social media. The study had obtained ethical approval from the Ethics Committee of the Jinzhou Medical University and was performed according to the provisions of the Declaration of Helsinki (as revised in Edinburgh 2000).

Measures

Sociodemographic Measures. Participants were asked to report their sociodemographic details including age, education level, current city of residence, employment status, duration of relationship, and religious beliefs.

Impact of Event Scale (IES). Participants were asked to complete a modified and validated self-administered Chinese version of 15-item IES questionnaire which was used to determine the extent of psychological impact of COVID-19.¹⁰⁻¹² These questions included: “trouble falling asleep,” “waves of strong feeling about the COVID-19 pandemic,” “feeling upset when thinking about the COVID-19 pandemic,” “dreams about the COVID-19 pandemic,” “staying away from reminders about the COVID-19 pandemic,” and “trying to imagine as if the COVID-19 was unreal.”¹⁰⁻¹² The IES questionnaire used in the study had 2 subscales, which were intrusive (ie, repeated thoughts about the COVID-19 pandemic) and avoidance scales (ie, effortful avoidance of situations that were able to remind the participants about the COVID-19 pandemic). The Cronbach’s alpha value for the IES questionnaire was 0.84. The items in the IES questionnaire were scored on a 4-point Likert scale (not at all (0), rarely (1), sometimes (3), or often (5)). A higher overall IES score was used to indicate that participants experienced a higher level of stress amid the COVID-19 pandemic. Participants with an IES score of ≥ 26 were considered to experience moderate-to-severe impact amidst the COVID-19 pandemic.¹⁰

Relationship and Sexuality. In addition, participants were asked to complete the validated self-administered questions regarding the impact of COVID-19 pandemic on their sexuality. Using a 5-point Likert scale, these questions assessed changes in frequency of sexual intercourse per week (response options ranging from significantly decrease to significantly increased), quality of usual sex life (response options from very negative to very positive), and emotional bonding (response options ranging from very negative to very positive) following the onset of COVID-19

pandemic. All the questions regarding the sexual behaviour were validated by pilot-testing the content and context in a group of Chinese adults. In addition, participants were asked to indicate if they were diagnosed with sexual dysfunction based on their medical and sexual history.

Statistical Analysis. Statistical analysis was performed by using SPSS software (SPSS, Chicago, IL). All normally distributed results of continuous variables were expressed as mean \pm standard deviation. In addition, frequency and percentages of variables were also calculated and tabulated. Inferential statistics including unpaired t-test and Chi-square test were used to assess if there was a significant difference between variables such as sex and IES. General linear model (GLM) multivariate analysis was used to assess the predictors of IES. A *P*-value $<.05$ was used to indicate statistical significant results.

RESULTS

Participant Sociodemographic Characteristics

A total of 1139 participants (ie, 735 males and 404 females) were recruited into the study (Table 1). Since our study employed nonrandom sampling, it is unlikely that our final sample resembled the national characteristics of the population in

terms of age, marital status, and education level. The mean age of participants was 33.6 ± 9.5 years, with 70.1% of them had a higher qualification. More than half of participants (73.4%) had a full-time employment status. More than half of participants (50.9%) had a 1-5 years of relationship, followed by 6–10 years of relationship (22.4%), <1 year of relationship (14.4%), and ≥ 11 years of relationship (12.3%). Region with the highest percentage of participants was from Northeast China (34.6%), followed by East China (24.0%), North China (13.8%), South Central China (10.4%), Northwest China (9.1%), and Southwest China (8.2%). None of the participants reported that they or their family members/friends were diagnosed for the COVID-19 at the time of the study. There were 96.0% of participants who reported that they did not have any religious affiliations. None of participants reported any sexual dysfunction.

Relationship and Sexuality

Overall, the majority (69.7%) reported no changes in the mean frequency of their sexual intercourse per week amid the COVID-19 pandemic (Table 2). Additionally, the majority (78.8%) reported that pandemic did not affect the quality of their usual sex lives amid the COVID-19 pandemic. There were 52.3% of participants who reported that pandemic did not affect their emotional bonding amid the COVID-19 pandemic.

Table 1. Sociodemographic characteristics of participants

| | All (n = 1,139) | Females (n = 404) | Males (n = 735) | <i>P</i> -value |
|--------------------------------------|-----------------|-------------------|-----------------|-----------------|
| Age (years)* | 33.6 \pm 9.5 | 32.9 \pm 8.1 | 35.5 \pm 11.9 | .043 |
| Education level, n (%) [†] | | | | |
| Secondary school | 340 (29.9) | 116 (28.7) | 224 (30.5) | .534 |
| Higher qualification | 700 (70.1) | 288 (71.3) | 511 (69.5) | |
| Region, n (%) [†] | | | | |
| North | 157 (13.8) | 31 (7.7) | 126 (17.1) | <.001 |
| Northeast | 394 (34.6) | 147 (36.4) | 247 (33.6) | |
| East | 273 (24.0) | 97 (24.0) | 176 (23.9) | |
| South Central | 118 (10.4) | 53 (13.1) | 65 (8.8) | |
| Southwest | 93 (8.2) | 37 (9.2) | 56 (7.6) | |
| Northwest | 104 (9.1) | 39 (9.7) | 65 (8.8) | |
| Employment status, n (%) | | | | |
| Full-time | 836 (73.4) | 295 (73.0) | 541 (73.6) | .012 |
| Part-time | 111 (9.7) | 28 (6.9) | 83 (11.3) | |
| Students | 192 (16.9) | 81 (20.0) | 111 (15.1) | |
| Duration of relationship (yr), n (%) | | | | |
| <1 | 164 (14.4) | 37 (9.2) | 127 (17.3) | <.001 |
| 1-5 | 580 (50.9) | 109 (51.7) | 371 (50.5) | |
| 6-10 | 255 (22.4) | 119 (29.5) | 136 (18.5) | |
| ≥ 11 | 140 (12.3) | 39 (9.7) | 101 (13.7) | |
| Religion, n (%) | | | | |
| No | 1,093 (96.0) | 385 (95.3) | 708 (96.3) | .398 |
| Yes | 46 (4.0) | 19 (4.7) | 27 (3.7) | |

*Mean \pm SD (all such values).

[†]Due to rounding, the total may not add to 100% exactly.

Bold *P*-values means *P* $<.05$

Table 2. IES and sexual behavior by sex, education level, and region

| | Sex (n = 1,139) | | P-value | Education level (n = 1,139) | | P-value | Region (n = 1,139) | | | | | | P-value |
|--|-------------------|-----------------|---------|-----------------------------|--------------------------------|---------|--------------------|--------------|----------------|--------------|-------------|--------------|---------|
| | Females (n = 404) | Males (n = 735) | | Secondary school (n = 340) | Higher qualification (n = 799) | | North (n = 157) | NE (n = 394) | East (n = 273) | SC (n = 118) | SW (n = 93) | NW (n = 104) | |
| IES* | 26.6 ± 9.2 | 27.8 ± 8.2 | .024 | 27.7 ± 8.7 | 27.2 ± 8.6 | .421 | 27.6 ± 7.6 | 28.3 ± 8.7 | 26.1 ± 9.1 | 27.2 ± 8.9 | 27.9 ± 8.0 | 26.8 ± 7.9 | .039 |
| IES ≥ 26, n (%) | 212 (52.5) | 450 (61.2) | .004 | 203 (59.7) | 459 (57.4) | .479 | 90 (57.3) | 248 (62.9) | 137 (50.2) | 66 (55.9) | 57 (61.3) | 64 (61.5) | .035 |
| Intrusive score | 14.6 ± 5.1 | 15.1 ± 4.8 | .115 | 15.0 ± 5.1 | 14.9 ± 4.8 | .869 | 14.9 ± 4.5 | 15.5 ± 4.9 | 14.1 ± 5.0 | 14.8 ± 5.1 | 15.2 ± 4.5 | 14.8 ± 4.7 | .009 |
| Avoidance score | 12.0 ± 5.0 | 12.7 ± 4.4 | .011 | 12.7 ± 4.5 | 12.3 ± 4.7 | .186 | 12.6 ± 4.2 | 12.7 ± 4.7 | 12.0 ± 5.0 | 12.4 ± 4.6 | 12.7 ± 4.4 | 12.0 ± 4.2 | .357 |
| Sexual behavior[†] | | | | | | | | | | | | | |
| Frequency of sexual intercourse during COVID-19, n (%) | | | | | | | | | | | | | |
| Decreased | 22 (5.4) | 18 (2.4) | .012 | 13 (3.8) | 27 (3.4) | .209 | 8 (5.1) | 16 (4.1) | 0 (0.0) | 0 (0.0) | 6 (6.5) | 10 (9.6) | <.001 |
| Same as before | 286 (70.8) | 508 (69.1) | | 248 (72.9) | 546 (68.3) | | 103 (65.6) | 286 (72.6) | 195 (71.4) | 87 (73.7) | 58 (62.4) | 65 (62.5) | |
| Increased | 96 (23.8) | 209 (28.4) | | 79 (23.2) | 226 (28.3) | | 46 (29.3) | 92 (23.4) | 78 (28.6) | 31 (26.3) | 29 (31.2) | 29 (27.9) | |
| COVID-19 affected quality of usual sexual life, n (%) | | | | | | | | | | | | | |
| Negatively | 25 (6.2) | 28 (3.8) | .187 | 19 (5.6) | 34 (4.3) | .534 | 11 (7.0) | 18 (4.6) | 10 (3.7) | 0 (0.0) | 5 (5.4) | 9 (8.7) | <.001 |
| Same as before | 312 (77.2) | 585 (79.6) | | 262 (77.1) | 635 (79.5) | | 134 (85.4) | 288 (73.1) | 208 (76.2) | 111 (94.1) | 77 (82.8) | 79 (76.0) | |
| Positively | 67 (16.6) | 122 (16.6) | | 59 (17.4) | 130 (16.3) | | 12 (7.6) | 88 (22.3) | 55 (20.1) | 7 (5.9) | 11 (11.8) | 16 (15.4) | |
| COVID-19 affected emotional bonding, n (%) | | | | | | | | | | | | | |
| Negatively | 21 (5.2) | 26 (3.5) | .400 | 17 (5.0) | 30 (3.8) | .515 | 8 (5.1) | 17 (4.3) | 11 (4.0) | 0 (0.0) | 4 (4.3) | 7 (6.7) | <.001 |
| No change | 208 (51.5) | 388 (52.8) | | 181 (53.2) | 415 (51.9) | | 68 (43.3) | 215 (54.6) | 173 (63.4) | 63 (53.4) | 34 (36.6) | 43 (41.3) | |
| Positively | 175 (43.3) | 321 (43.7) | | 142 (41.8) | 354 (44.3) | | 81 (51.6) | 162 (41.1) | 89 (32.6) | 55 (46.6) | 55 (59.1) | 54 (51.9) | |

*Mean ± SD (all such values).

[†]Due to rounding, the total may not add to 100% exactly.Bold P-values means $P < .05$ **Table 3.** IES and sexual behavior by employment status and duration of relationship

| | Employment status (n = 1,139) | | | P-value | Duration of relationship (yr) (n = 1,139) | | | | P-value |
|--|-------------------------------|---------------------|--------------------|---------|---|---------------|----------------|---------------|---------|
| | Full-time (n = 836) | Part-time (n = 111) | Students (n = 192) | | <1 (n = 164) | 1-5 (n = 580) | 6-10 (n = 255) | ≥11 (n = 140) | |
| IES* | 27.2 ± 8.8 | 29.9 ± 7.2 | 26.5 ± 8.4 | .002 | 26.9 ± 7.7 | 26.3 ± 8.8 | 27.4 ± 8.9 | 32.2 ± 6.7 | <.001 |
| IES ≥ 26, n (%) | 480 (57.4) | 81 (73.0) | 101 (52.6) | .002 | 93 (56.7) | 308 (53.1) | 147 (57.6) | 114 (81.4) | <.001 |
| Intrusive score | 15.0 ± 4.9 | 16.0 ± 4.6 | 14.2 ± 4.8 | .008 | 14.5 ± 4.4 | 14.3 ± 5.0 | 15.3 ± 5.0 | 17.5 ± 3.9 | <.001 |
| Avoidance score | 12.3 ± 4.7 | 14.0 ± 3.9 | 12.3 ± 4.8 | .001 | 12.4 ± 4.4 | 12.0 ± 4.8 | 12.1 ± 4.6 | 14.8 ± 3.8 | <.001 |
| Sexual behavior[†] | | | | | | | | | |
| Frequency of sexual intercourse during COVID-19, n (%) | | | | | | | | | |
| Decreased | 28 (3.3) | 3 (2.7) | 9 (4.7) | .757 | 0 (0.0) | 36 (6.2) | 0 (0.0) | 4 (2.9) | <.001 |
| Same as before | 581 (69.5) | 82 (73.9) | 131 (68.2) | | 79 (48.2) | 402 (69.3) | 199 (78.0) | 114 (81.4) | |
| Increased | 227 (27.2) | 26 (23.4) | 52 (27.1) | | 85 (51.8) | 142 (24.5) | 56 (22.0) | 22 (15.7) | |
| COVID-19 affected quality of usual sexual life, n (%) | | | | | | | | | |
| Negatively | 33 (3.9) | 3 (2.7) | 17 (8.9) | <.001 | 11 (6.7) | 38 (6.6) | 0 (0.0) | 4 (4.7) | <.001 |
| Same as before | 647 (77.4) | 89 (80.2) | 161 (83.9) | | 104 (63.4) | 475 (81.9) | 204 (80.0) | 897 (78.8) | |
| Positively | 156 (18.7) | 19 (17.1) | 14 (7.3) | | 49 (29.9) | 67 (11.6) | 51 (20.0) | 189 (16.6) | |
| COVID-19 affected emotional bonding, n (%) | | | | | | | | | |
| Negatively | 29 (3.5) | 3 (2.7) | 15 (7.8) | <.001 | 11 (6.7) | 33 (5.7) | 0 (0.0) | 3 (2.1) | <.001 |
| No change | 384 (45.9) | 78 (70.3) | 134 (69.8) | | 68 (41.5) | 333 (57.4) | 122 (47.8) | 73 (52.1) | |
| Positively | 423 (50.6) | 30 (27.0) | 43 (22.4) | | 85 (51.8) | 214 (36.9) | 133 (52.2) | 64 (45.7) | |

*Mean ± SD (all such values).

[†]Due to rounding, the total may not add to 100% exactly.Bold P-values means $P < .05$

There was a significant difference in frequency of sexual intercourse amid the COVID-19 between sexes ($P < .05$). Being male was significantly associated with increased frequency of sexual intercourse amid the COVID-19 pandemic ($P = .012$) (Table 2). Region was significantly associated with all the items in the sexual activity domain (all $P < .05$). Participants with a full-time job were more likely to report that the COVID-19 had positively affect the quality of their sexual lives and emotional bonding than participants with a part-time job and students (both $P < .001$). In terms of duration of relationship, participants who had been in relationships less than 1 year were more likely to have increased frequency of sexual intercourse per week amid the COVID-19 than participants who had been in relationships greater than or equal to one year ($P < .001$) (Table 3). Participants who had been in relationships less than 1 year were also more likely to report that that the COVID-19 had positively affect the quality of their sexual lives and emotional bonding than participants who had been in relationships greater than or equal to 1 year (both $P < .001$). Only education level was not associated with any items in the sexual activity domain ($P > .05$).

IES

The overall mean IES in participants was 27.4 ± 8.6 , reflecting moderate-to-severe stressful impact (Table 2). Males had a significantly higher mean IES score than females (27.8 vs 26.6 , respectively) ($P = .024$). In addition, participants from Northeast China were reported to have the highest mean IES score (28.3), followed by Southwest China (27.9), North China (27.6), South Central China (27.2), Northwest China (26.8), and East China (26.1) ($P = .039$). In terms of employment status, participants with part-time jobs reported the highest IES score (29.9) than participants with full-time jobs (27.2) and students (26.5) ($P = .002$) (Table 3). In terms of duration of relationship, participants who had been in relationships greater than or equal to 11 years reported the highest IES score (32.2), followed by participants who had been in relationships for 6–10 years (27.4), participants who had been in relationships less than 1 year (26.9), and participants who had been in relationships for 1–5 years (26.3) ($P < .001$).

Overall, the majority (58.1%) reported an IES score of ≥ 26 . There was a significant difference in IES score of ≥ 26 amid the COVID-19 between sexes ($P < .05$). Being male was associated with an IES score of ≥ 26 ($P = .004$) (Table 2). There was a significant relationship between the percentages of participants with an IES score ≥ 26 and regions (Northeast China 62.9%, Northwest China 61.5%, Southwest China 61.3%, North China 57.3%, South Central China 55.9%, and East China 50.2%, respectively) ($P = .035$). In terms of employment status, the highest percentage of participants with an IES score of ≥ 26 was participants with part-time jobs (72.0%), followed by

participants with full-time jobs (57.4%), and students (52.6%) ($P = .002$) (Table 3). In terms of duration of relationship, participants who had been in relationships greater than or equal to 11 years was significantly associated with an IES score ≥ 26 ($P < .001$).

The overall mean for intrusion and avoidance in participants were 14.9 ± 4.9 and 12.4 ± 4.6 , respectively (Table 2). Males had a significantly higher mean avoidance score than females (12.7 vs 12.0) ($P = .011$). There was no difference in mean intrusive score between males and females (15.1 vs 14.6) ($P = .115$). Participants from Northeast China reported the highest mean intrusive score than other regions ($P = .009$). There was no difference in mean avoidance score between regions ($P = .357$). Being in a part-time job was significantly associated with higher intrusive and avoidance scores ($P < .05$) (Table 3). In addition, participants who had been in relationships greater than or equal to 11 years was significantly associated with higher intrusive and avoidance scores ($P < .05$). Only education level was not associated with any items in the IES domain ($P > .05$).

Relationship Between IES and Sexual Activity

Following the COVID-19 pandemic, participants with an IES score of < 26 were more likely to have increased frequency of sexual intercourse per week ($P < .001$). In addition, participants with an IES score of < 26 were more likely to report that the COVID-19 pandemic had positively affected the quality of their usual sex lives ($P < .001$). On the other hand, participants with an IES score of ≥ 26 were more likely to report that the COVID-19 pandemic had positively affected their emotional bonding ($P < .001$).

DISCUSSION

To our knowledge, our study was the one of the earliest studies to assess the impact of mental health and stress concerns on the relationship and sexuality, especially in mainland China during the early stages of the COVID-19 pandemic. The lockdown due to the COVID-19 pandemic has not only impacted the health and economy, but it has also caused deterioration of social life in the Chinese population.^{11, 12} However, it is unclear if to what extent, this would also affect the sexual behaviour of Chinese couples. Although the SARS-CoV-2 is rapidly evolving into a global pandemic at the time of the study, there is a paucity of literature regarding the impact of COVID-19 on sexual behaviour.¹³⁻¹⁵

Our study reported that although being male was associated with a higher stressful impact, being male was also significantly associated with increased frequency of sexual intercourse amid the COVID-19 pandemic. Our findings were in line with the results by Jacob et al. who reported that being male was significantly associated with greater sexual activity in United Kingdom adults amid the COVID-19 self-isolation period.¹⁴ On the other hand, a study by Hall et al. reported that young women with

moderate/severe stress symptoms had significantly higher proportions of sexually active weeks than those without these stress symptoms (43% vs 35%, respectively).¹⁶ Therefore, additional research is needed to understand whether and how the sexual behaviors shape the mental health outcomes in both sexes, especially in stressful environment. In addition, it is still unclear how male sexual behavior may possibly affect female sexual attitude and vice versa, which is another possible future research area to be pursued and emphasized.

In addition, our study also reported that duration of relationship and employment status were significantly associated with the changes in sexual behavior amidst the COVID-19 pandemic. In our study, being in a full-time job was significantly associated with positive sexual health outcomes including quality of sexual life and emotional bonding. One possible reason might be that individuals being employed in a full-time job were less vulnerable to financial issues and negative psychological impacts due to the COVID-19 pandemic.⁹ Therefore, having a full-time job was more likely to lead to more economic stability and less stress, which could then impact sexuality. Also, participants who were in relationships less than 1 year were more likely to have positive sexual health outcomes including increased frequency of sexual intercourse per week and quality of sexual life amidst the COVID-19 pandemic. It is suggested that participants who were in relationships less than 1 year had high hopes for romance and were still in romantic relationships.¹⁷

In our study, participants who reported experiencing mild psychological impact of the COVID-19 pandemic were more likely to have an increase frequency of sexual intercourse per week. In addition, participants who experienced mild psychological impact of the COVID-19 pandemic were more likely to report that the COVID-19 pandemic had positively affected the quality of their usual sex lives. Our findings were consistent with the findings from the published literature.¹⁸ There are some factors that can help to facilitate the sexual intimacy, which subsequently may result in an increased frequency of sexual intercourse. These include: greater well-being and increased time spent together.¹⁹ Therefore, it is suggested that having greater well-being and more time together would lead to more frequent sexual activities. During the COVID-19 lockdown period, the couples were self-isolating at home and consequently, they were more likely to have an increase in time spending together with their intimate partner.¹³ In a study of young Chinese adults by Li et al., 41%, 30%, and 23% of young Chinese adults had decreased sexual frequency, increased masturbation frequency, and increased use of pornography amidst the COVID-19 pandemic.⁹ However, the authors did not further examine the gender dimensions and differences in these aspects, which should have been emphasized.⁹ A study by Jacob et al. reported that the number of days in self-isolation was significantly associated with sexual activity in UK adults during the COVID-19 self-isolation period.¹⁴ Similarly, another study by Yuksel et al also reported that during the COVID-19 pandemic, there was a significantly

higher frequency of sexual intercourse and sexual desire in Turkish adults.¹⁵ The authors suggested that sexual activity was used to overcome boredom, anxiety and stress, which were more likely to increase with increasing days of self-isolation during the COVID-19 self-isolation period.¹⁴ However, it was still unclear how this would differ by gender due to limited available studies.^{14, 15}

In addition, stressful life has been reported to decrease the frequency of sexual intercourse.²⁰ A study by Liu et al also reported a decrease in the frequency of sexual intercourse in a group of Chinese adults after being exposed to traumatic events which were associated with chronic stressors.²¹ Therefore, future quantitative and qualitative studies should consider investigating if there are gender and age-related differences in terms of frequency of sexual intercourse in different population groups from different countries. Moreover, additional research is also needed to investigate if there is a significant association between sexual activity and number of days in self-isolation among different population groups amid the COVID-19 lockdown period.

On the other hand, in our study, participants who experienced moderate-to-severe psychological impact of the COVID-19 pandemic were more likely to report that the COVID-19 pandemic had positively affected their emotional bonding. It is possible that during the COVID-19 lockdown period, they were getting more support from their intimate partner and spending more quality time together.¹³ Studies have reported that romantic experience and relationship when sustained over time are considered important sources of emotional bonding.¹⁸ In addition, the couples were spending more time together at home and there were no loss of living space amid the COVID-19 pandemic.¹⁵ This is because due to the fast pace of life in modern times, they may have little discretionary time to spend with their intimate partner, especially during nonpandemic times.¹⁴ Therefore, although the COVID-19 pandemic have disrupted the time for performing daily work activities including commuting to work, this time can now be used to spend with their intimate partner to reconnect and emotionally engaged.¹⁴

Our study had several strengths including a larger sample size. In addition, our study was one of the earliest studies to assess sexuality and health behaviours amidst the COVID-19 pandemic. Our study also assessed the IES of participants and correlated the IES with sexual behaviour among participants. This is particularly important because it offered a unique opportunity for understand how the stressful impact caused by the COVID-19 affected sexual behaviour, particularly in Asian context. In addition, pre-testing and pilot testing of the questionnaire used in our study had been performed to ensure the validity of the questionnaire used in our study was checked by pilot testing the questionnaire in our community. However, it is important to note that our study findings must be interpreted in light of its limitations. Since the questionnaire used in our study was self-administered and the participant

responses were based on their declaration; therefore, this could potentially introduce self-reporting bias into our study findings. In addition, we did not obtain the information regarding the number of days in self-isolation during the COVID-19 lockdown period. Our study also did not assess if participants had children. This is another limitation because children in the home are an important variable impacting stress and sexual behavior. The use of convenience sampling in our study also limited the generalisation of our study findings to the whole Chinese population. Other partnered conducts including petting, kissing, masturbation, oral and anal sex were not assessed in the study. Also, other limitations of sexual activity to marital coitus and the living in a couple dimension as a major driving force for sexual activity were not determined. Therefore, future studies should consider including these dimensions of sexual activity, and emphasising the gender differences and dimensions.

In conclusion, our study reported that despite the moderate-to-severe stressful impact due to the COVID-19 pandemic, majority of participants reported no significant changes in the frequency of their sexual intercourse per week, quality of their usual sexual lives and emotional bonding. In addition, we also identified some factors including being male were associated with higher stressful impact and increased frequency of sexual intercourse amid the COVID-19 pandemic. However, it is important to note that more is not always better and instead, quality of sex life should also be taken into consideration. Future studies should also consider investigating if the public health strategies designed to promote safe and consensual sexual activity may be used as a means to alleviate the detrimental health consequences in relation to self-isolation amid the COVID-19 pandemic.

Corresponding Authors: Yingfei Zhang, MSc, Mathematics Teaching and Research Office, Public Basic College, Jinzhou Medical University, Jinzhou, Liaoning 121001, China. E-mail: Zhangyingfei@jzmu.edu.cn; Zheng Feei Ma, PhD, Department of Health and Environmental Sciences, Xi'an Jiaotong-Liverpool University, Suzhou, Jiangsu 215123, China. E-mail: Zhengfeeima@xjtlu.edu.cn

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STATEMENT OF AUTHORSHIP

Conception and Design: Zheng Feei Ma; Yingfei Zhang; Yutong Zhang; Acquisition of Data: Yingfei Zhang; Zheng Feei Ma; Yutong Zhang; Analysis and Interpretation of Data: Yingfei Zhang; Zheng Feei Ma; Conghua Wen; Xiaoqin Luo; Yutong Zhang.

Drafting the Article: Zheng Feei Ma and Yingfei Zhang; Revising It for Intellectual Content: Yingfei Zhang; Zheng Feei Ma; Conghua Wen; Xiaoqin Luo; Yutong Zhang.

Final Approval of the Completed Article: Yingfei Zhang; Zheng Feei Ma; Conghua Wen; Xiaoqin Luo; Yutong Zhang.

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