EPIDEMIOLOGY

An Online Questionnaire Survey on the Sexual Life and Sexual Function of Chinese Adult Men During the Coronavirus Disease 2019 Epidemic

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ABSTRACT

Introduction: There has been no report regarding the impact on male sexual life or sexual function by changes in lifestyle during the coronavirus disease 2019 (COVID-19) epidemic.

Aim: To investigate the changes in sexual life and sexual function of Chinese men during the COVID-19 epidemic.

Methods: An online questionnaire was created and the survey was administered through social media to Chinese adult men.

Main Outcome Measure: The main end point was the deteriorated erectile function or ejaculatory control ability, defined by self-evaluation or by decreased International Index of Erectile Function-5 items (IIEF-5) scores or increased premature ejaculation diagnostic tool (PEDT) scores.

Results: Altogether, 612 questionnaires were collected. About 322 (52.6%) subjects were unmarried. About 8.4% and 8.5% subjects reported deteriorated erectile function or ejaculation control ability by self-evaluation, whereas 31.9% and 17.9% subjects showed decreased IIEF-5 scores or increased PEDT scores. Subjects with deteriorated erectile function by self-evaluation and decreased IIEF-5 scores had higher General Anxiety Disorder-7 ($P < .001$ and $P = .001$) and higher Patient Health Questionnaire-9 score ($P < .001$ and $P = .002$) after the epidemic, decreased frequency of sexual life ($P < .001$ and $P < .001$) and physical exercise ($P = .009$ and .007) after the epidemic. Subjects with deteriorated ejaculation control ability by self-evaluation and increased PEDT scores had higher General Anxiety Disorder-7 ($P < .001$ and $P < .001$) and higher Patient Health Questionnaire-9 score ($P < .001$ and $P = .002$) after the epidemic. Subjects with decreased frequency of sexual life had reduced income ($P < .001$), increased anxiety ($P < .001$) and depression ($P < .001$). Married subjects had higher proportion of improved depression ($P = .048$) and increased frequency of sexual life ($P = .010$).

Conclusion: During the COVID-19 epidemic, decreased sexual function was present in a certain proportion of adult men, and the risk factors include increased anxiety and depression, and decreased frequency of sexual life.
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Key Words: Coronavirus Disease 2019 (COVID-19); Erectile Dysfunction; Premature Ejaculation; Questionnaire; Sexual Function; Sexual Life

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INTRODUCTION

Coronavirus disease 2019 (COVID-19) has spread across the world, leading to more than 10 million infections and 500 thousand deaths as of July 1, 2020.[1] The World Health Organization declared the virus to be pandemic on March 11, 2020.[2] The pathogenic virus, named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has been reported to invade cells of various organs through angiotensin I—converting enzyme 2 receptors.[3] The most affected individuals and those with the most severe infections were elderly people or people with

comorbidities.[4] It is notable that although young or middle-aged men were also at risk of being infected by SARS-CoV-2,[5] there are currently few studies focusing on the reproductive system in this cohort: A study found a higher serum luteinizing hormone value and a lower ratio of testosterone to luteinizing hormone in male patients with COVID-19[6]; one study indicated that SARS-CoV-2 was detectable in semen specimens of male patients with COVID-19,[7] but two teams reported the absence of SARS-CoV-2 in semen from male patients with COVID-19 in the recovery stage.[8,9] There is no report about the impact of the virus on the reproductive system.

During the epidemic, however, the daily life of most men was significantly changed owing to the disease-prevention measures. A series of measures were enacted in most countries, including restrictions on transport, restrictions on entertainment, social distancing measures, and so on.[10−12] Changes in lifestyle might impact sexual life and possibly sexual function, even for healthy men. A few studies have reported decreased frequency of sexual life, decreased sexual satisfaction, and deteriorated partner relationships between sexual partners.[13−17] Most studies were focused on women or a mixture of women and men, while the sexual function of men has not been investigated.

With strict management, China declared the end of the first wave of the epidemic on March 12, 2020. To answer whether the COVID-19 epidemic had a negative impact on the sexual life and sexual function of Chinese men, we performed an online questionnaire survey.

METHODS

Subjects Inclusion

This online questionnaire was created using a professional system (Wenjuanxing, www.wjx.cn), and the survey was administered through social media including WeChat (version 7; Tencent, Shenzhen, China), Chunyuyisheng (version 9; Beijing Chunyu Software Co, Ltd, Beijing, China), Haodf (www.haodf.com), Zhihu (www.zhihu.com), and Weibo (weibo.com). To be included in this survey, subjects had to be Chinese men, aged 18 years or older, and had a history of sexual intercourse. Informed consent was obtained before participants completed the questionnaires (with declarations of privacy protection), and the survey was anonymous. Subjects completed the questionnaire using a mobile phone or personal computer. Ethical approval was obtained by the institutional review board.

Questionnaires

The questionnaire was composed of two parts. The first part contained items that participants were required to answer, including items assessing basic information (age, marital status, education level, occupation, smoking and alcohol addiction, history of previous sexual diseases, contact with COVID-19, and so on) and self-reported changes in work intensity, income, frequency of sexual life, erectile function, ejaculation, depression, anxiety, and partner time and intimacy behavior with sexual partners. Answers to most of the questions were classified into five levels. Habit of cigarette smoking was categorized as regular (at least 1 cigarette per day), occasional (not every day), and never (no smoke at all). Habit of alcohol drinking was categorized as regular (1 or more drinks per day), occasional (not every day), and never (no drink at all).[18,19] "Sexual life" was defined as the penetration of the penis into the vagina; "partner time" was defined as subjects and sexual partners spending time together instead of alone; and "intimacy behavior" was defined as holding hands, hugging, and kissing.

The second part contained optional items, including scales such as the International Index of Erectile Function-5 items (IIEF-5), Premature Ejaculation Diagnostic Tool (PEDT), General Anxiety Disorder-7 (GAD-7), and Patient Health Questionnaire (PHQ-9), and the detailed frequency of sexual life and physical exercise. Subjects completed the questionnaires based on both their condition 3 months before the outbreak of COVID-19 (before January 23, 2020) and 3 months after the outbreak (after January 23, 2020). All the contents of the questionnaire (including the scales) were displayed and filled out in the Chinese language.[20−25] The timeframe for this survey was from April 22, 2020 to May 14, 2020.

Data Collection and End Point

Data from the whole questionnaire were collected and analyzed. The main end point was deteriorated erectile function or ejaculatory control ability. Subjects who reported "deterioration to some extent" and "obvious deterioration" were judged as "deteriorated erectile function or ejaculatory control ability by self-evaluation." Subjects with decreased IIEF-5 scores or increased PEDT scores after the epidemic were judged as "deteriorated erectile function or ejaculatory control ability by scale."

Statistical Analysis

SPSS 20.0 (IBM Corp, Armonk, NY, USA) was used for statistical analysis. A two-sided P value of less than 0.05 indicated significant differences. A paired-sample t-test was used to compare continuous variables before and after the epidemic. Chi-square was used to compare the classified variables between different groups, and the Mann-Whitney U test was used to compare the continuous variables between different groups.

RESULTS

Baseline Characteristics

Altogether, 612 questionnaires were collected, and 251 (41.0%) respondents completed the second part of the questionnaire. The median age for all subjects was 28 years (interquartile range [IQR] 24−35). A total of 322 (52.6%) subjects were unmarried, 280 (45.8%) were married, and 10 (1.6%) were divorced or widowed.

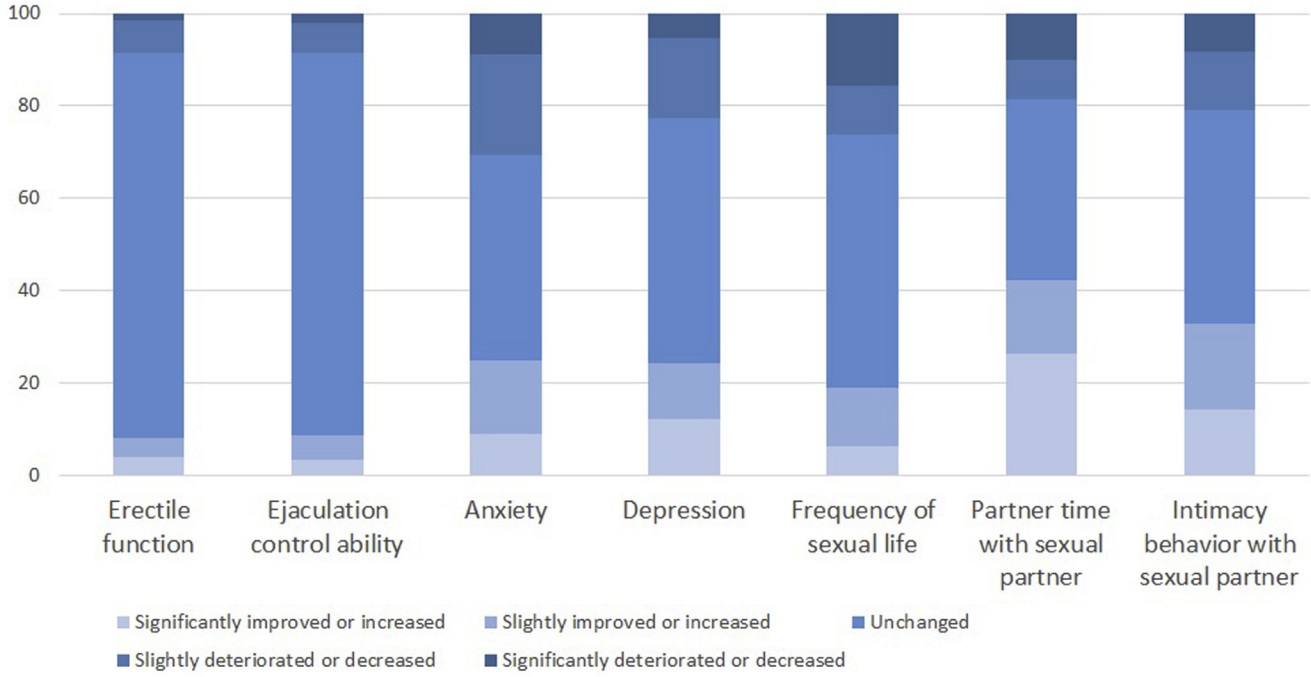

Figure 1. Self-reported changes in some characteristics after the epidemic. Detailed information is shown in Supplementary Table 2.

Most subjects had a highest academic degree of junior college (227 cases, 37.1%) or were undergraduates (206 cases, 33.7%). The largest proportion of occupation was company employee (170 cases, 27.8%), and 48 cases (7.8%) were medical staff. Subjects were distributed in different provinces of China, among which 11 cases (1.8%) were in Hubei Province, where the epidemic was most severe (Supplementary Table 1). There were 118 regular smokers (19.3%), 239 occasional smokers (39.1%), 255 never smokers (41.7%), 44 regular drinkers (7.2%), 447 occasional drinkers (73.0%), and 121 never drinkers (19.8%).

Three subjects had been diagnosed with COVID-19, and 2 subjects having family members who had been diagnosed with COVID-19. The rest of the subjects (607) had no close contacts with patients with COVID-19. Fifty-nine subjects participated in the control or treatment work for COVID-19. Forty-four patients (7.2%) had a history of sexual dysfunction, and 47 patients (7.7%) had previously taken related drugs, including sildenafil, tadalafil, dapoxetine, and traditional Chinese herbs (Fufang Xuanju capsule, Liuwei Dihuang pill, and so on).

Changes in Sexual Function After the Epidemic

As per the self-evaluation, the majority of patients had no changes in their erectile function (511 cases, 83.5%) or ejaculation control ability (507 cases, 82.8%). As shown in Figure 1 and Supplementary Table 2, approximately 8.1% of subjects and 8.7% of subjects reported improved erectile function or ejaculation control ability; while 8.4% and 8.5% of subjects reported deterioration in their erectile function or ejaculation control ability, respectively.

The IIEF-5 and PEDT scales were completed by 251 subjects. The median score of the IIEF-5 decreased from 21 (range 1−25, IQR 14−23) to 20 (range 1−25, IQR 11−23), and there is significant difference regarding the mean value (18.13 ± 6.74 vs 17.00 ± 7.15, t = 4.867, $P < .001$). There was no significant

Table 1. Changes of some characteristics and scores of scales before and after the COVID-19 epidemic

	Before epidemic	After epidemic	Mean difference	*P*
IIEF-5	18.13 ± 6.74	17.00 ± 7.15	1.13 ± 3.67	.000*
PEDT	4.75 ± 4.24	4.88 ± 4.50	−0.13 ± 2.15	.334
GAD-7	4.20 ± 4.65	5.09 ± 5.24	−0.88 ± 2.98	.000*
PHQ-9	4.44 ± 4.96	5.70 ± 6.14	−1.27 ± 3.49	.000*
Frequency of sexual life (per mo)	5.32 ± 5.73	5.42 ± 6.40	−0.10 ± 4.54	.713
Frequency of physical exercise (per wk)	1.95 ± 1.03	1.85 ± 1.06	0.10 ± 0.94	.061

Data was expressed as mean ± SD.
COVID-19 = coronavirus disease 2019; GAD-7 = General Anxiety Disorder-7; IIEF-5 = International Index of Erectile Function; PEDT = Premature Ejaculation Diagnostic Tool; PHQ-9 = Patient Health Questionnaire.
*Statistically significant.

Table 2. Comparison of characteristics between subjects with or without deteriorated erectile function by self-evaluation

	All	Absent	Present	*P*
All	612	561 (91.7)	51 (8.3)	
Marriage status				
Unmarried	322	295 (91.6)	27 (8.4)	.628
Married	280	256 (91.4)	24 (8.6)	
Divorced or widowed	10	10 (100.0)	0 (0.0)	
Highest academic degree				
Junior middle school or lower	36	32 (88.9)	4 (11.1)	.187
Senior middle school	90	81 (90.0)	9 (10.0)	
Junior college	227	211 (93.0)	16 (7.0)	
Undergraduate	206	193 (93.7)	13 (6.3)	
Master	36	30 (83.3)	6 (16.7)	
Doctor	17	14 (82.4)	3 (17.6)	
Cigarette smoking				
Regular	118	106 (89.8)	12 (10.2)	.117
Occasional	239	226 (94.6)	13 (5.4)	
Never	255	229 (89.8)	26 (10.2)	
Alcohol drinking				
Regular	44	41 (93.2)	3 (6.8)	.894
Occasional	447	410 (91.7)	37 (8.3)	
Never	121	110 (90.9)	11 (9.1)	
History of sexual dysfunction				
Present	44	30 (68.2)	14 (31.8)	<.001†
Absent	568	531 (93.5)	37 (6.5)	
History of consuming relevant drugs				
Present	47	34 (72.3)	13 (27.7)	<.001†
Absent	565	527 (93.3)	38 (6.7)	
Subject or family members diagnosed with COVID-19				
Present	5	4 (80.0)	1 (20.0)	.343
Absent	607	557 (91.8)	50 (8.2)	
Changes in intensity of work after the epidemic				
Increased	116	101 (81.7)	15 (12.9)	.185
Unchanged	232	218 (94.0)	14 (6.0)	
Decreased	165	151 (91.5)	14 (8.5)	
No work	99	91 (91.9)	8 (8.1)	
Participated in the control or treatment work for COVID-19				
No	553	508 (91.9)	45 (8.1)	.591
Yes	59	53 (89.8)	6 (10.2)	
Changes in income after the epidemic				
Increased	17	17 (100.0)	0 (0.0)	.648
Unchanged	207	190 (91.8)	17 (8.2)	
Decreased (within 30%)	133	120 (90.2)	13 (9.8)	
Decreased (30—50%)	90	81 (90.0)	9 (10.0)	
Decreased (more than 50%)	165	153 (92.7)	12 (7.3)	
Changes in anxiety after the epidemic				
Significantly improved	55	55 (100.0)	0 (0.0)	.001†
Slightly improved	97	91 (93.8)	6 (6.2)	
Unchanged	273	256 (93.8)	17 (6.2)	
Slightly deteriorated	133	115 (86.5)	18 (13.5)	
Significantly deteriorated	54	44 (81.5)	10 (18.5)	
GAD-7 score before the epidemic*		3.97 ± 4.52	6.45 ± 5.35	.025†
GAD-7 score after the epidemic*		4.62 ± 4.92	9.50 ± 6.29	<.001†

(continued)

Table 2. Continued

	All	Absent	Present	*P*
Changes in depression after the epidemic				
Significantly improved	75	73 (97.3)	2 (2.7)	<.001†
Slightly improved	74	68 (91.9)	6 (8.1)	
Unchanged	323	306 (94.7)	17 (5.3)	
Slightly deteriorated	107	89 (83.2)	18 (16.8)	
Significantly deteriorated	33	25 (75.8)	8 (24.2)	
PHQ-9 score before the epidemic		4.07 ± 4.73	7.95 ± 5.73	.002†
PHQ-9 score after the epidemic		5.00 ± 5.50	12.36 ± 7.94	<.001†
Changes in frequency of sexual life after the epidemic				
Significantly increased	39	38 (97.4)	1 (2.6)	<.001†
Slightly increased	77	73 (94.8)	4 (5.2)	
Unchanged	335	322 (96.1)	13 (3.9)	
Slightly decreased	65	50 (76.9)	15 (23.1)	
Significantly decreased	96	78 (81.3)	18 (18.8)	
Frequency of sexual life before the epidemic (per mo)*		5.14 ± 5.63	6.35 ± 6.29	.197
Frequency of sexual life after the epidemic (per mo)*		5.42 ± 6.19	5.03 ± 8.07	.143
Frequency of physical exercise before the epidemic (per mo)*		1.93 ± 1.02	2.23 ± 1.12	.142
Frequency of physical exercise after the epidemic (per mo)*		1.91 ± 1.08	1.38 ± 0.78	.009†
Changes in partner time with sexual partner after the epidemic				
Significantly increased	70	67 (95.7)	3 (4.3)	<.001†
Slightly increased	42	37 (88.1)	5 (11.9)	
Unchanged	104	96 (92.3)	8 (7.7)	
Slightly decreased	23	14 (60.9)	9 (39.1)	
Significantly decreased	26	21 (80.8)	5 (19.2)	
Changes in intimacy behavior with sexual partner after the epidemic				
Significantly increased	38	36 (94.7)	2 (5.3)	.001†
Slightly increased	49	45 (91.8)	4 (8.2)	
Unchanged	123	113 (91.9)	10 (8.1)	
Slightly decreased	33	22 (66.7)	11 (33.3)	
Significantly decreased	22	19 (86.4)	3 (13.6)	

COVID-19 = Coronavirus disease 2019; GAD-7 = General Anxiety Disorder-7; PHQ-9 = Patient Health Questionnaire.
*Data are expressed as mean ± SD. Other data are expressed as number (percentage).
†Statistically significant.

change in the mean PEDT scores before and after the epidemic (4.75 ± 4.24 vs 4.88 ± 4.50, t = −0.968, $P = .334$), with median values of 4 (range 0−20, IQR 1−7) and 4 (range 0−20, IQR 1−8), respectively (Table 1).

Characteristics of Subjects with Deteriorated Sexual Function

As shown in Table 2, subjects with "deteriorated erectile function by self-evaluation" had a higher proportion of history of sexual dysfunction ($P < .001$), a history of consuming of relevant drugs ($P < .001$), increased anxiety after the epidemic ($P = .001$), a higher GAD-7 score before and after the epidemic ($P = .025$ and $P < .001$), increased depression after the epidemic ($P < .001$), a higher PHQ-9 score before and after the epidemic ($P = .002$ and $P < .001$), a decreased frequency of sexual life ($P < .001$), a decreased frequency of physical exercise ($P = .009$) after the epidemic, decreased partner time ($P < .001$), and decreased intimacy behavior ($P = .001$) after the epidemic.

As shown in Table 3, 31.9% of subjects had decreased IIEF-5 scores after the epidemic, and they had a higher GAD-7 score ($P = .001$), a higher PHQ-9 score ($P = .002$) after the epidemic, higher proportion of decreased frequency of sexual life ($P < .001$), a lower frequency of sexual life ($P = .025$), and a lower frequency of physical exercise ($P = .007$) after the epidemic.

As shown in Table 4, subjects with "deteriorated ejaculation control ability by self-evaluation" were more frequent smokers ($P = .046$), had a higher proportion of history of sexual dysfunction ($P < .001$) and history of consuming relevant drugs ($P < .001$), increased anxiety after the epidemic ($P < .001$), a higher GAD-7 score ($P < .001$) after the epidemic, increased depression after the epidemic ($P < .001$), a higher PHQ-9 score before and after the epidemic ($P = .022$ and $P < .001$), decreased frequency of sexual life ($P < .001$) and physical exercise ($P = .027$) after the epidemic, and decreased partner time ($P < .001$) and intimacy behavior ($P < .001$) after the epidemic.

Table 3. Comparison of characteristics between subjects with or without deteriorated erectile function by IIEF-5

	All	Absent	Present	*P*
All	251	171 (68.1)	80 (31.9)	
Marriage status				
Unmarried	107	75 (70.1)	32 (29.9)	.803
Married	139	93 (66.9)	46 (33.1)	
Divorced or widowed	5	3 (60.0)	2 (40.0)	
Highest academic degree				
Junior middle school or lower	13	9 (69.2)	4 (30.8)	.121
Senior middle school	35	26 (74.3)	9 (25.7)	
Junior college	89	58 (65.2)	31 (34.8)	
Undergraduate	88	64 (72.7)	24 (27.3)	
Master	18	12 (66.7)	6 (33.3)	
Doctor	8	2 (25.0)	6 (75.0)	
Cigarette smoking				
Regular	46	32 (69.6)	14 (30.4)	.803
Occasional	93	61 (65.6)	32 (34.4)	
Never	112	78 (69.6)	34 (30.4)	
Alcohol drinking				
Regular	19	15 (78.9)	4 (21.1)	.379
Occasional	185	127 (68.6)	58 (31.4)	
Never	47	29 (61.7)	18 (38.3)	
History of sexual dysfunction				
Present	17	9 (52.9)	8 (47.1)	.164
Absent	234	162 (69.2)	72 (30.8)	
History of consuming relevant drugs				
Present	27	15 (55.6)	12 (44.4)	.138
Absent	224	156 (69.6)	68 (30.4)	
Subject or family members diagnosed with COVID-19				
Present	2	1 (50.0)	1 (50.0)	.581
Absent	249	170 (68.3)	79 (31.7)	
Changes in intensity of work after the epidemic				
Increased	50	34 (68.0)	16 (32.0)	.829
Unchanged	88	63 (71.6)	25 (28.4)	
Decreased	77	50 (64.9)	27 (35.1)	
No work	36	24 (66.7)	12 (33.3)	
Participated in the control or treatment work for COVID-19				
No	230	158 (68.7)	72 (31.3)	.523
Yes	21	13 (61.9)	8 (38.1)	
Changes in income after the epidemic				
Increased	6	5 (83.3)	1 (16.7)	.264
Unchanged	92	69 (75.0)	23 (25.0)	
Decreased (within 30%)	60	37 (61.7)	23 (38.3)	
Decreased (30—50%)	42	25 (59.5)	17 (40.5)	
Decreased (more than 50%)	51	35 (68.6)	16 (31.4)	
Changes in anxiety after the epidemic				
Significantly improved	17	13 (76.5)	4 (23.5)	.320
Slightly improved	37	25 (67.6)	12 (32.4)	
Unchanged	127	91 (71.7)	36 (28.3)	
Slightly deteriorated	50	32 (64.0)	18 (36.0)	
Significantly deteriorated	20	10 (50.0)	10 (50.0)	
GAD-7 score before the epidemic*		3.81 ± 4.48	5.01 ± 4.91	.053
GAD-7 score after the epidemic*		4.18 ± 4.59	6.95 ± 5.99	.001†

(continued)

Table 3. Continued

	All	Absent	Present	*P*
Changes in depression after the epidemic				
Significantly improved	26	19 (73.1)	7 (26.9)	.078
Slightly improved	27	18 (66.7)	9 (33.3)	
Unchanged	140	103 (73.6)	37 (26.4)	
Slightly deteriorated	47	26 (55.3)	21 (44.7)	
Significantly deteriorated	11	5 (45.5)	6 (54.5)	
PHQ-9 score before the epidemic		4.12 ± 4.98	5.08 ± 4.87	.073
PHQ-9 score after the epidemic		4.76 ± 5.43	7.64 ± 7.04	.002†
Changes in frequency of sexual life after the epidemic				
Significantly increased	20	17 (85.0)	3 (15.0)	<.001†
Slightly increased	43	32 (74.4)	11 (25.6)	
Unchanged	119	92 (77.3)	27 (22.7)	
Slightly decreased	33	18 (54.5)	15 (45.5)	
Significantly decreased	36	12 (33.3)	24 (66.7)	
Frequency of sexual life before the epidemic (per mo)*		5.09 ± 5.41	5.76 ± 6.07	.371
Frequency of sexual life after the epidemic (per mo)*		5.69 ± 6.03	4.39 ± 6.01	.025†
Frequency of physical exercise before the epidemic (per mo)*		1.93 ± 1.00	1.97 ± 1.06	.879
Frequency of physical exercise after the epidemic (per mo)*		1.96 ± 1.10	1.57 ± 0.90	.007†
Changes in partner time with sexual partner after the epidemic				
Significantly increased	34	25 (73.5)	9 (26.5)	.768
Slightly increased	19	13 (68.4)	6 (31.6)	
Unchanged	37	27 (73.0)	10 (27.0)	
Slightly decreased	11	6 (54.5)	5 (45.5)	
Significantly decreased	14	9 (64.3)	5 (35.7)	
Changes in intimacy behavior with sexual partner after the epidemic				
Significantly increased	18	14 (77.8)	4 (22.2)	.439
Slightly increased	27	20 (74.1)	7 (25.9)	
Unchanged	46	33 (71.7)	13 (28.3)	
Slightly decreased	14	8 (57.1)	6 (42.9)	
Significantly decreased	10	5 (50.0)	5 (50.0)	

COVID-19 = Coronavirus disease 2019; GAD-7 = General Anxiety Disorder-7; IIEF-5 = International Index of Erectile Function-5 items; PHQ-9 = Patient Health Questionnaire.
*Data are expressed as mean ± SD. Other data are expressed as number (percentage).
†Statistically significant.

As shown in Table 5, 17.9% of subjects had increased PEDT scores, and they had a higher GAD-7 score before and after the epidemic ($P = .048$ and $P < .001$) and a higher PHQ-9 score ($P = .002$) after the epidemic.

Other Characteristics

More than 40% of the subjects had decreased work intensity (Supplementary Table 2), while some subjects had increased partner time and intimacy behavior with their sexual partners. Approximately half of the subjects reported stable anxiety and depression, but the GAD-7 and PHQ-9 scores were slightly increased ($P < .001$ and $P < .001$, Table 1).

The characteristics of subjects with a decreased frequency of sexual life were also analyzed (Supplementary Table 3). They had a higher proportion of decreased work intensity ($P = .011$) and reduced income ($P < .001$), increased anxiety ($P < .001$) and depression ($P < .001$), and less partner time ($P < .001$) and less intimate behavior after the epidemic ($P < .001$).

In addition, a comparison of characteristics between married subjects and others (unmarried, divorced, widowed) was performed (Supplementary Table 4). Married subjects had a lower proportion of smoking ($P = .006$), a higher proportion of increased work intensity ($P < .001$) and higher income ($P < .001$), a higher proportion of improved depression ($P = .048$), and an increased frequency of sexual life ($P = .010$),

Table 4. Comparison of characteristics between subjects with or without deteriorated ejaculation control ability by self-evaluation

	All	Absent	Present	*P*
All	612	560 (91.5)	52 (8.5)	
Marriage status				
Unmarried	322	290 (90.1)	32 (9.9)	.294
Married	280	260 (92.9)	20 (7.1)	
Divorced or widowed	10	10 (100.0)	0 (0.0)	
Highest academic degree				
Junior middle school or lower	36	33 (91.7)	3 (8.3)	.145
Senior middle school	90	85 (94.4)	5 (5.6)	
Junior college	227	212 (93.4)	15 (6.6)	
Undergraduate	206	186 (90.3)	20 (9.7)	
Master	36	29 (80.6)	7 (19.4)	
Doctor	17	15 (88.2)	2 (11.8)	
Cigarette smoking				
Regular	118	106 (89.8)	12 (10.2)	.046†
Occasional	239	227 (95.0)	12 (5.0)	
Never	255	227 (89.0)	28 (11.0)	
Alcohol drinking				
Regular	44	40 (90.9)	4 (9.1)	.986
Occasional	447	409 (91.5)	38 (8.5)	
Never	121	111 (91.7)	10 (8.3)	
History of sexual dysfunction				
Present	44	32 (72.7)	12 (27.3)	<.001†
Absent	568	528 (93.0)	40 (7.0)	
History of consuming relevant drugs				
Present	47	33 (70.2)	14 (29.8)	<.001†
Absent	565	527 (93.3)	38 (6.7)	
Subject or family members diagnosed with COVID-19				
Present	5	3 (60.0)	2 (40.0)	.011†
Absent	607	557 (91.8)	50 (8.2)	
Changes in intensity of work after the epidemic				
Increased	116	102 (87.9)	14 (12.1)	.424
Unchanged	232	216 (93.1)	16 (6.9)	
Decreased	165	152 (92.1)	13 (7.9)	
No work	99	90 (90.9)	9 (9.1)	
Participated in the control or treatment work for COVID-19				
No	553	509 (92.0)	44 (8.0)	.142
Yes	59	51 (86.4)	8 (13.6)	
Changes in income after the epidemic				
Increased	17	15 (88.2)	2 (11.8)	.455
Unchanged	207	192 (92.8)	15 (7.2)	
Decreased (within 30%)	133	125 (94.0)	8 (6.0)	
Decreased (30—50%)	90	82 (91.1)	8 (8.9)	
Decreased (more than 50%)	165	146 (88.5)	19 (11.5)	
Changes in anxiety after the epidemic				
Significantly improved	55	54 (98.2)	1 (1.8)	<.001†
Slightly improved	97	92 (94.8)	5 (5.2)	
Unchanged	273	257 (94.1)	16 (5.9)	
Slightly deteriorated	133	117 (88.0)	16 (12.0)	
Significantly deteriorated	54	40 (74.1)	14 (25.9)	
GAD-7 score before the epidemic*		3.99 ± 4.43	6.63 ± 6.30	.072
GAD-7 score after the epidemic*		4.57 ± 4.75	10.84 ± 6.99	<.001†

(continued)

Table 4. Continued

	All	Absent	Present	*P*
Changes in depression after the epidemic				
Significantly improved	75	74 (98.7)	1 (1.3)	<.001†
Slightly improved	74	70 (94.6)	4 (5.4)	
Unchanged	323	306 (94.7)	17 (5.3)	
Slightly deteriorated	107	90 (84.1)	17 (15.9)	
Significantly deteriorated	33	20 (60.6)	13 (39.4)	
PHQ-9 score before the epidemic		4.12 ± 4.64	8.00 ± 6.83	.022†
PHQ-9 score after the epidemic		4.93 ± 5.24	14.37 ± 8.60	<.001†
Changes in frequency of sexual life after the epidemic				
Significantly increased	39	36 (92.3)	3 (7.7)	<.001†
Slightly increased	77	70 (90.9)	7 (9.1)	
Unchanged	335	327 (97.6)	8 (2.4)	
Slightly decreased	65	47 (72.3)	18 (27.7)	
Significantly decreased	96	80 (83.3)	16 (16.7)	
Frequency of sexual life before the epidemic (per mo)*		5.18 ± 5.80	6.08 ± 4.49	.074
Frequency of sexual life after the epidemic (per mo)*		5.42 ± 6.29	4.96 ± 7.57	.270
Frequency of physical exercise before the epidemic (per mo)*		1.94 ± 1.02	2.20 ± 1.15	.276
Frequency of physical exercise after the epidemic (per mo)*		1.89 ± 1.07	1.42 ± 0.83	.027†
Changes in partner time with sexual partner after the epidemic				
Significantly increased	70	64 (91.4)	6 (8.6)	<.001†
Slightly increased	42	37 (88.1)	5 (11.9)	
Unchanged	104	99 (95.2)	5 (4.8)	
Slightly decreased	23	15 (65.2)	8 (34.8)	
Significantly decreased	26	20 (76.9)	6 (23.1)	
Changes in intimacy behavior with sexual partner after the epidemic				
Significantly increased	38	35 (92.1)	3 (7.9)	<.001†
Slightly increased	49	45 (91.8)	4 (8.2)	
Unchanged	123	115 (93.5)	8 (6.5)	
Slightly decreased	33	22 (66.7)	11 (33.3)	
Significantly decreased	22	18 (81.8)	4 (18.2)	

COVID-19 = Coronavirus disease 2019; GAD-7 = General Anxiety Disorder-7; PHQ-9 = Patient Health Questionnaire.
*Data are expressed as Mean ± SD. Other data are expressed as number (percentage).
†Statistically significant.

partner time ($P = .002$), and intimacy behavior with sexual partners ($P = .018$).

DISCUSSION

We evaluated the change in sexual function among participants based on both self-evaluations and the scale scores. More than 80% of the subjects reported unchanged erectile function and ejaculatory control ability by self-evaluation. However, although no significant change in the PEDT score was observed, there was a small but significant change in the IIEF-5 scores. We could conclude that the sexual function of most subjects was stable during the epidemic.

The most obvious factors related to the deterioration of sexual function were anxiety and depression. Most subjects in the present study reported increases in anxiety and depression, especially in those with deteriorated sexual function. Our previous investigation on outpatients in the Department of Andrology found that many patients with erectile dysfunction, premature ejaculation and other diseases had anxiety and depression.[26] Besides, within many previous studies that investigated possible influencing factors for erectile dysfunction or premature ejaculation, there were plenty of studies that reported the relationship between "depression/anxiety and changes of sexual function," which have similar conclusion as the present study.[27–31] The significance of the results of our study is that during a pandemic disease, even with low mortality rate, decline in sexuality was associated with depression and anxiety by the disease and worse life satisfaction and quality.

There have been several literatures regarding the possible mechanisms, including the disturbance on the hypothalamic–pituitary–adrenocortical axis,[32] the direct inhibition of the spinal erection center from the nervous system, the excessive sympathetic outflow or increased levels of peripheral catecholamine,[33] and the possible regulation of short (s) allele in the promoter region of the serotonin transporter (5-HTTLPR) gene.[34–37] During the epidemic, anxiety and depression were

Table 5. Comparison of characteristics between subjects with or without deteriorated ejaculation control ability by PEDT

	All	Absent	Present	*P*
All	251	206 (82.1)	45 (17.9)	
Marriage status				
Unmarried	107	89 (83.2)	18 (16.8)	.418
Married	139	114 (82.0)	25 (18.0)	
Divorced or widowed	5	3 (60.0)	2 (40.0)	
Highest academic degree				
Junior middle school or lower	13	11 (84.6)	2 (15.4)	.090
Senior middle school	35	30 (85.7)	5 (14.3)	
Junior college	89	74 (83.1)	15 (16.9)	
Undergraduate	88	75 (85.2)	13 (14.8)	
Master	18	12 (66.7)	6 (33.3)	
Doctor	8	4 (50.0)	4 (50.0)	
Cigarette smoking				
Regular	46	37 (80.4)	9 (19.6)	.922
Occasional	93	76 (81.7)	17 (18.3)	
Never	112	93 (83.0)	19 (17.0)	
Alcohol drinking				
Regular	19	14 (73.7)	5 (26.3)	.548
Occasional	185	152 (82.2)	33 (17.8)	
Never	47	40 (85.1)	7 (14.9)	
History of sexual dysfunction				
Present	17	12 (70.6)	5 (29.4)	.201
Absent	234	194 (82.9)	40 (17.1)	
History of consuming relevant drugs				
Present	27	20 (74.1)	7 (25.9)	.251
Absent	224	186 (83.0)	38 (17.0)	
Subject or family members diagnosed with COVID-19				
Present	2	1 (50.0)	1 (50.0)	.235
Absent	249	205 (82.3)	44 (17.7)	
Changes in intensity of work after the epidemic				
Increased	50	42 (84.0)	8 (16.0)	.961
Unchanged	88	72 (81.8)	16 (18.2)	
Decreased	77	62 (80.5)	15 (19.5)	
No work	36	30 (83.3)	6 (16.7)	
Participated in the control or treatment work for COVID-19				
No	230	187 (81.3)	43 (18.7)	.294
Yes	21	19 (90.5)	2 (9.5)	
Changes in income after the epidemic				
Increased	6	6 (100.0)	0 (0.0)	.578
Unchanged	92	77 (83.7)	15 (16.3)	
Decreased (within 30%)	60	47 (78.3)	13 (21.7)	
Decreased (30–50%)	42	36 (85.7)	6 (14.3)	
Decreased (more than 50%)	51	40 (78.4)	11 (21.6)	
Changes in anxiety after the epidemic				
Significantly improved	17	17 (100.0)	0 (0.0)	.144
Slightly improved	37	31 (83.8)	6 (16.2)	
Unchanged	127	106 (83.5)	21 (16.5)	
Slightly deteriorated	50	37 (74.0)	13 (26.0)	
Significantly deteriorated	20	15 (75.0)	5 (25.0)	
GAD-7 score before the epidemic*		3.99 ± 4.68	5.14 ± 4.48	.048†
GAD-7 score after the epidemic*		4.52 ± 4.99	7.64 ± 5.67	<.001†

(continued)

Table 5. Continued

	All	Absent	Present	*P*
Changes in depression after the epidemic				
Significantly improved	26	23 (88.5)	3 (11.5)	.109
Slightly improved	27	22 (81.5)	5 (18.5)	
Unchanged	140	120 (85.7)	20 (14.3)	
Slightly deteriorated	47	34 (72.3)	13 (27.7)	
Significantly deteriorated	11	7 (63.6)	4 (36.4)	
PHQ-9 score before the epidemic		4.27 ± 4.96	5.17 ± 4.94	.156
PHQ-9 score after the epidemic		5.15 ± 5.87	8.21 ± 6.77	.002†
Changes in frequency of sexual life after the epidemic				
Significantly increased	20	15 (75.0)	5 (25.0)	.230
Slightly increased	43	34 (79.1)	9 (20.9)	
Unchanged	119	104 (87.4)	15 (12.6)	
Slightly decreased	33	27 (81.8)	6 (18.2)	
Significantly decreased	36	26 (72.2)	10 (27.8)	
Frequency of sexual life before the epidemic (per mo)*		5.20 ± 5.60	5.76 ± 5.78	.371
Frequency of sexual life after the epidemic (per mo)*		5.05 ± 5.86	6.30 ± 6.80	.128
Frequency of physical exercise before the epidemic (per mo)*		1.92 ± 1.02	2.09 ± 0.97	.194
Frequency of physical exercise after the epidemic (per mo)*		1.80 ± 1.07	2.00 ± 0.98	.110
Changes in partner time with sexual partner after the epidemic				
Significantly increased	34	28 (82.4)	6 (17.6)	.365
Slightly increased	19	16 (84.2)	3 (15.8)	
Unchanged	37	32 (86.5)	5 (13.5)	
Slightly decreased	11	7 (63.6)	4 (36.4)	
Significantly decreased	14	13 (92.9)	1 (7.1)	
Changes in intimacy behavior with sexual partner after the epidemic				
Significantly increased	18	15 (83.3)	3 (16.7)	.480
Slightly increased	27	21 (77.8)	6 (22.2)	
Unchanged	46	41 (89.1)	5 (10.9)	
Slightly decreased	14	10 (71.4)	4 (28.6)	
Significantly decreased	10	9 (90.0)	1 (10.0)	

COVID-19 = Coronavirus disease 2019; GAD-7 = General Anxiety Disorder-7; PEDT=Premature Ejaculation Diagnostic Tool; PHQ-9 = Patient Health Questionnaire.
*Data was expressed as Mean ± SD. Other data was expressed as number (percentage).
†Statistically significant.

likely to increase owing to a fear of infection, concerns about work and financial burden, and so on. Notably, the increases in anxiety and depression may have been due to the deterioration of sexual function; the direction of this relationship needs to be carefully examined in clinical work.

Several studies have focused on the changes in the frequency of sexual life during the epidemic,[13–17] while the present study is firstly reported the relationship with the sexual function of men. The frequency of sexual life was significantly related to changes in erectile function and ejaculatory control ability, and subjects with a low frequency of sexual life had less partner time and less intimacy behavior with sexual partners. Owing to the restrictions on social activity and transport during the epidemic, partners who do not live together would have less chance for sexual life. We also found that married subjects had a significantly higher frequency of sexual life and increased partner time and intimacy behavior with sexual partners. The changes in lifestyle during the epidemic might be beneficial for the sexual life of those with stable sexual partners (especially wives) but harmful to unmarried individuals. The mechanisms of the impact or partners' relationships by social distancing, as per the current reports, are mainly related to mental stress and frequency of sexual life. Because of social distancing and other measurements, people have worry about the uncertainty about the future,[13,38] and psychological problems including depression, anxiety, and frustration would be present.[13,39] The lack of privacy and the decrease in psychological stimuli would lead to decreased frequency of sexual life,[13–15] which significantly impact the partner relationships.

Several subjects had previous experience visiting clinics or taking relevant drugs owing to sexual dysfunction, and they were more likely to have decreased erectile function and ejaculation control ability in this study. During the epidemic period, the management of chronic diseases, including sexual dysfunction, might be affected by traffic management and medical resource

allocation. In addition, the frequency of sports exercises would be decreased, which would lead to the decline of physical function, including the decline of sexual function.

Based on the present study, there are some recommendations that might help to maintain sexual function during the epidemic. First, it would be helpful to maintain a regular frequency of sexual life when possible, both for married and unmarried men. In addition, physical exercise should be maintained when possible; it is notable that even patients with mild cases of COVID-19 in Fangcang Hospitals in Wuhan, China, performed physical exercises in the form of dancing,[40] which was beneficial for their recovery. Moreover, a healthy mental status is extremely important, and it should be known that the epidemic as well as the relevant restrictions were only temporary, and short-term unsatisfactory sexual life might be temporary because of the expectation of change of lifestyle and remission of psychogenic ED after COVID-19.[41–44] Last but not least, communication with doctors should be maintained through social networks, and the consumption of relevant medicines should be maintained owing to the importance of regular treatment.[45]

There are certain limitations to this study. Selection bias was inevitable, and the sample size was small. Further validation and larger sample size are required to provide a more accurate description of the characteristics. Considering the subjects' desire to fill in a long questionnaire during the epidemic, we made the questions regarding the scales optional. The incomplete data and the possibility of recall bias might have affected the results. The lack of information on intravaginal ejaculatory latency time, sleeping status, and financial burden also limited further analysis. Nevertheless, this is the first study regarding the impact of the COVID-19 epidemic on sexual function. It should be noted that currently, owing to epidemic-related restrictions, it is difficult to perform a high-quality clinical study. A large-scale investigation could be expected in the near future.

CONCLUSION

During the COVID-19 epidemic, decreased sexual function was present in a certain proportion of adult men, and the risk factors include increased anxiety and depression, and decreased frequency of sexual life.

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REFERENCES

1. World Health Organisation. Coronavirus disease 2019 (COVID-2019): situation report—156; Available at: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200624-covid-19-sitrep-156.pdf?sfvrsn=af42e480_2. Accessed July 1, 2020.
2. World Health Organisation. WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020; Available at: https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19—11-march-2020. Accessed March 11, 2020.
3. Letko M, Marzi A, Munster V. Functional Assessment of cell Entry and Receptor usage for SARS-CoV-2 and other Lineage B Betacoronaviruses. **Nat Microbiol 2020;5:562-569.**
4. Guan WJ, Ni ZY, Hu Y, et al. China medical treatment Expert group for Covid-19. Clinical characteristics of coronavirus disease 2019 in China. **N Engl J Med 2020;382:1708-1720.**
5. Epidemiology Working Group for NCIP Epidemic Response, Chinese Center for Disease Control and Prevention. The epidemiological characteristics of an outbreak of 2019 novel coronavirus diseases (COVID-19) in China. **Zhonghua Liu Xing Bing Xue Za Zhi 2020;41:145-151.**
6. Ma L, Xie W, Li D, et al. Effect of SARS-CoV-2 infection upon male gonadal function: a single center-based study. **medRxiv 2020; 2020.03.21.20037267.**
7. Li D, Jin M, Bao P, et al. Clinical characteristics and results of semen tests among men with coronavirus disease 2019. **JAMA Netw Open 2020;3:e208292.**
8. Pan F, Xiao X, Guo J, et al. No evidence of SARS-CoV-2 in semen of males recovering from COVID-19. **Fertil Sterility 2020;113:1135-1139.**
9. Song C, Wang Y, Li W, et al. Absence of 2019 novel coronavirus in semen and testes of COVID-19 patients. **Biol Reprod 2020;103:4-6.**
10. Koo JR, Cook AR, Park M, et al. Interventions to mitigate early spread of SARS-CoV-2 in Singapore: a modelling study. **Lancet Infect Dis 2020;20:678-688.**
11. Colbourn T. COVID-19: extending or relaxing distancing control measures. **Lancet Public Health 2020;5:e236-e237.**

12. Prem K, Liu Y, Russell TW, et al. Centre for the Mathematical Modelling of Infectious Diseases COVID-19 Working Group, Jit M, Klepac P. The effect of control strategies to reduce social mixing on outcomes of the COVID-19 epidemic in Wuhan, China: a modelling study. **Lancet Public Health 2020;5:e261-e270.**

[13]. Cito G, Micelli E, Cocci A, et al. The impact of the COVID-19 quarantine on sexual life in Italy. **Urology 2020;147:37-42.**

14. Li W, Li G, Xin C, et al. Challenges in the Practice of sexual medicine in the time of COVID-19 in China. **J Sex Med 2020; 17:1225-1228.**

15. Jacob L, Smith L, Butler L, et al. Challenges in the Practice of sexual medicine in the time of COVID-19 in the United Kingdom. **J Sex Med 2020;17:1229-1236.**

16. Schiavi MC, Spina V, Zullo MA, et al. Love in the time of COVID-19: sexual function and quality of life analysis during the social distancing measures in a group of Italian reproductive-age Women. **J Sex Med 2020;17:1407-1413.**

17. Li G, Tang D, Song B, et al. Impact of the COVID-19 pandemic on partner relationships and sexual and reproductive health: cross-sectional, online survey study. **J Med Internet Res 2020;22:e20961.**

18. Suarez E, Beckham J, Green K. The relation of Light-to-Moderate alcohol consumption to Glucose Metabolism and Insulin Resistance in Nondiabetic adults: the Moderating effects of depressive Symptom severity, Adiposity, and Sex. **Int J Behav Med 2017;24:927-936.**

19. Wesselink A, Hatch E, Rothman K, et al. Prospective study of cigarette smoking and fecundability. **Hum Reprod 2019; 34:558-567.**

20. Peng YS, Chiang CK, Hung KY, et al. The association of higher depressive symptoms and sexual dysfunction in male haemodialysis patients. **Nephrol Dial Transpl 2007;22:857-861.**

21. Huang YP, Chen B, Ping P, et al. The premature ejaculation diagnostic tool (PEDT): linguistic validity of the Chinese version. **J Sex Med 2014;11:2232-2238.**

22. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. **J Gen Intern Med 2001; 16:606-613.**

23. Ruiz MA, Zamorano E, García-Campayo J, et al. Validity of the GAD-7 scale as an outcome measure of disability in patients with generalized anxiety disorders in primary care. **J Affect Disord 2011;128:277-286.**

24. Wang W, Bian Q, Zhao Y, et al. Reliability and validity of the Chinese version of the Patient Health Questionnaire (PHQ-9) in the general population. **Gen Hosp Psychiatry 2014;36:539-544.**

25. Zeng Q, He Y, Liu H, et al. Reliability and validity of Chinese version of the Generalized Anxiety Disorder 7-item (GAD7) scale in screening anxiety disorders in outpatients from traditional Chinese internal department. **Chin Ment Health J 2013;27:163-168.**

26. Yuan Y, Fang D, Zhang Z, et al. Large-scale single-center investigation of the prevalence and patterns of depression and anxiety in outpatients of andrology clinic. **J Clin Urol 2016; 31:303-307.**

27. Yang Y, Song Y, Lu Y, et al. Associations between erectile dysfunction and psychological disorders (depression and anxiety): a cross-sectional study in a Chinese population. **Andrologia 2019;51:e13395.**

28. Lu Y, Fan S, Cui J, et al. The decline in sexual function, psychological disorders (anxiety and depression) and life satisfaction in older men: a cross-sectional study in a hospital-based population. **Andrologia 2020;52:e13559.**

29. Culha MG, Tuken M, Gonultas S, et al. Frequency of etiological factors among patients with acquired premature ejaculation: prospective, observational, single-center study. **Int J Impot Res 2020;32:352-357.**

30. Jiang T, Osadchiy V, Mills JN, et al. Is it all in My Head? Self-reported psychogenic erectile dysfunction and depression are Common among young men Seeking Advice on social media. **Urology 2020;142:133-140.**

31. Calzo JP, Austin SB, Charlton BM, et al. Erectile dysfunction in a sample of sexually active young adult men from a US cohort: Demographic, Metabolic, and mental health Correlates. **J Urol 2020; 101097JU0000000000001367.**

32. Goldstein I. The mutually reinforcing triad of depressive symptoms, cardiovascular disease, and erectile dysfunction. **Am J Cardiol 2000;86:41F-45F.**

33. Steers WD. Neural pathways and central sites involved in penile erection: neuroanatomy and clinical implications. **Neurosci Biobehav Rev 2000;24:507-516.**

34. Ozbek E, Tasci AI, Tugcu V, et al. Possible association of the 5-HTTLPR serotonin transporter promoter gene polymorphism with premature ejaculation in a Turkish population. **Asian J Androl 2009;11:351-355.**

35. Zhu L, Mi Y, You X, et al. A meta-analysis of the effects of the 5-hydroxytryptamine gene-linked promoter region polymorphism on susceptibility to lifelong premature ejaculation. **PLoS One 2013;8:e54994.**

36. Lesch KP, Bengel D, Heils A, et al. Association of anxiety-related traits with a polymorphism in the serotonin transporter gene regulatory region. **Science 1996;274:1527-1531.**

37. Wray NR, James MR, Gordon SD, et al. Accurate, large-scale genotyping of 5HTTLPR and flanking SNPs in an association study of depression, anxiety and personality measures. **Biol Psychiatry 2009;66:468-476.**

38. Lima CKT, Carvalho PMM, Lima IAAS, et al. The emotional impact of Coronavirus 2019-nCoV (new Coronavirus disease). **Psychiatry Res 2020;287; 112915.**

39. Li Z, Ge J, Yang M, et al. Vicarious traumatization in the general public, members, and non-members of medical teams aiding in COVID-19 control. **Brain Behav Immun 2020. https://doi.org/10.1016/j.bbi.2020.03.007 [Epub ahead of print].**

40. Chen S, Zhang Z, Yang J, et al. Fangcang shelter hospitals: a novel concept for responding to public health emergencies. **Lancet 2020;395:1305-1314.**

41. Esposito K, Giugliano F, Di Palo C, et al. Effect of lifestyle changes on erectile dysfunction in obese men: a randomized controlled trial. **Clin Trial JAMA 2004;291:2978-2984.**

42. Kratzik CW, Lackner JE, Märk I, et al. How much physical activity is needed to maintain erectile function? Results of the Androx Vienna Municipality Study. **Eur Urol 2009;55:509-516.**
43. Cavallini G. Resolution of erectile dysfunction after an andrological visit in a selected population of patients affected by psychogenic erectile dysfunction. **Asian J Androl 2017;19:219-222.**
44. Martin SA, Atlantis E, Lange K, et al. Florey Adelaide Male Ageing Study. Predictors of sexual dysfunction incidence and remission in men. **J Sex Med 2014;11:1136-1147.**
45. Rubio-Aurioles E, Porst H, Kim ED, et al. A randomized open-label trial with a crossover comparison of sexual self-confidence and other treatment outcomes following tadalafil once a day vs. tadalafil or sildenafil on-demand in men with erectile dysfunction. **J Sex Med 2012;9:1418-1429.**

SUPPLEMENTARY DATA

Supplementary data related to this article can be found at https://doi.org/10.1016/j.esxm.2020.100293.