

# The Effect of COVID-19 Stress on Sexual Compulsivity Symptom: The Mediating Role of Perceived Social Support

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## Research Article

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# Abstract

**Introduction** Previous studies have revealed that the life event stress were associated with people's psychology and behaviors, and impacted individuals' sexual behaviors especially. However, few study have investigated the effect and mechanism of the emergency COVID-19 on psychosexual behaviors during the COVID-19 outbreak in China. Thus, this primary objective of the research was to explore the links between COVID-19 stressing and sexual compulsive symptom, and perceived social support.

**Methods** This study used a cross-design, 3219 undergraduate students were recruited online to complete all questionnaires.

**Results** The obtained results confirmed that COVID-19-stressing was correlated with perceive social support and sexual compulsive symptom, and perceived social support mediated the relation between COVID-19-stressing and sexual compulsive symptom; and gender moderated the link of COVID-19-stressing and perceive social support. In addition, in the case of the individuals' sexual compulsive symptom, the regression analyses showed that COVID-19-stressing and perceive social support were significantly predicted.

**Conclusions** Thus, the findings extends previous knowledge and provide highlighted ideas, indicating that the COVID-19 not only affected individuals' physical health, but also impacted their psychological behaviors and intention, such as sexual compulsive symptom. Moreover, the findings revealed that compared to the female, the male students would promoted higher perceived social support when COVID-19-stressing is boosting.

**Policy Implication** It is important that individuals' sexual psychology were cared via professional consulting during people are isolation for the emergent infection.

## 1. Introduction

The Corona Virus Disease 2019 (COVID-19) outbreak in China, the emergency infection disease impacted Chinese social hugely. Especially, China Government had adopted tremendous policies to battle the contagion, protect the public and preventing human infections in person, such as isolation of the whole people in China. As previous studies revealed that the life event stress were associated with people's psychology and behaviors (Lu et al. 2017; Park et al. 2018; Rivers and Sanford 2018). Based on the coping theory, the COVID-19 event must be a strong life event stress for people, which strongly impacted people's emotion and behaviors. In particular, the life event stress and negative life events were associated with sexual behaviors (Gore-Felton et al. 2002; Lakshmi et al. 2007). However, few study have investigated the effect and mechanism of the emergency COVID-19 on psychosexual behaviors during the COVID-19 outbreak in China.

The growing number of studies have evidenced that young undergraduate students have more and more sexual compulsivity behaviors and/or sexuality behavioral intentions (Duan et al. 2012; Ghobadzadeh et al. 2019; Li et al. 2016). In this study "Sexual Compulsivity Symptom (SCS)" means individuals' sexuality behaviors, sexual behavioral intention and sexting behaviors. Previous studies showed that many factors were found which effected young college studies sexual behaviors and sexuality intension, for example, the gender (Xiong et al. 2015), media messages information (Chen et al. 2010; Zhu et al. 2014), time spent on mass media and perceived parental attitude (Zhu et al. 2014), especially, the family factors which parents should timely and contrapuntally provide sex knowledge and sex education for their children (Zhang et al. 2017) and parent-teen communication

about sex (Wang et al. 2007). In a word, based on the Ecological Systems Theory (Bronfenbrenner 1989), young undergraduate studies' on sexual compulsivity symptom was influenced by many factors, and the factors can be summarized as two aspects: outside environmental factors and person oneself coping factors (Gore-Felton et al. 2002; Lakshmi et al. 2007).

Moreover, previous studies had revealed that the stressful life events influenced on individuals emotions and behaviors (Chen et al. 2014; Huang et al. 2017; Lu et al. 2017; Park et al. 2018; Rivers and Sanford 2018). In particular, the stressful life events or negative life events were correlated with sexual behaviors for young human (Cheney et al. 2015; Ghobadzadeh et al. 2019; Voisin et al. 2017). Further, longitudinal study also found that the experiences for individuals and family changes were strong associated with sexual behaviors (Dorius et al. 1993). Based on the stress-theory that individuals coping ability could be influenced by the life events stress (Vanderbilt-Adriance and Shaw 2008), some studies had evidenced that individual sexual behaviors and sexuality behavioral intention were associated with outside environmental factors and coping factor (Gore-Felton et al. 2002; Lakshmi et al. 2007). Specially, the life event stress and coping ability influenced ones sexual compulsive symptom (Chen et al. 2014; Cheney et al. 2015; Ghobadzadeh et al. 2019; Huang et al. 2017; Park et al. 2018; Voisin et al. 2017). Therefore, we can propose the notion that the COVID-19 stress was negatively correlated with sexual compulsive symptom.

Furthermore, the psychosexual theory refers to individual sexual behavior was effected by ones' emotion and social culture (Yu and Gao 2008). Previous studies have showed that individual sexual compulsive symptom was correlated with the coping factor (Gore-Felton et al. 2002; Lakshmi et al. 2007), especially, the support system can help improve people coping ability and increase coping efficacy of stress (Chu et al. 2014; Wang 2005). Similarly, many studies have explored the effects mechanism of social support on coping stress (Jimenez et al. 1992; Ye et al. 2014). For instance, social support as a mediator between stress and emotion affect (Shen et al. 2018), and the relationship between life event stress and drug use (Yang and Ye 2014). In addition, some studies suggested that family communication was strong related to adolescent sexual emotions and behaviors (Mirthe et al. 2020), and the peers were the relationship that had significant effect on adolescent sexual behavior (Soller and Haynie 2013; Zhang et al. 2015), and social support was significantly associated with sexual risk behaviors in woman (Abbamonte et al. 2020; Gore-Felton et al. 2002). Therefore, perceives social support would promote individuals coping ability or coping efficacy. That is to say, higher level of perceived social support could help promote and reduce sexual risk behavior (Mergenova et al. 2017; Miller 2017). In conclusion, we can assume that perceived social support which individuals remarkably affects sexual compulsive symptom for the isolation young undergraduate students.

To sum up, through the review of previous literature, we could hypothesized that there are associations between COVID-19 stress, perceived social support (PSSS) and sexual compulsive symptom. However, few studies have examined the effect of perceived social support on the relation between COVID-19 stress and coping ability in the isolation period of COVID-19 infection outbreak. What's more, previous studies have revealed that sociodemographic, such as gender, age, could influence individuals' coping efficacy and ability (Bahar 2010; Zhang et al. 2015). Based on the above literature analyses and previous studies, the main purpose of current study is to investigate into the relationship between COVID-19 stress and sexual compulsive symptom, and the effect mechanism for young undergraduate studies. Thus, we used a cross-sectional design to explore the links between COVID-19 stress and sexual compulsivity symptom, and the mediation of perceives social support, and

test the gender as a moderator to this relationships (Fig 1). Furthermore, we expected that individuals with lower levels of COVID-19 stress have higher perceived social support and sexual compulsivity symptom.

Fig. 1. Hypothesized mediation and

## 2. Methods

### 2.1 Participants and Procedure

Participants were recruited online via the smartphone from some universities. A total of 3219 undergraduate students were asked to complete the questionnaires, aged 17 to 24 years ( $M = 20.8$ ,  $SD = 1.4$ ; 741 male, 23%, 2478 females, 77%). All questionnaires were completed by anonymously.

Collecting study data was in conjunction with psychological surveys and counseling. Participants were isolation in home quarantine (over 21 days).

### 2.2 Measures

**2.2.1 COVID-19 stress** COVID-19 stress was measured by the COVID-19-stressing Questionnaire. The questionnaire items initially rooted the Adolescent Self-Rating Life-Events Check List (ASLEC), and 8 psychological behaviors indicators assessed individual subjective emotion for the COVID-19 stress. Items were utilized to measure self-rating stressing of COVID-19 (e.g., "I take more time care for the COVID-19," "I feel higher nervous as my fever," "I shall fear when someone was cooled or disease for the COVID-19," "I feel bore when everyone take about the COVID-19,"  $\alpha = 0.772$ ). Items were measured on a 5-point Likert-type scale, ranging from 1 (*Lowest*) to 5 (*Highest*), the scale indicated the stressing of COVID-19. The goodness-of-fit indices were as follows:  $\chi^2(6.815)/df(4) = 1.704$ ,  $p = 0.000$ , Comparative Fit Index (CFI) = 0.998, Tucker-Lewis Index (TLI) = 0.988, Root Mean Square Error of Approximation (RMSEA) = 0.015. The results indicated that the COVID-19-stressing Questionnaire has goodness reliability and validity.

**2.2.2 Perceived Social Support** Perceived social support was measured by the Perceived Social Support Scale (PSSS. Zimet 1987). PSSS have 12 items which measured the individuals possess' social support (e.g., "My families can help me," "I can rely on my friends in the times of trouble," "I can enjoy happiness and sorrow with my families, friends and workmates," "I can talk about my trouble with my families,"  $\alpha = 0.959$ ). Participants were asked to rate a 7-point scale, ranging from 1 (*Strongly disagreeing*) to 7 (*Strongly agreement*). The sum score reflected the level of support from family, leader and friends, and the goodness-of-fit were as follows:  $\chi^2(158.72849)/df(34) = 4.668$ ,  $p = 0.000$ , CFI = 0.990, TLI = 0.982, RMSEA = 0.057.

**2.2.3 Sexual Compulsivity Symptom** Sexual compulsivity symptom was assessed by the Sexual Compulsivity Scale (SCS. Kalichman and Rompa 2001). The scale has 10 items which indicated individuals' seeking sexual behaviors and sexting idea, and those items was used to evaluate sexuality-related problems including comment sexual ideas, and sexting behaviors, and sexual behaviors, and sexual behavioral intention (e.g., "My sexual thoughts and behaviors are causing problems in my life," "My desires to have sex have disrupted my daily life," "I sometimes get so horny I could lose control," "I think about sex more than I would like to," "I feel that sexual thoughts and feelings are stronger than I am,"  $\alpha = 0.815$ ). This scale were asked the participants had to rate a 6-point scale[1], ranging from 1 (*Not at all like me*) to 6 (*Very much like me*). The sum score reflected the level of

sexual compulsivity symptom, the goodness-of-fit were as follows:  $\chi^2(82.825)/df(17) = 4.872$ ,  $p = 0.000$ , CFI = 0.990, TLI = 0.982, RMSEA = 0.057.

**2.2.4 Sociodemographic and COVID-19-Data** Participants were asked to complete demographic information data, such as gender, age, rural/urban areas, and family. Besides, others information, such as the Times for answer all questionnaires, and whether living with the confirmed COVID-19 or suspected COVID-19 patient (family or/and unit or/and residential area), and home-isolation or hospital control-isolation.

The Times data level was measured as follows. First, deleted the excessive time data values from the all data. Then, separated the data into two level group by the mean value ( $M$ ) (1= Under  $M$  level, 2= Up  $M$  level).

### **2.3 Statistical analysis**

SPSS 22.0 and MPLUS 7.0 were used to perform the data analysis. The analyses consisted of the differences testing, descriptive statistics, correlation analyses, hierarchical regressing analyses, and the testing of mediator (moderator) model. Furthermore, we estimated the mediational models and moderating model by Process (model 4) and (model 8). Meanwhile, we select bias-corrected (BC) bootstrapping, a nonparametric resampling procedure, to test the indirect effects (Preacher and Hayes 2008). This procedure involved repeatedly sampling from the data set (5000 bootstrap resamples) and estimating the indirect effect in each resampled data set. When zero is not in the 95% confidence interval (CI), the indirect effect is significantly different from zero at  $p < 0.05$  (two tailed) (Preacher and Hayes 2008).

[1] The original scale rated from 1 to 4. To increase score range for items, we used 1-6 Likert-type scoring.

## **3. Results**

### **3.1 Testing of Common Method Variance**

In order to avoid the common method variance effects, we used the procedural method followed: (1) all questionnaires were completed anonymously; (2) all questionnaires had good reliability and validity to reduce or avoid systematic errors as much as possible; (3) some items was scored in reverse for questionnaires; (4) the sample were recruited from different school. In addition, we used the Harman Single Factor Test to diagnose the common method variance, the results showed that there were 7 factors which eigenvalue more than 1, and the first factor can explain 24.84% of the variation, less than the critical of 40%. The results indicated that there was not significantly common method variance in the study.

### **3.2 Sociodemographic Differences for Variables**

In order to test the sociodemographic differences in COVID-19-stressing, perceived social support and sexual compulsivity symptom, the results showed as the Table 1.

Performed the independent sample t-tests, the differences were significantly to illustrate an overall significant effect of gender on the dependent variables. The female have higher COVID-19-stressing, PSSS and SCS than male, In particular, the COVID-19-stressing ( $p < 0.001$ ) and PSSS ( $p < 0.01$ ) was significant. Similarly, participants over the ages of 21 have lower COVID-19-stressing, and higher PSSS and SCS compared to younger than that

age, only the differences of COVID-19-stressing ( $p < 0.001$ ) was significantly; urban participants have higher COVID-19-stressing, and lower PSSS and SCS compared to rural participants, while only COVID-19-stressing ( $p < 0.001$ ) and SCS ( $p < 0.05$ ) differences were significantly. Therefore, this result showed that differences of COVID-19-stressing, PSSS and SCS were significant for gender, years and urban/rural.

### **3.3 COVID-19 Data Differences for Variables**

In order to examine the COVID-19 Data differences in the COVID-19-stressing, perceived social support, and sexual compulsivity symptom, independent sample-t tests was performed (Table 2).

As the Table 2 showed, this results illuminated that confirmed participants have more COVID-19-stressing, PSSS and SCS, but only PSSS ( $p < 0.01$ ), SCS ( $p < 0.001$ ) differences were significantly. Similarly, suspected participants have more COVID-19-stressing, PSSS and SCS, but only PSSS ( $p < 0.001$ ), SCS ( $p < 0.001$ ) differences were significantly; Isolated participants have more COVID-19-stressing and PSSS, lower SCS, and only the COVID-19-stressing ( $p < 0.001$ ) and SCS ( $p < 0.05$ ) differences were significantly.

### **3.4 Descriptive statistics and Correlation analyses**

Table 3 depicts the descriptive statistics and the relations among all variables. Gender was positively related to Times ( $p < 0.01$ ), COVID-19-stressing ( $p < 0.01$ ) and PSSS ( $p < 0.01$ ); Times were significantly related to COVID-19-stressing ( $p < 0.05$ ), PSSS ( $p < 0.001$ ) and SCS ( $p < 0.001$ ); COVID-19-stressing was positively correlated with PSSS ( $p < 0.001$ ), and negatively correlated with SCS ( $p < 0.001$ ); PSSS was positively related to SCS ( $p < 0.001$ ).

Thus, individuals with higher COVID-19 stress would possess more perceived social supports, and lower sexual compulsive symptom. However, individuals with higher perceived social support would be more sexual compulsive symptom.

### **3.5 Hierarchical Regression Analyses**

In order to test the effect of sociodemographic, COVID-19-data, COVID-19-stressing and perceived social supports on sexual compulsive symptom, hierarchical regression analyses was conducted in this section. Meanwhile, SCS would be used as the dependent variable. The results was demonstrated in Table 4.

Based the Table 4, the step 4 regression analyses results showed that gender and age would not significantly predicted the SCS, only the Times ( $\beta = 0.051$ ,  $t = 3.137$ ,  $p < 0.01$ ), COVID-19-stressing ( $\beta = -.2092$ ,  $t = -12.685$ ,  $p < 0.001$ ), and PSSS ( $\beta = 0.350$ ,  $t = 21.287$ ,  $p < 0.001$ ) would significantly predicted the SCS. This results suggested that the Times, COVID-19-stressing and PSSS could affect individuals sexual compulsivity symptom. Meanwhile, higher COVID-19-stressing individuals should lower sexual compulsive symptom, individuals with higher perceived social support should be more sexual compulsive symptom.

### **3.6 Mediation effects analyses**

Mplus7.0 was performed to explore the relationship between COVID-19 stress and sexual compulsive symptom, and the mediator role of perceive social support. First and foremost, by estimating the mediation model with a multi-group analysis, there was not significant difference between men and women group for the all paths and variances constrained ( $\Delta\chi^2 = 6.541$ ,  $\Delta df = 6$ ,  $p > 0.05$ ). Thus, we could explore the relationships in the final analyses as a whole controlling gender and age.

Second, goodness-of-fit indices of the hypothesized model were as follows:  $\chi^2 = 7.826$ ,  $df = 3$ ,  $\chi^2/df = 2.609$ ,  $p = 0.001$ , CFI = 0.995, TLI = 0.981, RMSEA = 0.062. The results showed that the hypothesized model had a good fitness to the data.

Furthermore, Process (model 4) was developed with Hayes (2013) which was performed to test the mediator effects in the relationship between COVID-19 stress and sexual compulsivity symptom, and performed 5000 Bootstrap to examine the mediator effect, bases on the 0 was not in the CI indicate the mediating effects was significant. The results showed that perceived social support would have a mediator effect in the relationship between COVID-19 stress and SCS (0.048, CI [0.035 0.064]). As predicted, COVID-19-stressing was significantly associated with lower sexual compulsive symptom and indirectly related to sexual compulsive symptom partly via higher perceived social support (Fig. 2).

### **3.7 Moderating effects analyses**

Process (model 8) was developed with Hayes (2013) which was performed to test the moderating effect of gender in the relationship between COVID-19-stressing and perceived social support, sexual compulsivity symptom, and performed 5000 Bootstrap examine the mediator effect score, through the 0 is or not in the CI.

The results showed that COVID-19 stress could significantly predict perceived social support ( $\beta = .127$ ,  $t = 7.189$ ,  $p < 0.001$ , CI [.092 .161]), and the interaction could significantly predict perceived social support ( $\beta = -.130$ ,  $t = -3.384$ ,  $p < 0.001$ , CI [-.206 -.055]). The results illustrated that gender was as a moderating role in the relationship between COVID-19 stress and PSSS. Meanwhile, the findings suggested that gender was not a moderating role in the relationship between COVID-19 stress and sexual compulsivity symptom ( $\beta = .046$ ,  $t = 1.281$ ,  $p > 0.05$ , CI [-.025 .117]).

Moreover, the moderating effect of gender would be interpreted in the subsequent analyses. That is, examined the relationship between COVID-19-stressing and perceive social support and the direction of the interaction was affected by gender. The participants were selected two groups according to the scores of COVID-19-stressing (High group: top 27% of COVID-19; Low group: bottom 27% of COVID-19). The simple effect analyses was conducted (Fig 3). The results showed that the main effects of gender was significant ( $F=6.004$ ,  $p < 0.05$ ) in the low group; the main effects of gender was not significant ( $F=0.183$ ,  $p > 0.05$ ) in the high group. Thus, this findings revealed that the difference of PSSS for the male was significant compared to the female, so it appears that the relationship between COVID-19 stress and perceive social support was more positively significant for the male group.

## **4. Discussion**

The study utilized a cross-design to examine the links between COVID-19-stressing, perceived social support, and sexual compulsive symptom, especially, the mediating role of perceives social support in China undergraduate students during the COVID-19 infection outbreak period. This results showed that individuals with higher level of COVID-19-stressing would have lower sexual compulsive symptom, and perceived social support would buffer the negatively effects of COVID-19-stressing on sexual compulsive symptom. In addition, the relationship between COVID-19-stressing and perceived social support was moderated by gender. In word, undergraduate students' COVID-19-stressing could impacted on perceived social support and sexual compulsive symptom which was

influenced by gender. Specifically, the COVID-19-stressing can promote perceived social support in the male group compared to the female.

#### ***4.1 Difference analyses and regression analyses***

The study results showed that COVID-19 stress was affected by gender, years and rural/urban (life environment). This results indicates that the female, younger people in urban area would have higher stress than the male who are older and in rural area. Negative life events (confirmed or suspected COVID-19) and personality characteristics would affect individuals' emotions. The finding is accorded with the stress-theory and the ecological systems theory, that individual emotion was affected by the life event and personality characteristic (Vanderbilt-Adriance and Shaw 2008).

Furthermore, because the sexual compulsive symptom was affected by negative life stress (COVID-19, Isolation), and life environment (rural/urban), generally, it was in accordance with previous studies, which indicated that individuals would have different sexual compulsive symptom (Gore-Felton et al. 2002; Lakshmi et al. 2007). Specifically, the study suggested that male and older individuals had more SCS than the female and younger participants, and higher stress individuals have lower sexual compulsive symptom (Duan et al. 2012; Ghobadzadeh et al. 2019; Li et al. 2016; Xiong et al. 2015). Thus, it can be concluded that confirmed, suspected, no-isolation and rural undergraduate students' had higher sexual compulsive symptom, and the Times, COVID-19-stress and perceived social support strongly influenced sexual compulsive symptom.

#### ***4.2 The Direct and Indirect Associations between COVID-19-stressing and SCS***

The results suggest the links between COVID-19-stressing and PSSS on sexual compulsive symptom. First, COVID-19-stressing has direct negative impact on individuals' SCS, and via PSSS on SCS. And the most significantly is that results are in accordance with previous studies findings that negative life events was related to sexual compulsive symptom (Chen et al. 2014; Cheney et al. 2015; Ghobadzadeh et al. 2019; Huang et al. 2017; Park et al. 2018). Moreover, this finding examined the ecological systems theory (Bronfenbrenner 1989) that individuals' behaviors was influenced by many factors include outside environmental factors and individuals coping factors (Gore-Felton et al. 2002; Lakshmi et al. 2007). In accordance with this, it is revealed as a significant predictor of undergraduate studies' sexual compulsive symptom, namely the life event stress. Furthermore, previously researches have demonstrated that negative life event or stressful life event impacted individuals' sexual behavior and sexual behavioral emotion, which may also lead to lower level sexual compulsive symptom during home quarantine.

What's more, the results extends the effect mechanism of COVID-19 on sexual compulsive symptom, which COVID-19 could impact sexual compulsive symptom via perceived social support. This also indicated that individual sexual compulsive symptom would boost by the higher COVID-19 through perceived social support. Consisted with previous studies, perceived social support can mediate the relationship between life event or life stress and emotion or behaviors (Abbamonte et al. 2020; Chu et al. 2014; Gore-Felton et al. 2002; Mergenova et al. 2017; Miller 2017; Wang 2005). It can be explained by the resource protect theory that individual psychological resources may protect negative affect by the stress, and individuals' perceived social support could enhance their coping efficacy (Klink et al. 2008; Ye et al. 2014), then further enhance ones coping ability to negative life events (Carroll et al. 2009). Thus, whatever the life event stress was heavenly, there is not significantly negative effect on individual sexual compulsive symptom with the higher perceived social support. Specifically, individuals support

system can help improve coping ability to increase affection of stress (Jimenez et al. 1992; Shen et al. 2018; Wang 2005; Chu et al. 2014). In a word, this study indicated that strongly social support can boost individual coping ability on life event stress (Mirthe et al. 2020), similarly, perceived social support was significantly associated with sexual compulsive symptom (Abbamonte et al. 2020; Gore-Felton et al. 2002; Soller and Haynie 2013; Zhang et al. 2015), and mediated the relation between COVID-19 stress and sexual compulsive behavior.

These obtained findings confirmed similarly reports that COVID-19 stress has significant negative related to sexual compulsive symptom, and perceived social support acted as a partial mediator. Furthermore, the current study revealed that COVID-19 stress was not only associated with lower levels of sexual compulsive symptom, also confirmed that individuals' sexual behaviors were influenced by the social support and life event stress.

#### ***4.3 The Moderating effects of Gender between COVID-19-stressing and PSSS***

As predicted, the gender moderated the relationship between COVID-19-stressing and perceived social support. This result reflected that male students would perceive social support for enhancing with the COVID-19-stressing, female students, however, always have more perceived social support than male students. The findings revealed that the female possessed more perceived social support compared to the male group in their normal lives. In accordance with previous studies, it can be betrayed that the life events could boost more perceived social support (Chen et al. 2014; Huang et al. 2017; Lu et al. 2017; Park et al. 2018; Rivers and Sanford 2018). It can be tested that perceived social support was related to life event stress and the effect of influence may exist individuals' difference (Ye et al. 2014). Moreover, the result showed that individuals' psychological behavior response was influenced by environment and individual difference was significant as well.

#### ***4.4 Implications***

Along with the COVID-19 infectious outbreak in China, people's life and psychology were impacted by the COVID-19 infectious. Specially, a series of government policies, such as downtime, suspensions, and isolation were implemented efficiently. Since the infectious disease was regarded as a strongly stressful life events for individuals, it will be meaningful to utilize a chance to research the effect influence of the COVID-19 event on people health which contain sexual behavior and sexual behaviors intention in the real social event. Furthermore, the finding showed that people ought to not only care their physical health, but also they should place more concern on their psychological health when they are encountered the negative life events. Meanwhile, the study highlighted that the female possess higher perceived social support than the male for normal lifetime. More significantly, this paper extended the previous knowledge such as coping theory and prevention and control mechanism of important epidemic for peacetime. Finally, this study would contribute to the scientific understanding and promotion of health for undergraduate students.

#### ***4.4 Limitations and Directions for Future Research***

There were some important limitations in this study. First of all, the sample focused on the undergraduate students who were recruited online, therefore, the whole participants did not conclude others population (all age range, all career). That may be the limitation for this study. Second, this study used a cross-design, only assumed the correlation between variables, so the findings could not draw a conclusion that there will be the causal relationship for COVID-19 stress and sexual compulsive symptom. Last but not the least, the longitudinal effect of COVID-19 stress on people was not examined because of the short period.

Furthermore, when considering this highlighted findings and limitations, future research will hugely benefit from extending our investigation. Firstly, only by exploring the perceived social support mechanism effect on the relation between COVID-19 stress and sexual compulsive symptom, future research would extend the mechanism effect factors, such as individual emotion depression, anxiety. Secondly, based on previous studies that post the stressing was strong impacted people health, thus, the main objective of the future research will investigate the longitudinal effect of the COVID-19 on sexual compulsive symptom.

## 5. Conclusions

The current research found that COVID-19-stressing was associated with perceived social support and sexual compulsively symptom. To a large extent, the study highlights that the negative life events significantly effect on individuals sexual behavior and intention, and perceived social support was the mediating role for these relationships. Additionally, the links between COVID-19-stressing and perceive social support were moderated by gender. This result could extend our understanding of sexual behavior, which were influenced by negatively life events. In ultimate analysis, the findings proposed the evidence that perceived social support can not only boost individuals' psychological health, but also benefits of sexual behavior health.

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## Declarations

**Ethical Approval:** Along with the quarantine polices for the COVID-19 infectious breakout in China, we provides psychological propaganda and counseling on time. Meanwhile, all participants completed the questionnaires voluntarily, and all procedures were in accordance with the psychological research ethics and ethical standards of Beijing Normal University in this studies.

**Informed Consent:** Informed consent was obtained from all participants included in the study.

**Conflict of Interest:** Those authors declare that they have no conflict of interest.

**Fund:** This study has no funding.

## Tables

Table 1 The differences analyses of variables on gender, years and urban/rural ( $n = 3219$ )

Variable	Male(741) (M±SD)	Female(2478) (M±SD)	F	T	<21year(1796)>21year(1423) (M±SD)	(M±SD)	F	T	Urban (1266) (M±SD)	Rural(1953) (M±SD)	F	T
COVID-19	2.779±0.892	2.904±0.761	21.988***	-3.758***	2.922±0.818	2.817±0.760	6.406*	3.715***	2.958±0.763	2.822±0.736	9.764***	3.433***
PSSS	5.002±1.519	5.163±1.308	32.796***	-2.836**	5.100±1.394	5.159±1.318	6.616**	-1.208	5.104±1.335	5.116±1.431	0.465	0.455
SCS	4.319±0.672	4.338±0.627	6.356*	-0.717	4.327±0.646	4.342±0.626	0.558	-0.658	4.131±0.645	4.365±0.718	0.218	-1.386*

Not: \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ . COVID-19 was COVID-19-stressing, PSSS is perceived social support, SCS is sexual compulsivity symptom.

Table 2 The differences analyses of variables on confirmed/no, suspected/no, isolation/no ( $n = 3219$ )

Variable	Confirmed(1163) (M±SD)	No(2056) (M±SD)	F	T	Suspected(1139) (M±SD)	No(2080) (M±SD)	F	T	Isolation(1122) (M±SD)	No(2097) (M±SD)	F	T
COVID-19	2.881±0.778	2.865±0.824	3.263	0.558	2.880±0.776	2.867±0.828	4.080	.424	2.938±0.831	2.842±0.773	11.144***	3.263***
PSSS	5.181±1.305	5.030±1.450	18.714***	3.016**	5.184±1.303	5.021±1.455	21.303***	3.251***	5.140±1.351	5.119±1.366	0.168	0.406
SCS	4.378±0.611	4.225±0.675	15.361***	5.288***	4.377±0.609	4.233±0.680	18.039***	5.297***	4.303±0.647	4.350±0.632	0.208	-1.987*

Not: \* $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . Confirmed meaning people family or around have confirmed COVID-19 infectious, Suspected meaning people family or around have suspected COVID-19 infectious, Isolation meaning people were quarantine isolation.

Table 3 The descriptive statistics and correlation analyses ( $n = 3219$ )

	M±SD	1	2	3	4	5	6	
Gender	1	1						
Age	2	20.79±1.461	-.027	1				
Times	3	468.66±308.23	.077**	.009	1			
COVID-19	4	2.875±0.895	.066**	.072**	-.041*	1		
PSSS	5	5.126±1.361	.050**	-.018	.054**	.137**	1	
SCS	6	4.333±0.637	.013	-.005	.112**	-.162**	.324**	1

Table 4 Hierarchical regression analyses on SCS

step	predictors	$R^2$	$\beta$	$T$
1	Gender	.013	.710	
	Ages		-.278	
		.000		
2	Gender	.007	.073	
	Ages		-.422	
	Times		4.256***	
		.006		
	$\Delta R^2$	.006***		
3	Gender	.018	.738	
	Age		.254	
	Times		3.914***	
	COVID-19		-9.213***	
		.031		
	$\Delta R^2$	.026***		
4	Gender	.005	.335	
	Age		.963	
	Times		3.137**	
	COVID-19		-12.685***	
	PSSS		21.287***	
		.151		
	$\Delta R^2$	.120***		

Not: \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ . Time is the times for answer questionnaire, COVID-19 was COVID-19-stressing, PSSS is perceived social support, SCS is sexual compulsivity symptom.

## Figures

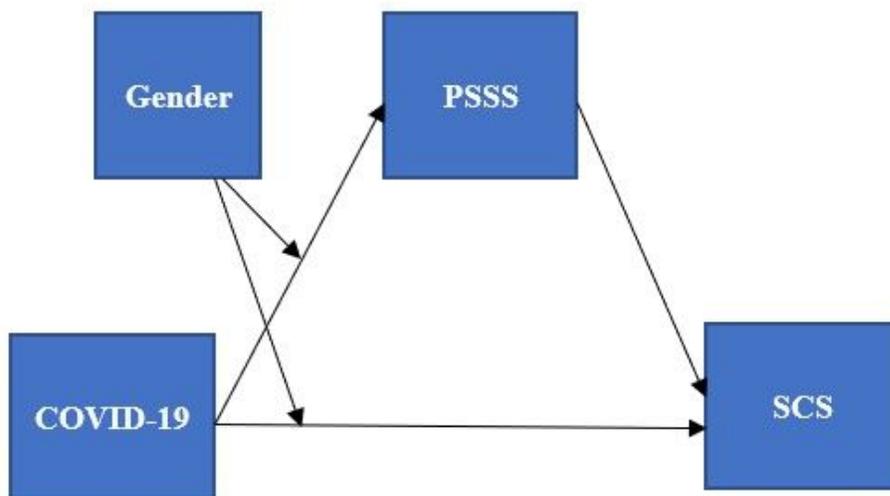


Figure 1

Hypothesized mediation and moderation model

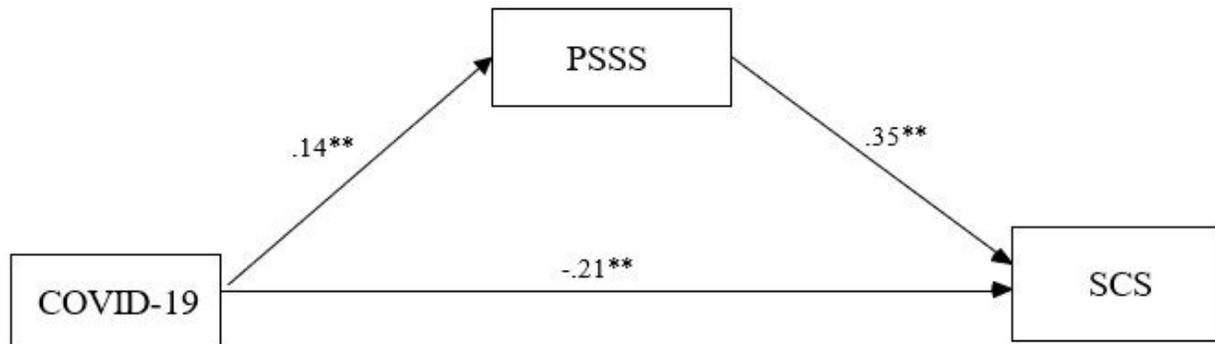


Figure 2

Significantly direct paths of the final tested mediation model. Note: COVID-19 stress (COVID-19), Perceives social support (PSSS), Sexual compulsive symptom (SCS). Standardized regression weights are presented. Direct effects and indirect effects are significant. \* $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

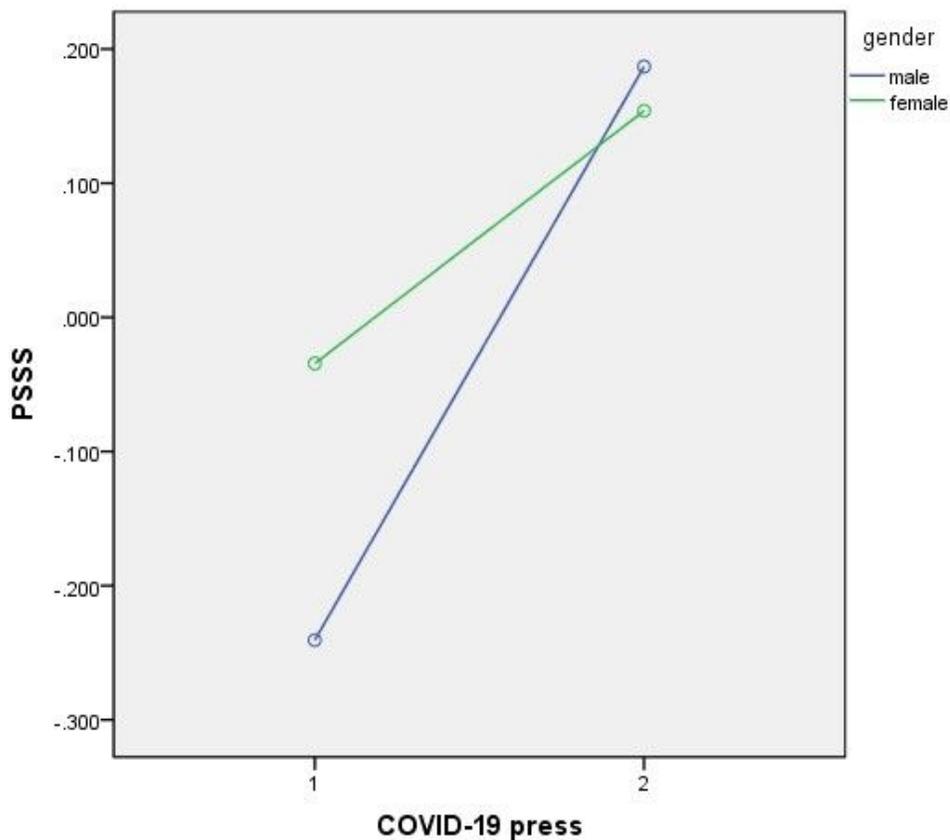


Figure 3

The moderating effect of gender in the relationship between COVID-19 stress and perceive social support (The vertical axis is the Z score of PSSS). Note: COVID-19-stressing (COVID-19 stress: 1=low group; 2=high group), Perceives social support (PSSS).