

Physical exercise and economic burden associated with anxiety symptoms in pregnant women during the COVID-19 pandemic

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Research Article

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Abstract

Background: COVID-19 with high infectivity and high concealment has been widely spread around the world. This major public health event has caused anxiety among the public, including pregnant women. The aim of this study was to assess the incidence of anxiety symptoms in pregnant women during the COVID-19 pandemic and its influencing factors.

Methods: Using an ongoing prospective pregnancy registry, we performed a single center cross-sectional analysis to investigate the overall prevalence of anxiety symptoms among pregnant women during the COVID-19 pandemic. Online questionnaires were used to collect information including sociodemographic data, physical activity and economic situations. The Zung Self-Rating Anxiety Scale (SAS) was used to assess anxiety symptoms. The univariate regression analysis was performed to detect factors potentially influencing anxiety symptoms among pregnant women. The multivariate regression analysis was also conducted to analyze the association of physical exercise and economic burden with anxiety symptoms by adjusting for other variables.

Results: A total of 1,517 pregnant women entered the analysis. The study reported that 31.64% of the respondents had anxiety symptoms. Those with bank loans were at higher odds of suffering from anxiety symptoms compared to those without bank loans [(adjusted odds ratio (aOR) 1.494, 95% confidence interval (CI) 1.181~1.889]. Those who took 2,000~5,000 steps/day (aOR 0.825, 95% CI 0.603~0.875) and >5,000 steps/day (aOR 0.924, 95% CI 0.439~0.945) were at lower odds of suffering from anxiety symptoms compared to those who took <500 steps/day. Similarly, the adjusted odds ratios for anxiety symptoms was 0.750 (95% CI 0.663~0.790) and 0.800 (95% CI 0.226~0.889) lower in participants with exercise frequencies of 4-6, and ≥ 7 times/week, compared to those with a frequency of <2 times/week.

Conclusions: Three in ten pregnant women experienced anxiety symptoms during the COVID-19 pandemic, and anxiety symptoms showed association with bank loans and physical exercise. To prevent anxiety of pregnant women, the promotion of healthy lifestyles, improvement of mental health services, and expansion of social support should be implemented during epidemics. In parallel, the integration of psycho-educational interventions with mental health services among public health centers is required to minimize anxiety symptoms in pregnancy women.

Background

The novel contagious pneumonia named coronavirus disease 2019 (COVID-19) has broken out in more than 211 countries/territories/areas since the end of 2019 (1). As of August 11, 2020, more than 19 million people worldwide had been infected with SARS-CoV-2 (2). The COVID-19 pandemic is not only a public health emergency but also global shocks with societal and economical transformations. It is believed that the COVID-19 pandemic has profound psychosocial impact on vulnerable populations around the world, including pregnant women (3, 4). Pregnancy women are more likely to develop mental health problems than non-pregnant women (5, 6). Physiological changes during pregnancy such as a

suppressed immune system may contribute to increased susceptibility to viral infection (7, 8). Uncertainty and concerns about risk of COVID-19 infection were found to be important drivers of adverse mental health outcomes (5, 6, 9-11). Pregnant women have a strong tendency to express more concern about the COVID-19 than other infectious diseases during this period of time, and they bear greater psychological pressure during the COVID-19 pandemic than prior to this outbreak (6). In this complex situation, pregnant women may be more susceptible to mental health issues (such as anxiety and depression) compared to the pre-COVID-19 situations (3, 12, 13).

Anxiety is a complex and mysterious emotional state, which is considered a manifestation of stress response. Epidemiological studies have shown that the mental health problems of pregnant women are mainly anxiety and depression (3, 14-15). In addition, the incidence of anxiety during pregnancy was obviously higher than depression, and the occurrence of many postpartum depression is closely related to prenatal anxiety (16, 17). Pregnant women are more prone to anxiety with the prevalence of gestational anxiety ranging from 15% to 23%, in comparison with the general population with 3 to 5% of anxiety symptoms (6). Specific physiological and hormonal changes during pregnancy may contribute to the development of mental health problems in pregnant women (18, 19). Moreover, other non-biological factors such as economic income, marital status, age, life-time experiences and attitudes also play a key role in the development of anxiety symptoms in women during pregnancy (20, 21). Previous studies have shown that large-scale public health events such as the COVID-19 pandemic independently associated with the risk for anxiety in pregnant women (4, 9, 12).

Anxiety during pregnancy is not only detrimental to the health of an expectant mother, it is also likely to have negative consequences for the development and health of the fetus (6, 22, 23). Mental health care for pregnant women, whether they were infected with COVID-19 or not, should receive serious consideration. Anxiety during pregnancy and its adverse effects can be modulated by preventive interventions such as behavioural counselling, psycho-education and individual support, which in turn can be influenced by the social and economic environment of pregnant women. Thus, the aim of this cross-sectional study is to assess the prevalence of anxiety symptoms and associated factors in pregnant women during the COVID-19 pandemic. This will help formulate screening strategies to identify risk groups that need intervention during pregnancy, optimize psychological intervention strategies, and improve nursing and healthcare delivery.

Materials And Methods

Study design and setting

This is a single-center cross-sectional study through a self-administered questionnaire. The anonymous survey questionnaire was designed with five segments to collect data regarding: (1) demographic and baseline characteristics; (2) the COVID-19 status; (3) household income and debt burden during the COVID-19 pandemic; (4) physical exercise during the COVID-19 pandemic; (5) anxiety status. The questionnaire was developed, reviewed and pretested by professors in Obstetrics (Jie Deng and her

colleagues). The present study recruited pregnant women from the Department of Obstetrics and Gynaecology, Xiangyang No.1 People's Hospital, Hubei University of Medicine. The study protocol was approved by the Ethics Committee Board at Xiangyang No.1 People's Hospital (No.2019GCP032).

This research uses an online questionnaire. The questionnaire was written and distributed through the Chinese professional survey website *Wenjuanxing* (<http://www.wjx.com>, Changsha Ranxing Information Technology Co., LTD, Changsha, China). The source of the subject is limited to the Xiangyang city and its surrounding suburbs. Xiangyang is northwest to Wuhan, approximately 326 km from Wuhan. Wuhan is the capital of Hubei province and the centre of the COVID-19 epidemic in China. Passengers in Wuhan city can travel to Xiangyang via high-speed trains in less than 2 hours. Therefore, the sampling area was representative with respect to its geographic location. The online questionnaires were distributed from March 2 to 16, 2020, through a widely-used WeChat platform for pregnant mothers to those registered for prenatal care in Xiangyang No.1 People's Hospital. All study participants were asked to fill in this questionnaire once during this study. Only fully completed questionnaires could be submitted online. The dwelling area of the participants were identified by network IP addresses.

It took the respondents 5-10 minutes to complete the questionnaire. At the beginning of the questionnaire, we presented the research background and informed participants that our purpose was to help pregnant women improving the preventive behaviors of self-medication. All participants were also be assured that their participation was voluntary and confidential. An electronic informed consent was obtained from each participant prior to starting the investigation.

Data collection

Data collection and input were automatically conducted through *Wenjuanxing* on the Internet. The collected data from the questionnaires were reviewed and checked for completeness before data entry. Overall, 1,669 participants completed the questionnaires. Fifty six investigators were excluded on the basis of the following criteria: (1) maternal age <15 or >45 years; (2) non-pregnant or with the answer of "already delivered"; (3) subjects with history of anxiety and mood disorders prior to the COVID-19 outbreak; (4) pregnant women with diabetes, hypertension or other pregnancy complications. To avoid repetition, participants who filled out questionnaires with the same IP address (n=32) were excluded from further analysis. Questionnaires (n=64) answered in <1 minutes or >30 minutes were regarded as invalid. After exclusion, a total of 1,517 participants were ultimately included in the analysis (Fig. 1), yielding an effective response rate of 90.89%.

Measures

The average steps per day were recorded by a mobile phone pedometer and calculated for each participant. Background information including maternal age, ethnicity, education level, occupation, marital status, duration of marriage, historic and present pregnancy information, residential areas, family or social history of the COVID-19 exposure, household income levels, whether had bank loans, and physical exercise during pregnancy was obtained.

The Self-Rating Anxiety Scale (SAS), which was originally developed by Zung in 1971 (24), were administrated to assess the anxiety status in pregnant woman. The SAS consists of 20 self-reporting items that describes subjective feelings and manifestation of anxiety. Responding to each item, each participant should indicate how much each statement applies to her in the recent two weeks. Each question is scored on a scale of 1-4 (1=rarely, 2=occasionally, 3=frequently, 4=always). The scores of 20 items are summed up as the total score. To standardize the total score, the total score was multiplied with 1.25. Anxiety status was obtained by the standard total score. Respondents who score <50 are free from anxiety, while those who score ≥ 50 are regarded as having anxiety (24). SAS was reported to be broadly used and has demonstrated good validity and reliability among Chinese populations (14, 25).

We considered multiple covariates and potential confounding factors between healthy group (SAS score <50) and anxiety group (SAS score ≥ 50). The demographic variables were defined as follows: age group (<25 years and ≥ 25 years), parity (primipara and multipara), education level (postgraduate, college or others), occupation (stable income earners and unstable income earners), and having household bank loans (Yes or No). The government of China adopted different types of quarantine measures and other public health measures aiming to reduce the spread of the COVID-19 in different areas according to the COVID-19 infection conditions, these measures also had a great impact on mental health of pregnant women (12, 14). So the residence areas was categorized into three degrees during the COVID-19 pandemic according to the identified numbers of infected patients (No confirmed cases or no new confirmed cases for 14 consecutive days are low-risk areas. There are new confirmed cases within 14 days, the cumulative number of confirmed cases is not more than 50, or the cumulative number of confirmed cases is more than 50, and there is no clustering epidemic within 14 days, which is a medium risk area. The total number of confirmed cases was more than 50, and cluster epidemic occurred within 14 days, which was a high-risk area)(Fig. 1). The epidemic-related variables were considered to be stratification variables, including household income, daily number of walking steps, exercise time and frequency.

Statistical analysis

In descriptive analysis, the continuous and categorical variables were described as Mean SD or n (%) in both health population and anxiety group. Chi-square test was performed to examine the association of characteristics between health population and anxiety group. And *t* test was for continuous variables. All the statistical analysis was used by the SPSS (version 25.0, IBM, NY, USA). All tests were 2-sided, and *P* value<0.05 was considered as statistically significant.

Anxiety was regarded as the dependent variable, and multivariable logistical regression model by backward method was used estimate the association between health population and anxiety group through univariate model. Odds ratio (OR) with 95% confidence interval (CI) were reported to determine the strength of association of potential factors with anxiety symptoms.

Results

Description of the Characterization of Participants

All participants (n =1517) were non-infected with COVID-19. 31.64% of respondents reported anxiety symptoms, ranging from 29.80% mild ($50 \leq \text{SAS score} < 60$) to 1.78% moderate ($60 \leq \text{SAS score} < 70$) and 0.06% severe ($70 \leq \text{SAS score}$). The mean age and gestational weeks of women were 29.87 ± 6.14 (range: 19-45) years and 29.56 ± 5.74 (range: 22-36) weeks, respectively. The majority of the respondents were primipara (59.26%, n =899). Eighty percent (n =1214) lived in high and middle risk areas, and 20% (n=303) in low risk area. A total of 73.04% (n =1108) of the respondents were unstable income earners while 26.96% (n =409) were stable income earners. Sixty-one percent of participants (n =932) had bank loans. There were 493 (47.54%) participants with household income \geq ¥ 10,000 yuan before the COVID-19 pandemic. However, the percentage of participants with household income \geq ¥ 10,000 yuan was decreased during the COVID-19 pandemic (12.99%, n =197). The majority of participants choose walking as their predominant form of exercise (74.69%, n =1133). Nearly 27.75% (n =421) reported walking \geq 2,000 steps per day. Approximately 22.21% (n =337) of the participants exercise for \geq 30 mins per day, and 12.32% (n =187) exercise every day.

In the univariate analysis, five variables were observed to be significantly associated with anxiety symptoms ($P \leq 0.05$): having bank loans, household income during the COVID-19 pandemic, daily number of walking steps, exercise time and exercise frequency. In pregnant women with loan debt, the prevalence of anxiety symptoms was 66.04%, higher than 59.31% in pregnant women without loan debt. Likewise, the participants with low household income ($<$ ¥ 5,000 yuan) had a higher prevalence of anxiety symptoms 33.46% than the participants with moderate-to-high household income (\geq ¥ 5,000 yuan) 31.24% during the COVID-19 pandemic. Moreover, in pregnant women with little (exercise duration $<$ 5mins per day and exercise frequency $<$ 2 times per week) and regular exercise (exercise duration \geq 30 mins per day and exercise frequency 4 times per week), the prevalence of anxiety symptoms was 36.14% vs. 6.54%. The other variables, including age, parity, gestational weeks, education, residential areas, occupation, household income before the COVID-19 pandemic and exercise type did not correlate with anxiety symptoms ($P > 0.05$) (Table 1).

Univariate and multivariate analyses

Univariate model-fitting analyses indicated that pregnant women with bank loans have a higher risk of anxiety symptoms (cOR 1.470, 95% CI: 1.170~1.847, $P = 0.001$) (Table 2). Interestingly, compared with pregnant women reporting the total walking steps $<$ 500 steps per day, the cORs of anxiety symptoms were 0.666 (95% CI: 0.503~0.882, $P = 0.005$) and 0.526 (95% CI: 0.332~0.834, $P = 0.006$) for those who walking 2,000-5,000 steps per day and $>$ 5,000 steps per day, respectively. Compared with pregnant women reporting the exercise time $<$ 5 mins per day, the cORs of anxiety symptoms were 0.795 (95% CI: 0.619~0.921, $P = 0.027$), 0.636 (95% CI: 0.465~0.847, $P = 0.004$) and 0.441 (95% CI: 0.258~0.755, $P = 0.003$) for those who exercise 5~30 mins per day, 30~60 mins per day and $>$ 60 mins per day, respectively. Compared with pregnant women reporting the exercise frequency $<$ 2 times per week, the cORs of anxiety symptoms were 0.603 (95% CI: 0.302~0.940, $P = 0.036$) and 0.801 (95% CI: 0.265~0.964,

$P = 0.001$) for those who exercise 4~6 times per week and every day, respectively. The multivariate logistic model revealed that bank loans was independently associated with the increased risk of anxiety symptoms in pregnant women (aOR 1.494, 95% CI: 1.181~1.889, $P = 0.001$). Additionally, exercise 4~6 times per week and every day could help to decrease the risk of anxiety symptoms in pregnant women (aOR 0.750, 95% CI: 0.663~0.790, $P = 0.023$) and (aOR 0.800, 95% CI: 0.226~0.889, $P = 0.009$). Those who walking 2,000-5,000 steps per day and > 5,000 steps per day could also help to decrease the risk of anxiety symptoms in pregnant women (aOR 0.825, 95% CI: 0.603~0.875, $P = 0.014$) and (aOR 0.924, 95% CI: 0.439~0.945, $P = 0.020$). However, we did not observe any notable associations between exercise time and anxiety symptoms in the multivariate logistic model.

Discussion

The current outbreak of the COVID-19 in Wuhan City and the other major cities (including Xiangyang) in Hubei province has raised global concerns. The COVID-19 pandemic, and associated quarantine measures, and hospital isolation, and social distancing to contain the virus, have contributed to increased anxiety symptoms and negative emotion among the general populations in China (26, 27). Pregnant women formally considered a vulnerable population, prone to develop anxiety and other adverse emotions, mainly because of their physical, psychological and social changes (28). This study is performed to identify anxiety symptoms and associated factors in pregnant women during the COVID-19 pandemic. In this representative sample of pregnant women living in Xiangyang, 31.64% of participants reported having anxiety symptoms. Prevalence of anxiety symptoms during pregnancy was associated with physical exercise and economic burden. As this was a cross-sectional retrospective study, these causal relationships could not be determined from this study.

The COVID-19 pandemic could yield a variety of negative psychological effects in different groups of the population, including pregnant women (5, 29, 30). Pregnant women are more likely to develop anxiety (5, 14), which is considerable depending on physical conditions and living environment (31). Since the COVID-19 was rapidly advancing in China with high mortality risk, Chinese government had implemented control measures including lockdowns, home quarantines and hospital isolation to slowing the COVID-19 transmission across China. Moreover, pregnant women were worried that they or their family members might contract COVID-19, and consequently, transmitting it to their foetuses (26). These factors mentioned above may contribute to the development and persistence of anxiety symptoms among pregnant women (30, 32). During the COVID-19 pandemic, the results of previous studies showed that pregnant women had higher prevalence of anxiety symptoms compared to the general population or the pregnant women before the COVID-19 outbreak, which is in line with the present study (4, 33-35). For example, a large cross-sectional survey showed that the prevalence of anxiety symptoms in workers during the epidemic period of the COVID-19 in China was 3.4% (36). Liu *et al.* found that 24.5% of pregnant women in Wuhan were suffering from anxiety symptoms during the COVID-19 outbreak (14). A study in Iran found that 43.9% of pregnant women had moderate-to-severe anxiety symptoms (35). A web-based cross-sectional study found that, in Colombia, the proportion of pregnant women with anxiety symptoms was as high as 50.4% (37). More recently, Zhu *et al.* carried out a cross-sectional study in

Gansu Province (China), and it was observed that the pregnant women's anxiety level was comparable to that of the front-line medical staff during the COVID-19 pandemic (38). Anxiety symptoms during pregnancy have repeatedly been demonstrated to be an independent risk factor for adverse obstetric and neonatal outcomes (22, 23). In this regard, pregnancy care providers (obstetrician-gynecologist, neonatologist and nurses) and other public health professionals should actively provide credible, useful and real-time information and emotional support to pregnant women exposed to a public health emergency, such as the COVID-19 pandemic. Moreover, acceptable and effective means of providing accurate and health care information related to the COVID-19 or other infections to the pregnant women are needed.

In the present study, we found that pregnant women with bank loans were at a higher risk for developing anxiety symptoms during the COVID-19 pandemic. This association was not confounded by monthly household income. It is worth to underline that the COVID-19 pandemic has affected the employment and family incomes (39). For instance, the normal economic activity was suspended during the COVID-19 pandemic, and the monthly household income has been temporarily reduced or suspended. For the pregnant women whose income was heavily affected by COVID-19, they may have difficulties in paying bills and loans (6). The burden of bank loans may contribute to pregnant women's experiences of anxiety symptoms. Thus it is possible that pregnant women with bank loans or household debt during the COVID-19 pandemic were prone to experiencing mental symptoms of anxiety. Among pregnant women, those with lower incomes also report greater symptoms of anxiety and poorer birth outcomes (40, 41). Similarly, pregnancy women with low family income were at increased risk to develop anxiety symptoms during the COVID-19 pandemic (11, 14). For example, the results of Li et al. study showed that pregnant women with income losses the COVID-19 pandemic had higher prevalence of anxiety symptoms compared to unpregnant women (14). In our study, although there was not a significant association between the participants' household income and their anxiety symptoms, we believe that household income during the COVID-19 pandemic may have a contribution to anxiety symptoms among pregnant women. In this respect, in order to improve birth outcomes and child development trajectories, it is recommended that the government and policy makers should develop and implement policies to provide financial support for low-income pregnant women and their families with bank loans during the pandemic.

In numerous studies, regular physical activity is reported to be a protective factor against anxiety symptoms in pregnant women (31). In this study, there was a significant relationship between participants' daily walking activity with anxiety symptoms. We found that the participants with pedometer steps greater than 2000 steps/day and exercise frequency at least 4 time/week were less likely to anxiety symptoms. We speculated that the trimester-specific effect of regular walking activity on anxiety symptoms is mostly due to biochemical and neurophysiological changes over time. For example, Mild-to-moderate intensity exercise such as daily walking increases the release of neurotransmitters, such as serotonin (5-TH), dopamine, and noradrenaline, these neurotransmitters were found associated with a better response to anti-anxiety treatment (42). In a study conducted by Kahyaoglu et al.(10), it was shown that pregnant women who do not engage in regular physical activity have a higher risk of anxiety than pregnant women who engaged in regular physical activity during the COVID-19 pandemic. Hence, it is

plausible that the practice of daily walking activity, being associated with a reduced probability of anxiety symptoms among pregnant women, could be a protective factor during the COVID-19 pandemic. Since the aerobic activity most commonly performed by women during pregnancy is walking, in clinical work, we hope that medical staff encourage pregnant women to regularly participate in planning physical activity to benefit their mental health. For the pregnant women themselves, they should actively seek out care advice from healthcare professionals such as physicians and nurses, adhere to practical advice on lifestyle modifications, and find proper outlet for their motions to avoid anxiety symptoms and its negative consequences.

The results of this study provide new data on the association between physical exercise, economic burden and anxiety symptoms among pregnant women during the COVID-19 pandemic. However, several limitations of this study need to be acknowledged when interpreting the results. First, the data were collected in early March, when the number of new coronavirus cases continues to decline and the overall epidemic situation remains at a low level in China. Thus the results of the present study may not be able to be generalized to the more advanced phases of the pandemic. Second, it was conducted at a single center and our participants were not representative of the population of pregnant women in China. There is the possibility of selection bias. Third, with a cross-sectional study design and the use of self-reported data, no cause-effect relationship can thus be established in this study. Forth, the present study used the SAS to assess anxiety symptoms, thus the results of anxiety symptoms might lack comparability with clinical diagnostic measurements of anxiety. Finally, the data were collected online, thus preventing a face-to-face interview of the respondents. There is a chance that those who have anxiety disorders are not able to complete the questionnaire online, and hence respondent bias may be present. Despite these limitations, the present findings will convey evidence-based information to healthcare professionals when they provide comprehensive care to pregnant women.

Conclusions

This study examined the prevalence of anxiety symptoms in pregnant women during the COVID-19 pandemic in Xiangyang and explore the corresponding factors associated with anxiety. Our findings indicated that the COVID-19 pandemic have affected the prevalence of anxiety symptoms in women during pregnancy. In addition, we found that pregnant women with bank loans were associated with a greater risk of feeling anxiety than other women, while pregnant women with regular walking activity at a lower risk of developing anxiety symptoms. Given the adverse short- and long-term effects of anxiety on pregnant mothers and their offspring, the clinical and public health strategies targeting pregnant mothers should develop and adopt to improve mental health, especially during this pandemic or other emergency situation. Moreover, more social supports such as financial, emotional and information support are needed for pregnant mothers.

Abbreviations

COVID-19: Coronavirus disease 2019; SAS: Self-Rating Anxiety Scale; OR: Odds ratio; CI: Confidence interval; cOR: Crude odds ratio; aOR: Adjusted odds ratio; CNY: Chinese yuan; SD: Standard deviation.

Declarations

Acknowledgements

Not applicable.

Authors' contributions

JD, CHH and PD contributed to the protocol design. YXN and MC collected data. YXN, CL, JQW, JYS and SCS analysed data. PD, JD, CHH and PX contributed to the interpretation of results. PD drafted the manuscript and JD proofread the manuscript. PD, CHH and PX revised the final version. All authors made substantial contributions to the paper and read and approved the final manuscript.

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Availability of data and materials

The data used and analysed during this study are available from the corresponding author on reasonable request.

Ethics approval and consent to participate

The study was approved by the Ethics Committee of Xiangyang No.1 People's Hospital, Xiangyang, China (approval number: 2019GCP032). Electronic consent was obtained from each study participant before starting the questionnaire. All responses were recorded anonymously and no identifying information was collected.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no conflict of interest.

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Tables

Table 1 The association between socio-demographic characteristics, economic status and exercise related factors with anxiety symptoms in pregnant women

Characteristics	Health (n=1037)	Anxiety (n=480)		<i>P</i>
Age(yaer)^{ab}			3.150	0.076
<25	151(14.56)	87(18.12)		
≥25	886(85.44)	393(81.88)		
Parity^a			1.986	0.159
Primipara	602(58.05)	297(61.88)		
Multipara	435(41.95)	183(38.12)		
Gestational weeks^b	29.68 5.84	30.42 5.43	2.304	0.127
Education^a			5.852	0.054
High school and lower	582(56.12)	301(62.71)		
College	415(40.02)	157(32.71)		
Undergraduate	40(3.86)	22(4.58)		
Residential areas^a			2.202	0.333
Low risk area	197(19.00)	106(22.08)		
Middle risk area	121(11.67)	58(12.08)		
High risk area	719(69.33)	316(65.84)		
Occupation^a			0.005	0.942
Stable income earners	279(26.90)	130(27.08)		
Unstable income earners	758(73.10)	350(72.92)		
Have bank loans			6.284	0.012
Yes	615(59.31)	317(66.04)		
No	422(40.69)	163(33.96)		
Monthly household income before the COVID-19 pandemic, CNY^a			0.617	0.892
< ¥ 5,000	181(17.45)	91(18.96)		
¥ 5,000~¥ 9,999	519(50.05)	233(48.54)		
¥ 10,000~¥ 20,000	267(25.75)	125(26.04)		
>¥ 20,000	70(6.75)	31(6.46)		

Monthly household income during the COVID-19 pandemic, CNY^a	108.401	<0.000
< ¥ 5,000	604(58.24)	147(30.63)
¥ 5,000~¥ 9,999	306(29.52)	263(54.79)
¥ 10,000~¥ 20,000	100(9.64)	52(10.83)
>¥ 20,000	27(2.60)	18(3.75)
Predominant form of exercise^a	0.476	0.788
Walking	762(73.48)	371(77.29)
Yoga	184(17.74)	81(16.88)
Calisthenics	60(5.78)	28(5.83)
Daily number of walking steps (steps/day)^a	16.408	0.001
500-2,000	438(42.24)	186(38.75)
2,000-5,000	232(22.37)	91(18.96)
>5,000	76(7.33)	22(4.58)
Exercise time (mins/day)^a	18.777	<0.000
<5	370(35.68)	190(39.58)
5-30	441(42.52)	186(38.75)
30-60	141(13.60)	91(18.96)
>60	87(8.20)	18(2.71)
Exercise frequency (times/week)^a	42.645	<0.000
<2	595(57.38)	351(73.13)
2-3	124(11.96)	50 (10.41)
4-6	177(11.07)	33(6.88)
Every day	141(13.59)	46(9.58)

CNY Chinese Yuan.

^a Categorical variables were presented as n (%)

^b Continuous variables were presented mean SD.

Table 2 Odd ratios (95%CI) of anxiety symptoms for economic status and physical activity in logistic regression models

Variables	Univariate model ^a		Multivariate model ^b	
	cOR (95%CI)	<i>P</i>	aOR (95%CI)	<i>P</i>
Have bank loans	1.470 (1.170~1.847)	0.001	1.494 (1.181~1.889)	0.001
Monthly household income before the COVID-19 pandemic, CNY				
<5,000	1		1	
5,000~9,999	1.174 (0.719~1.918)	0.522	0.967 (0.729~1.282)	0.816
10,000~20,000	0.965 (0.614~1.516)	0.877	1.079 (0.766~1.519)	0.664
>20,000	1.067 (0.665~1.713)	0.788	1.038 (0.611~1.762)	0.891
Monthly household income during the COVID-19 pandemic, CNY				
<5,000	1		1	
5,000~9,999	0.700 (0.562~2.155)	0.780	0.772 (0.586~1.018)	0.067
10,000~20,000	0.823 (0.412~1.642)	0.579	0.832 (0.534~1.297)	0.417
>20,000	0.923 (0.438~1.944)	0.833	0.886 (0.389~2.019)	0.773
Daily number of walking steps (steps/day) ^a				
<500	1		1	
500-2,000	0.857 (0.683~1.076)	0.185	0.958 (0.752~1.221)	0.063
2,000-5,000	0.666 (0.503~0.882)	0.005	0.825 (0.603~0.875)	0.014
>5,000	0.526 (0.332~0.834)	0.006	0.924 (0.439~0.945)	0.020
Exercise time (mins/day)				
<5	1		1	
5-30	0.795 (0.619~0.921)	0.027	0.710 (0.370~1.361)	0.302
30-60	0.636 (0.465~0.847)	0.004	1.042 (0.562~1.935)	0.895
>60	0.441 (0.258~0.755)	0.003	0.928 (0.503~1.750)	0.841
Exercise frequency (times/week)				
<2	1		1	
2-3	0.319 (0.185~2.214)	0.294	0.592 (0.447~1.180)	0.558
4-6	0.603 (0.302~0.940)	0.036	0.750 (0.663~0.790)	0.023

every day	0.801 (0.265~0.964)	0.001	0.800 (0.226~0.889)	0.009
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aOR Adjusted Odds Ratio, cOR Crude Odds Ratio, CI Confidence Interval, CNY Chinese Yuan.

^a Only one factor was included in the univariate model.

^b The above all 6 factors in this table were simultaneously included in the multivariate model by backward method according to $P_{out} < 0.10$.

Figures

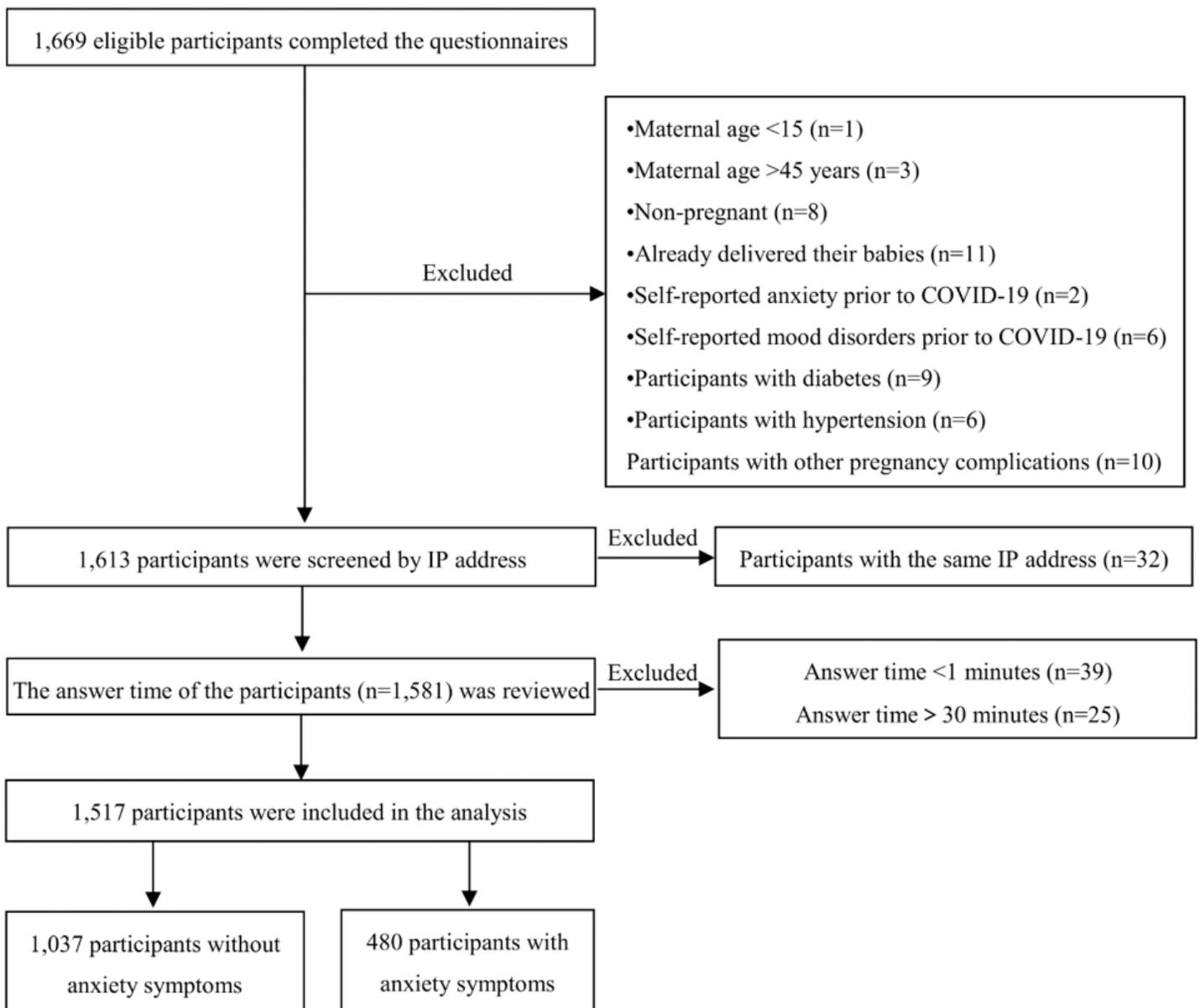


Figure 1

Participant Flow Diagram



Figure 2

Risk area division for COVID-19 infection in Xiangyang city and its surrounding suburbs. Note: The designations employed and the presentation of the material on this map do not imply the expression of any opinion whatsoever on the part of Research Square concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. This map has been provided by the authors.