Mental health status of Chinese residents during the COVID-19 epidemic

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Research article

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Abstract

Background: To investigate the mental health status of Chinese residents during the epidemic of COVID-19, identify the positive and negative factors and explore the regulatory effects of negative cognitive processing bias on mental health.

Methods: Using a general questionnaire, such as the self-rating depression scale, the state anxiety inventory, and the negative cognitive processing bias questionnaire, an internet-based survey was conducted on 60199 residents in China. An ordered multiple logistic regression analysis model was used to analyze the collected data.

Results: The survey showed that the incidences of mild, moderate, and severe depressive symptoms were 62.65%, 11.33%, and 6.14%, respectively, and that of mild, moderate and severe anxiety symptoms were 33.21%, 41.27%, and 22.99%, respectively. The results of ordered multiple logistic regression analysis showed that factors, such as female gender, age more than 55 years elderly, high school education level, medical staff, marital conflicts, negative attention bias, rumination, and death rate positively affected the level of depressive and anxiety symptoms. The good family functionality, democratic working atmosphere, and a myriad of social activities negatively affected the level of depressive and anxiety symptoms.

Conclusion: The Chinese residents exhibited a high prevalence of anxiety and depressive symptoms during the epidemic. Thus, psychological interventions should focus on the vulnerable groups, and cognitive training should focus on reducing the negative cognitive processing bias that might be an effective way to alleviate the mental stress of the general public during the COVID-19 pandemic.

Background

In late December 2019, the 2019 coronavirus disease (COVID-19) appeared in Wuhan City, Hubei Province, China, and spread rapidly nationwide and worldwide [1]. On January 30, 2020, the World Health Organization (WHO) declared the COVID-19 epidemic as a public health emergency of international concern [2]. The number of confirmed cases and deaths is changing hourly and daily and can be tracked on the website of National Health Commission of China [3]. According to these numbers, the daily confirmed growth rate of cases and death rate reflect changes in the trend of the epidemic [4]. As of late February 2020, China had a total of nearly 80,000 confirmed cases and nearly 3,000 deaths, thereby causing a large burden of morbidity and mortality.

As a result of the rapidly increasing numbers of confirmed cases and deaths, Chinese residents have been experiencing psychological problems, including anxiety and depression [5]. The severity of COVID-19 infection, the uncertainty of when to control the disease, and information overload, can raise the concern among the masses [6]. In addition, with the implementation of the isolation policy, people are quarantined at home, reducing face-to-face social activities, which increases psychological stress [7] and develop feelings of anger and loneliness [5]. These challenges and stress may cause a common mental disorder [8]. In addition, cognitive factors may affect public mental health and influence anxiety and depression when facing the COVID-19 epidemic. The diathesis-stress theory states that the interaction between external life events and individual's internal quality leads to psychological problems [9]. The cognitive model of depression posits that depression symptoms are maintained by negatively biased cognition, including negative attention bias, negative memory bias, and rumination [10-12]. The negative cognitive processing influences what people attend to, how they interpret new information, and what they remember at a later point in time, which exacerbate and sustain the negative mood that typifies depressive episodes [13, 14]. Research conducted over the last 50 years supports this proposition [15, 16]. And the negative cognitive processing bias could also negatively predict an individual's mental health [17]. Therefore, this study assumes that the public's mental health is not only related to external factors such as epidemic information, work environment, family conditions, and social activities, but also related to internal factors such as cognitive processing.

Presently, the studies on the depression and anxiety during COVID-19 are primarily focused on the medical staff, and only a few studies, lacking large samples, are on the mental health of ordinary residents. Some studies have pointed out that the psychological impact caused by these public health emergencies, such as the severe acute respiratory syndrome(SARS) epidemic in China in 2003 [18] and the Middle East respiratory syndrome (MERS) epidemic in 2012 [19, 20], may last for a long time. These events have brought severe psychological trauma to the people. Therefore, research on mental health and early intervention in a psychological crisis for the public is necessary [21].
This cross-sectional study explores the influence of various factors on the mental health of residents under stress during public health emergencies and provides accurate decision-making reference to the government departments with respect to the mental health of normal people.

**Methods**

**Participants**

From February 23 to 29, 2020, the current study used a snowball sampling approach to distribute questionnaires online in the mainland of China. The questionnaires were distributed to WeChat circles of friends, Tencent QQ and other public platforms. When participants completed the questionnaire, they forwarded it to their own WeChat circle of friends or other public platforms to expand the sample size. Each IP address could only be filled in once. The inclusion criteria were as follows: (1) 18–65-years-old, (2) native Chinese residents and could complete the questionnaires on the cellphone or computer, (3) informed consent. The exclusion criteria were: (1) unable to read correctly or use computer or cellphone to complete the questionnaires, (2) refused to participate in this research.

In order to control bias, the questionnaires were initially distributed in the same number in each provincial capital city. The daily sample size is based on the experience of a national survey and the sample size is set to be more than 1500 [22]. A total of 66152 questionnaires were returned. On February 26 and 27, only 5 individuals filled out the questionnaire. Therefore, the data of these two days were excluded. And 5948 questionnaires such as missing data, incomplete information or extreme data were excluded. After deleting these substandard responses, a total of 60199 valid questionnaires were analyzed in this study, with an effective rate of 91%.

The current study was approved by the Ethics Committee of the First Affiliated Hospital of Chongqing Medical University, China. All participants confirmed the informed consent before answering the questionnaires.

**Measures**

**Self-compiled descriptive characteristics questionnaire:** Demographic data, work environment, family conditions, and social activities were extracted by 13 items, including gender, age, education level, occupation, marital status, family structure in childhood, whether the only child in the family, parenting style in childhood, whether living with parents before 10-years-old, number of close friends, the collective atmosphere in work/school, the management style of work/school, and social activities of last 2 weeks. According to Baumrind’s research [23], parenting style in childhood was divided into authoritarian, neglectful, permissive and democratic styles. The management style of work/school was divided into three most common types of leadership styles as defined by Kurt Lewin—autocratic, laissez-faire and democratic [24].

**Depressive symptoms:** The self-rating depression scale (SDS) [25] contains 20 items, and the design was based on the diagnostic criteria for depression. The subjects rated each item using a 4-point Likert scale with respect to how they have felt during the past several days. The raw sum score of SDS is 20–80; however, the results are usually presented as the SDS index, which is obtained by expressing the raw score converted to 100-points scale. The cut-off value of SDS standard score is 53, 53–62 with mild depressive symptoms, 63–72 with moderate depressive symptoms, and >73 with severe depressive symptoms according to the Chinese norm [26]. The Chinese version had a good internal consistency reliability of the total scale (α = 0.86) [27]. The Cronbach's α of current study is 0.63.

**Anxiety symptoms:** The state anxiety inventory (SAI) is a scale from the state-trait anxiety inventory [28], containing 20 items to evaluate state anxiety under stress, using a 4-point Likert scale. The total score ranged from 20–80; according to the score boundaries, the total score was 20–39 without anxiety symptoms, 40–47 with mild anxiety symptoms, 48–54 with moderate anxiety symptoms, and 55–80 with severe anxiety symptoms. The Chinese version had a good internal consistency reliability of the total scale (α = 0.91) [29]. The Cronbach's α of current study was 0.68.

**Negative cognitive processing bias questionnaire (NCPBQ):** It [16] is a 16-item self-report measure in Chinese, assessing the negative attention bias, negative memory bias, and rumination, using a 4-point Likert scale (1 = not match; 4 = perfect match). An example of an item is "I always remember my mistakes clearly." Higher total scores indicate negative cognitive processing bias. It had a good
internal consistency reliability of the total scale ($\alpha = 0.89$) in a normal population of college students. The Cronbach's $\alpha$ of current study was 0.84, and that of negative attention bias, negative memory bias, and rumination was 0.78, 0.68, and 0.72, respectively.

Confirmed growth rate and death rate

Confirmed growth rate is the ratio of the difference between the cumulative number of confirmed cases announced on the day and on the previous day to the cumulative number of confirmed cases announced on the previous day. The death rate is the ratio of the difference between the cumulative number of deaths announced on the day and on the previous day to the cumulative number of deaths announced on the previous day. The number of confirmed cases and deaths was provided by the website of National Health Commission of China [3].

Depressed group and anxiety group

The participants were divided into non-depressed, mild depressive symptom, moderate depressive symptom, and severe depressive symptom groups according to the SDS scoring criteria. Also, they were divided into non-anxiety, mild anxiety symptom, moderate anxiety symptom, and severe anxiety symptom groups according to the SAI scoring criteria.

Data analysis

The data were analyzed using software SPSS 23.0 and SAS 9.4. Measurement data were expressed as mean ± standard deviation (± sd). The age data were divided down by the maximum age, with every ten years as an age group. Enumeration data were expressed by the number of people (%). The correlation between the severities of depressive and anxiety symptoms was evaluated by Pearson's correlation coefficient, and $P < 0.05$ on double sides was statistically significant. The analysis of the correlations between characteristics (gender, age, education level, occupation, family structure in childhood, the only child in the family, parenting style in childhood, living with parents before 10-years-old, number of close friends, the collective atmosphere in work/school, the management style of work/school, marital status, and social activities of last 2 weeks) and anxiety or depressive symptoms initially were assessed by the chi-square test. The correlations between negative cognitive processing bias (negative attention bias, negative memory bias, and rumination), confirmed growth rate, death rate, and anxiety or depressive symptoms initially were assessed by one-way analysis of variance (ANOVA). The variables with $P < 0.05$ were entered in the ordered multiple logistic regression analysis models by stepwise method.

Results

General characteristics of the participants

The cohort comprised 34418 (57.2%) females and 25781 (42.8%) males among the 60199 questionnaires, aged 18–65 (average: 34.66 ± 12.02)-years-old. The demographic characteristics of participants are shown in Table 1.

Confirmed growth rate and death rate

According to the cumulative numbers of confirmed cases and deaths of COVID-19 in China provided by the National Health Commission of the People's Republic of China, we found that the confirmed growth rate fluctuated between 0.28% and 0.85%, and the death rate fluctuated between 1.60% and 6.14% from February 23–29 (Figure 1).

Prevalence of anxiety and depressive symptoms

The SDS standard score of all the participants was 58.31 ± 8.46 points; among them, 19.89% were non-depressed, 62.65% were mildly depressed, 11.33% were moderately depressed, and 6.14% were severely depressed. The SAI score of all the participants was 51.52 ± 7.52 points; among them, 2.53% were non-anxious, 33.21% were mildly anxious, 41.27% were moderately anxious, and 22.99% were severely anxious (Figure 2). The correlation analysis showed a significant positive correlation between the severities of depressive and anxiety symptoms ($r = 0.33, P < 0.001$).

Analysis of related factors of anxiety and depressive symptoms
Single-factor chi-square test results showed significant differences in the ratio of different degrees of depressive symptom and the ratio of different degrees of anxiety symptom with respect to gender, age, education level, occupation, family structure in childhood, whether the only child in the family, parenting style in childhood, whether living with parents before 10-years-old, number of close friends, collective atmosphere in work/school, management style of work/school, marital status, and social activities of last 2 weeks (P < 0.001). The one-way analysis of variance results showed significant differences in the scores of negative attention bias, negative memory bias, and rumination, confirmed growth rate, and death rate associated with different degrees of depressive and anxiety symptoms (P < 0.001).

In the ordered multiple logistic regression model of depressive symptoms, all the factors were correlated with the severity of depressive symptoms except the factors of the only child in the family, education level at master's degree or above, white collar, neglectful or permissive parenting style in childhood. Negative attention bias, rumination, confirmed growth rate, and death rate had positive effects on the severity of depressive symptoms, while negative memory bias had a negative effect on the severity of depressive symptoms (Table 2). In the ordered multiple logistic regression model of anxiety symptoms, all the factors were correlated with the severity of anxiety except the confirmed growth rate, teacher, other jobs, 1-2 close friends, laissez-faire management style of work/school. Negative attention bias, negative memory bias, rumination, and death rate had positive effects on the severity of anxiety symptoms (Table 3).

**Discussion**

Our web-based cross-sectional study identified a significantly high prevalence of anxiety and depressive symptoms in Chinese residents during the COVID-19 outbreak. China Mental Health Survey (CMHS) conducted a cross-sectional epidemiological survey in 2019, which revealed that 3.6% of Chinese adults had symptoms of depressive disorder and 5.0% had anxiety [30]. The current study suggested the depression and anxiety symptoms of the public rapidly increased when a major infectious disease occurred. Chinese residents showed a higher level of anxiety than depression, and they were positively correlated. These findings were similar to those in the previous study, wherein individuals with anxiety were prone to depression, and depressed people tend to be anxious [31]. Owing to the isolation policy, the social activities of the residents were reduced markedly. The lack of social activities related to a higher level of anxiety and depressive symptoms in people than those with abundant social activities. Social activity is an essential way of sharing interest and socializing with familiar people. Participation at high levels in social activities has been proven to be associated with decreased depressive symptoms [32].

The death rate and the confirmed growth rate of COVID-19 reflect the severity of the epidemic. During our survey, the volatility trends of death rate and confirmed growth rate were not identical. Strikingly, the confirmed growth rate had a greater effect on depression severity, and only the death rate could positively affect the anxiety level. During the pandemic of COVID-19, people could seek out related information from official channels to stay informed about the situation. Due to the strong transmission of COVID-19 and the continuous adjustment of diagnosis and treatment programs, the fluctuation of epidemic data may cause fluctuations in the psychological pressure on the public.

Male respondents showed a significantly lower level of depressive and anxiety symptoms than their female counterparts. This phenomenon was in accordance with the results from previous research, which concluded that women are much more vulnerable to stress and more likely to develop higher psychological distress during the COVID-19 outbreak than men [33]. The social role of females as the lead caregiver in the family in addition to their professional roles, and they are more sensitive than males might be an interpretation for this phenomenon, which needs further research. Additionally, individuals between 56- and 65-years-old presented more severe depressive and anxiety symptoms than other age groups. Studies and reports showed a relatively low incidence risk of COVID-19 for young people but a very high mortality risk for seniors [34,35]. This may cause the elderly to be more worried about the epidemic.

The results also showed that education level and occupation were related to depression. People with a high school diploma had the highest risk of severe depressive and anxiety symptoms than others. The level of education may be related to the acquisition and identification of epidemic information, which needs further study. During the outbreak, the medical staff had a higher level of depression and anxiety than other jobs because they had to face heavier workload and the risk of direct infection of COVID-19. These pressures could be internalized, causing depression and anxiety [36]. Collective atmosphere and management style are critical factors that affect mood at work or school. The results showed that occasional quarrels were better than peace, tranquility, and
frequent quarrels for decreasing the anxiety level, and democratic management is the best for reducing anxiety and depression. A
democratic and relatively free working atmosphere can increase people's enthusiasm for work and help to cope with stress, while a
poor work atmosphere is related to depression and anxiety in the working population [37]. Also, the more friends, the lower the level of
anxiety. Friendship is a protective factor for mental health when facing stress [38].

Family is another aspect that affects anxiety and depressive symptoms during the COVID-19 outbreak. Living with two parents is not
as depressive as for other groups. Having sisters or brothers, and not being the only child in the family could contribute to less
anxiety. The democratic parenting style and living with parents before 10 years of age are also conducive to the response to the
epidemic. Good family functionality is negatively correlated to stress and depressive symptoms [39]. Marital status also reflects the
family situation. Compared to unmarried people, divorced people are more likely to be depressive, and people with marriage history
could also get anxiety. Intriguingly, job, and income are rapidly reduced while marital conflicts increased during the isolation period,
which may be associated with the risk of depression [40].

Negative cognitive processing bias plays a negative role in regulating people's mental health, especially negative attention bias and
rumination, during COVID-19. People with negative attention bias could easily succumb to negative stimuli, such as reports about
death and confirmed cases, rather than cured cases. Lacking attention flexibility that engages with positive information and
disengages from salient negative information might cause the failure of adaptive emotion regulation processes [41]. The rumination
refers to the repeated thinking and analysis of negative emotions and feelings, which affects the onset of depression [42]. Individuals
with ruminant traits are likely to be immersed in depression and anxiety and unable to extricate themselves because the
overwhelming news reports have already created a repressive emotional atmosphere. Negative memory bias means a tendency to
recall over-general memory and more negative memory than normal subjects, has been regarded as an important risk factor of the
emotional disorder [43]. People with this bias might recall negative information about a similar situation during the SARS epidemic.
The memory that is abstract lacks concrete detail, and tends to classify coronavirus as a disaster, leads to enhanced anxiety.
Individuals with negative cognitive processing bias tend to pay more attention to negative information, continue to ruminate on
negative emotions and make negative explanations for the results of events, thereby affecting their mental health [17].

Since January 2020, the National Health Commission of China has published several guidelines for emergency psychological crisis
intervention, established psychological assistance hotlines, and provided online mental health education for the COVID-19 epidemic
[44, 45]. All these measures contributed to easing the public psychological disturbance and psychological harm. The findings of the
current study suggested the following recommendations for future interventions: (1) focus on the vulnerable groups, such as the
elderly, women, medical staff, and high school educated people, and care about people's family situation and social activity; (2)
provide information on COVID-19 prevention, treatment, control for the public, avoid the release of false information, and the spread
of rumors; (3) use cognitive training to reduce mental distress, focus on individuals with high negative cognitive processing bias,
encourage and teach them to use emotion regulation strategies, and separate attention from negative emotions when they feel
anxious or depressive, in order to maintain and promote their mental health; (4) provide authoritative psychological evaluation
procedures and online psychotherapy to prevent further mental health problems.

Nevertheless, the present study has several limitations. First, this study used the method of cross-sectional design, rendering it
difficult to make causal inferences. Second, the study was limited to an online survey because of the COVID-19 outbreak, leading to
the possibility of selection bias while sampling. We might overestimate the ratios of anxiety and depressive symptoms because
people who voluntarily choose to participate in the survey might be more aware of their mental health issues than those who did not
participate. Third, due to the web-based study design, we could not control the origin of the participants' regions and guarantee the
representativeness of the sample, which might affect the research results.

**Conclusions**

In conclusion, we assessed the mental health status of Chinese residents during the COVID-19 outbreak and identified the related risk
factors of anxiety and depressive symptoms. The elderly, women, medical staff, and high school educated people were at an
especially high risk of displaying psychological issues. Negative cognitive processing bias plays a negative role in regulating mental
health. Psychological interventions should focus on the vulnerable groups, and cognitive training that focuses on reducing negative
cognitive processing bias might be an effective way to alleviate the mental stress of the general public during the COVID-19
pandemic.
Declarations

Ethics approval and consent to participate
The current study was approved by the Ethics Committee of the First Affiliated Hospital of Chongqing Medical University, China, and all participants provided written informed consent.

Consent for publication
Not applicable

Availability of data and materials
The datasets used and analysed during the current study are available from the corresponding author on reasonable request.

Competing interests
The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Authors’ contributions
Jiang Wen contributed to design, analysis, drafted manuscript, critically revised manuscript and gave final approval.

Liu Xuerong contributed to design, contributed to acquisition, gave final approval.

Zhang Jingxuan contributed to acquisition and gave final approval.

Feng Zhengzhi contributed to conception, critically revised manuscript and gave final approval.

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Abbreviations
self-rating depression scale (SDS)
state anxiety inventory (SAI)
severe acute respiratory syndrome (SARS)
Middle East respiratory syndrome (MERS)
Negative cognitive processing bias questionnaire (NCPBQ)

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Tables

Table 1. Descriptive characteristics of the participants (n=60199)
| Variables                        | Grouping        | N (%)          |
|---------------------------------|-----------------|----------------|
| Gender                          |                 |                |
|                                 | Female          | 34418 (57.17)  |
|                                 | Male            | 25781 (42.83)  |
| Age (years)                     |                 |                |
| 18–25                           |                 | 17858 (29.66)  |
| 26–35                           |                 | 18445 (30.64)  |
| 36–45                           |                 | 10345 (17.18)  |
| 46–55                           |                 | 9864 (16.39)   |
| 56–65                           |                 | 3687 (6.12)    |
| Education level                 |                 |                |
| Primary school                  |                 | 5585 (9.28)    |
| Middle school                   |                 | 1733 (2.88)    |
| High school                     |                 | 19028 (31.61)  |
| Bachelor’s degree               |                 | 31098 (51.66)  |
| Master’s degree or above        |                 | 2755 (4.58)    |
| Occupation                      |                 |                |
| Worker                          |                 | 10001 (16.61)  |
| Farmer                          |                 | 3615 (6.01)    |
| Soldier                         |                 | 5262 (8.74)    |
| Medical staff                   |                 | 9153 (15.20)   |
| Teacher                         |                 | 7396 (12.29)   |
| Cadre                           |                 | 3777 (6.27)    |
| White collar                    |                 | 12106 (20.11)  |
| Other                           |                 | 8889 (14.77)   |
| Family structure in childhood   |                 |                |
| Two parents                     |                 | 42116 (69.96)  |
| One parent                      |                 | 10742 (17.84)  |
| Other                           |                 | 7341 (12.19)   |
| Only child in the family        |                 |                |
| No                              |                 | 12051 (20.02)  |
| Yes                             |                 | 48148 (79.98)  |
| Parenting style in childhood    |                 |                |
| Authoritarian                   |                 | 28396 (47.17)  |
| Neglectful                      |                 | 2546 (4.23)    |
| Parameter                                      | Count      | Percentage |
|------------------------------------------------|------------|------------|
| Permissive                                    | 17706      | (29.41%)   |
| Democratic                                    | 11551      | (19.19%)   |
| Living with parents before 10-years-old       |            |            |
| Yes                                           | 34581      | (57.44%)   |
| No                                            | 25618      | (42.56%)   |
| Number of close friends                       |            |            |
| None                                          | 6199       | (10.30%)   |
| 1-2                                           | 21791      | (36.20%)   |
| >3                                            | 32209      | (53.50%)   |
| Collective atmosphere in work/school           |            |            |
| Peace and tranquility                         | 19135      | (31.79%)   |
| Occasional quarrels                           | 33570      | (55.77%)   |
| Frequent quarrels                             | 7494       | (12.45%)   |
| Management style of work/school               |            |            |
| Autocratic                                    | 45270      | (75.20%)   |
| Laissez-faire                                 | 2349       | (3.90%)    |
| Democratic                                    | 12580      | (20.90%)   |
| Marital status                                |            |            |
| Unmarried                                     | 12530      | (20.81%)   |
| Married                                       | 29299      | (48.67%)   |
| Divorced                                      | 10652      | (17.69%)   |
| Remarried                                     | 6265       | (10.41%)   |
| Widowed                                       | 1453       | (2.41%)    |
| Social activities of last 2 weeks             |            |            |
| 0-2                                           | 22790      | (36.48%)   |
| 3-5                                           | 17003      | (28.24%)   |
| 6-8                                           | 8366       | (13.90%)   |
| >9                                            | 12040      | (20.00%)   |
| Investigation date                            |            |            |
| February 23                                   | 9642       | (16.02%)   |
| February 24                                   | 6598       | (10.96%)   |
| February 25                                   | 6783       | (11.27%)   |
| February 28                                   | 27148      | (45.10%)   |
| February 29                                   | 10028      | (16.66%)   |
Table 2. Ordered multiple logistic regression analysis of depression-related factors
|                                 | Non-depression group (n=11971) | Mild depressive symptom group (n=37713) | Moderate depressive symptom group (n=6819) | Severe depressive symptom group (n=3696) | $\chi^2$ | $P$  | $B$  | OR (95% CI) | $P$  |
|--------------------------------|--------------------------------|-----------------------------------------|-------------------------------------------|------------------------------------------|---------|------|------|-------------|------|
| $N(\%)$/M±SD                  |                                |                                         |                                           |                                          |         |      |      |             |      |
|                               | 6481 (18.8%)                  | 21714 (63.1%)                          | 3999 (11.6%)                              | 2224 (6.5%)                              | 67.133  | <0.001 | Referent | 1.0          | >0.05 |
|                               | 5490 (21.3%)                  | 15999 (62.1%)                          | 2820 (10.9%)                              | 1472 (5.7%)                              | -0.307  | 0.736 (0.705–0.767) | <0.001 |
|                               | 6163 (34.5%)                  | 10064 (56.4%)                          | 1059 (5.9%)                               | 572 (3.2%)                               | 23912.598 | <0.001 | Referent | 1.0          | >0.05 |
|                               | 3456 (18.7%)                  | 13318 (72.2%)                          | 1088 (5.9%)                               | 583 (3.2%)                               | 0.601   | 1.824 (1.735–1.917) | <0.001 |
|                               | 1112 (10.7%)                  | 8227 (79.5%)                           | 660 (6.4%)                                | 346 (3.3%)                               | 0.813   | 2.255 (2.128–2.389) | <0.001 |
|                               | 953 (9.7%)                    | 5173 (52.4%)                           | 342 (6(34.7%))                            | 312 (3.2%)                               | 1.825   | 6.204 (5.833–6.597) | <0.001 |
|                               | 287 (7.8%)                    | 931 (25.3%)                            | 586 (15.9%)                               | 1883 (51.1%)                             | 3.961   | 52.520 (48.416–56.971) | <0.001 |
| level                         | 1356 (24.3%)                  | 3312 (59.3%)                           | 680 (12.2%)                               | 237 (4.2%)                               | 240.618 | <0.001 | Referent | 1.0          | >0.05 |
|                               | 253 (14.6%)                   | 1188 (68.6%)                           | 208 (12.0%)                               | 84 (4.8%)                                | 0.579   | 1.783 (1.558–2.041) | <0.001 |
|                               | 3427 (18.0%)                  | 12083 (63.5%)                          | 2197 (11.5%)                              | 1321 (6.9%)                              | 0.851   | 2.343 (2.196–2.500) | <0.001 |
|                               | 6273 (20.2%)                  | 19529 (62.8%)                          | 3392 (10.9%)                              | 1904 (6.1%)                              | 0.607   | 1.834 (1.728–1.947) | <0.001 |
|                               | 662 (24.0%)                   | 1601 (58.1%)                           | 342 (12.4%)                               | 150 (5.4%)                               | -       | -     | >0.05 |             |      |
|          | 1716 (17.2%) | 6618 (66.2%) | 1065 (10.6%) | 602 (6.0%) | 1260.539 | <0.001 | Referent | 1.0 | 0.118 | 1.125 (1.030–1.229) | 0.009 |
|----------|--------------|--------------|--------------|------------|----------|---------|----------|-----|-------|---------------------|-------|
|          | 644 (17.8%)  | 2056 (56.9%) | 618 (17.1%)  | 297 (8.2%) | 2093     | 0.294   | 1.341   | 1.236–1.456 | <0.001 |
|          | 891 (16.9%)  | 3276 (62.3%) | 780 (14.8%)  | 315 (6.0%) | 1336     | 0.554   | 1.741   | 1.622–1.868 | <0.001 |
| off      | 2093 (22.9%) | 5359 (58.5%) | 973 (10.6%)  | 728 (8.0%) | 1119     | -0.391  | 0.676   | 0.616–0.742 | <0.001 |
|          | 2912 (24.1%) | 7156 (59.1%) | 1200 (9.9%)  | 838 (6.9%) | 1260     | 0.238   | 1.269   | 1.193–1.350 | <0.001 |
|          | 1950 (16.2%) | 7990 (66.3%) | 1467 (12.2%) | 644 (5.3%) | 1889     | 0.323   | 1.382   | 1.301–1.468 | <0.001 |
|          | 10021 (20.8%)| 29723 (61.7%) | 5352 (11.1%) | 3052 (6.3%) | 1185     | 0.448   | 1.566   | 1.463–1.676 | <0.001 |
| in the family |          |              |              |              |          |         |         |         |       |
|          | 1950 (16.2%) | 7990 (66.3%) | 1467 (12.2%) | 644 (5.3%) | 161.151  | <0.001  | Referent | 1.0 | -     |
|          | 10021 (20.8%)| 29723 (61.7%) | 5352 (11.1%) | 3052 (6.3%) |          | -       | -       |       | >0.05 |
|          |              |              |              |              |          |         |         |         |       |
| style in childhood |      |              |              |              |          |         |         |         |       |
|          | 5723 (20.2%) | 17917 (63.1%) | 2857 (10.1%) | 1899 (6.7%) | 577      | -       | -       |       | >0.05 |
|          | 3492 (19.7%) | 10949 (61.8%) | 2211 (12.5%) | 1054 (6.0%) |          | -       | -       |       | >0.05 |
|          | 2179 (22.9%) | 7297 (58.5%) | 1431 (10.6%) | 644 (5.6%) |          | -0.192  | 0.825   | 0.775–0.880 | <0.001 |

**History of psychiatric illness in childhood**

**International classification of diseases**

**Family psychiatric illness**

**Schools and associated factors (17.2%)**

**Teachers and associated factors (17.8%)**

**Other associated factors (17.1%)**

**Style in childhood**

**Communication in childhood**

**Adult psychiatric illness**

**Family psychiatric illness**

**Schools and associated factors (17.2%)**

**Teachers and associated factors (17.8%)**

**Other associated factors (17.1%)**

**Style in childhood**

**Communication in childhood**

**Adult psychiatric illness**

**Family psychiatric illness**

**Schools and associated factors (17.2%)**

**Teachers and associated factors (17.8%)**

**Other associated factors (17.1%)**

**Style in childhood**

**Communication in childhood**
|                          | (18.9%) | (63.2%) | (12.4%) |          |          |          |
|--------------------------|---------|---------|---------|----------|----------|----------|
| parents before 10 years old |         |         |         |          |          | 0.878    |
|                          | 7036    | 21089   | 4101    | 2355     | 124.316  | <0.001   |
|                          | (20.3%) | (61.0%) | (11.9%) | (6.8%)   | Referent | 1.0      |
|                          |         |         |         |          | 0.292    | 1.340 (1.279-1.403) | <0.001 |
| close friends            |         |         |         |          |          |          |
|                          | 1402    | 3437    | 897     | 463 (7.5%) | 197.072  | <0.001   |
|                          | (22.6%) | (55.4%) | (14.5%) |          | Referent | 1.0      |
|                          | 4413    | 13675   | 2288    | 1415     |          | 0.533    |
|                          | (20.3%) | (62.8%) | (10.5%) | (6.5%)   |          | 1.705 (1.561-1.863) | <0.001 |
|                          | 6156    | 20601   | 3634    | 1818(5.6%) |          | 0.250    |
|                          | (19.1%) | (64.0%) | (11.3%) |          |          | 1.284 (1.182-1.394) | <0.001 |
| atmosphere in work/school |         |         |         |          |          |          |
| nd                       | 3254    | 12078   | 2576    | 1227     | 301.141  | <0.001   |
|                          | (17.0%) | (63.1%) | (13.5%) | (6.4%)   | Referent | 1.0      |
|                          | 7119    | 21177   | 3384    | 1890     |          | -0.132   |
|                          | (21.2%) | (63.1%) | (10.1%) | (5.6%)   |          | 0.876 (0.839-0.915) | <0.001 |
|                          | 1598    | 4458    | 859     | 579 (7.7%) |          | -0.410   |
|                          | (21.3%) | (59.5%) | (11.5%) |          |          | 0.664 (0.617-0.714) | <0.001 |
| nt style of work/school  |         |         |         |          |          |          |
|                          | 8670    | 28464   | 5397    | 2739     | 139.059  | <0.001   |
|                          | (19.2%) | (62.9%) | (11.9%) | (6.1%)   | Referent | 1.0      |
|                          | 553     | 1506    | 153 (6.5%) | 137 (5.8%) |          | 0.490    |
|                          | (23.5%) | (64.1%) |          |          |          | 1.632 (1.481-1.797) | <0.001 |
|                          | 2748    | 7743    | 1269    | 820 (6.5%) |          | -0.086   |
|                          | (21.8%) | (61.6%) | (10.1%) |          |          | 0.917 (0.863-0.975) | 0.005  |
| tus                      |         |         |         |          |          |          |
|                          | 2680    | 7710    | 1368    | 772 (6.2%) | 425.677  | <0.001   |
|                          | (21.4%) | (61.5%) | (10.9%) |          | Referent | 1.0      |
|                          | 6156    | 18280   | 3137    | 1726     |          | -0.212   |
|                          | (21.0%) | (62.4%) | (10.7%) | (5.9%)   |          | 0.809 (0.765-0.856) | <0.001 |
|                          | 1540    | 6806    | 1639    | 667 (6.3%) |          | 0.273    |
|                          | (14.5%) | (63.9%) | (15.4%) |          |          | 1.313 (1.225-1.408) | <0.001 |
|                          | 1312    | 3963    | 560 (8.9%) | 430 (6.9%) |          | -0.160   |
|                          | (20.9%) | (63.3%) |          |          |          | 0.852 (0.788-0.921) | <0.001 |
|                          | 283     | 954     | 115 (7.9%) | 101 (7.0%) |          | -0.347   |
|                          | (18.9%) | (63.2%) | (12.4%) |          |          | 0.707 (0.601-| <0.001 |
| Activities of last 2 weeks | | | | | Referent | 1.0 | - |
|---------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| 4672 (20.5%) | 14057 (61.7%) | 2553 (11.2%) | 1508 (6.6%) | 493.130 | <0.001 | Referent | 1.0 | - |
| 3132 (18.4%) | 10500 (61.8%) | 2156 (12.7%) | 1215 (7.1%) | 0.388 | 1.474 (1.403–1.548) | <0.001 |
| 1243 (14.9%) | 5714 (68.3%) | 1034 (12.4%) | 375 (4.5%) | 0.137 | 1.146 (1.077–1.221) | <0.001 |
| 2924 (24.3%) | 7442 (61.8%) | 1076 (8.9%) | 598 (5.0%) | -0.209 | 0.812 (0.767–0.859) | <0.001 |
| 12.24±3.36 | 12.3±3.28 | 13.70±3.65 | 13.17±3.81 | 388.962 | <0.001 | 0.047 | 1.048 (1.042–1.054) | <0.001 |
| 12.04±3.13 | 12.04±3.24 | 12.27±3.20 | 12.90±3.35 | 88.817 | <0.001 | -0.012 | 0.988 (0.982–0.994) | <0.001 |
| 6.55±2.37 | 6.62±2.42 | 7.57±2.58 | 7.14±2.62 | 350.426 | <0.001 | 0.022 | 1.022 (1.014–1.030) | <0.001 |
| 0.45±0.18 | 0.53±0.15 | 0.56±0.20 | 0.59±0.26 | 1130.900 | <0.001 | 1.938 | 6.946 (6.243–7.728) | <0.001 |
| 3.41±2.01 | 2.06±0.88 | 3.63±1.59 | 4.40±1.48 | 7363.433 | <0.001 | 0.025 | 1.0245 (1.014–1.037) | <0.001 |

Table 3. Ordered multiple logistic regression analysis of anxiety-related factors.
| Non-anxiety group (n=1522) | Mild anxiety symptom group (n=19994) | Moderate anxiety symptom group (n=24843) | Severe anxiety symptom group (n=13840) | \( \chi^2 \) | \( P \) | \( B \) | OR (95% CI) | \( P \) |
|-------------------------|--------------------------------------|----------------------------------------|----------------------------------------|------|-----|------|-------------|-----|
| N(\%)/ M±SD             | N(%)/ M±SD                            | N(%)/ M±SD                             | N(%)/ M±SD                             |      |     |      |             |     |
| 983 (2.9%)              | 10448 (30.4%)                         | 14390 (41.8%)                          | 8597 (25.0%)                           | 375.489 | <0.001 | Referent | 1.0         | -   |
| 539 (2.1%)              | 9546 (37.0%)                          | 10453 (40.5%)                          | 5243 (20.3%)                           | -0.541 | 0.582 (0.558–0.608) | <0.001 |
| 47 (0.3%)               | 9407 (52.7%)                          | 4006 (22.4%)                           | 4398 (24.6%)                           | 25371.421 | <0.001 | Referent | 1.0         | -   |
| 1382 (7.5%)             | 8712 (47.2%)                          | 4595 (24.9%)                           | 3756 (20.4%)                           | -0.194 | 0.824 (0.786–0.863) | <0.001 |
| 9 (0.1%)                | 1013 (9.8%)                           | 7879 (76.2%)                           | 1444 (14.0%)                           | 1.151 | 3.162 (2.996–3.338) | <0.001 |
| 17 (0.2%)               | 659 (6.7%)                            | 7756 (78.6%)                           | 1432 (14.5%)                           | 1.177 | 3.244 (3.072–3.425) | <0.001 |
| 67 (1.8%)               | 203 (5.5%)                            | 607 (16.5%)                            | 2810 (76.2%)                           | 3.16 | 23.664 (21.600–25.925) | <0.001 |
| level                   |                                      |                                        |                                        |      |     |      |             |     |
| 397 (7.1%)              | 2133 (38.2%)                          | 2142 (38.4%)                           | 913 (16.3%)                            | 1857.616 | <0.001 | Referent | 1.0         | -   |
| 19 (1.1%)               | 550 (31.7%)                           | 984 (56.8%)                            | 180 (10.4%)                            | 1.497 | 4.470 (3.898–5.127) | <0.001 |
| 453 (2.4%)              | 4714 (24.8%)                          | 8969 (47.1%)                           | 4892 (25.7%)                           | 1.979 | 7.237 (6.722–7.791) | <0.001 |
| 625 (2.0%)              | 11609 (37.3%)                         | 11555 (37.2%)                          | 7309 (23.5%)                           | 1.534 | 4.635 (4.313–4.981) | <0.001 |
| 28 (1.0%)               | 988 (35.9%)                           | 1193 (43.3%)                           | 546 (19.8%)                            | 0.633 | 1.883 (1.688–2.100) | <0.001 |
|                  | Referent | 1.0  |    |
|------------------|----------|------|----|
| **Type in childhood** |          |      |    |
| **ts** | 968 (2.3%) | 14648 | 17504 | 8996 | 525.993 | <0.001 | Referent | 1.0 | - |
|                  | 447 (4.2%) | 2896 | 4306 | 3093 | -0.146 | 0.864 (0.814–0.917) | <0.001 |
|                  | 107 (1.5%) | 2450 | 3033 | 1751 | 0.560 | 1.750 (1.639–1.869) | <0.001 |
| **in the family** |          |      |    |
|                  | 285 (2.4%) | 4200 | 5304 | 2262 | 158.001 | <0.001 | Referent | 1.0 | - |
|                  | 1237 (2.6%) | 15794 | 19539 | 11578 | 0.075 | 1.078 (1.018–1.141) | 0.010 |
| **Style in childhood** |          |      |    |
|                  | 895 (3.2%) | 10439 | 10027 | 7035 | 1902.066 | <0.001 | Referent | 1.0 | - |
|                  | 234 (9.2%) | 1092 | 826 | 394 | -0.293 | 0.746 (0.679–0.820) | <0.001 |
|                  | 237 (1.3%) | 5182 | 7983 | 4304 | 0.361 | 1.434 (1.348–1.526) | <0.001 |
|                  | 156 (1.4%) | 3281 | 6007 | 2107 | -0.244 | 0.784 (0.738–0.832) | <0.001 |
| parents before the age of 10 years | | | | | Referent | | |
|---|---|---|---|---|---|---|
| 748 (2.2%) | 10945 (31.7%) | 13526 (39.1%) | 9362 (27.1%) | 783.037 | <0.001 | Referent 1.0 |
| 774 (3.0%) | 9049 (35.3%) | 11317 (44.2%) | 4478 (17.5%) | 0.077 | 1.080 (1.027– 1.135) | 0.003 |
| close friends | | | | | |
| 88 (1.4%) | 1810 (29.2%) | 2474 (39.9%) | 1827 (29.5%) | 400.275 | <0.001 | Referent 1.0 |
| 375 (1.7%) | 7434 (34.1%) | 8719 (40.0%) | 5263 (24.2%) | - | - | >0.05 |
| 1059 (3.3%) | 10750 (33.4%) | 13650 (42.4%) | 6750 (21.0%) | -0.480 | 0.619 (0.593– 0.646) | <0.001 |
| atmosphere in work/school | | | | | |
| 428 (2.2%) | 4964 (25.9%) | 9005 (47.1%) | 4738 (24.8%) | 1999.006 | <0.001 | Referent 1.0 |
| 660 (2.0%) | 13455 (40.1%) | 12514 (37.3%) | 6941 (20.7%) | -0.222 | 0.801 (0.766– 0.837) | <0.001 |
| 434 (5.8%) | 1575 (21.0%) | 3324 (44.4%) | 2161 (28.8%) | 0.162 | 1.175 (1.090– 1.268) | <0.001 |
| nt style of work/school | | | | | |
| 1180 (2.6%) | 14087 (31.1%) | 19777 (43.7%) | 10226 (22.6%) | 1151.705 | <0.001 | Referent 1.0 |
| 7 (0.3%) | 1450 (61.7%) | 469 (20.0%) | 423 (18.0%) | - | - | >0.05 |
| 335 (2.7%) | 4457 (35.4%) | 4597 (36.5%) | 3191 (25.4%) | -0.073 | 0.930 (0.880– 0.983) | 0.010 |
| tus | | | | | |
| 232 (1.9%) | 4422 (35.3%) | 5210 (41.6%) | 2666 (21.3%) | 1167.223 | <0.001 | Referent 1.0 |
| 766 (2.6%) | 10175 (34.7%) | 11779 (40.2%) | 6579 (22.5%) | 0.251 | 1.285 (1.221– 1.353) | <0.001 |
| 295 (2.8%) | 2294 (21.5%) | 5210 (48.9%) | 2853 (26.8%) | 0.977 | 2.656 (2.491– 2.833) | <0.001 |
| 222 (3.5%) | 2669 (42.6%) | 1922 (30.7%) | 1452 (23.2%) | 0.402 | 1.495 (1.384– 1.615) | <0.001 |
| 7 (0.5%) | 434 (29.9%) | 722 (49.7%) | 290 (20.0%) | 0.772 | 2.164 (1.870– 2.503) | <0.001 |
| Activities of last 2 weeks | Referent |  | - |
|---------------------------|----------|---|---|
| 803 (3.5%) 6783 (29.8%) 9699 (42.6%) 5505 (24.2%) 2363.756 <0.001 | Referent 1.0 | - |
| 239 (1.4%) 4483 (26.4%) 7459 (43.9%) 4822 (28.4%) | 0.835 2.304 (2.183–2.433) <0.001 |
| 66 (0.8%) 2934 (35.1%) 3919 (46.8%) 1447 (17.3%) | 0.332 1.394 (1.305–1.488) <0.001 |
| 414 (3.4%) 5794 (48.1%) 3766 (31.3%) 2066 (17.2%) | -0.887 0.412 (0.388–0.438) <0.001 |
| 10.22±3.44 11.61±2.21 12.56±3.45 14.01±4.10 1725.451 <0.001 | 0.104 1.110 (1.104–1.116) <0.001 |
| 11.36±3.45 11.20±2.13 12.36±3.68 13.10±3.27 1100.525 <0.001 | 0.067 1.069 (1.063–1.075) <0.001 |
| 5.62±2.11 5.90±1.91 6.99±2.47 7.65±2.74 1732.229 <0.001 | 0.126 1.134 (1.126–1.143) <0.001 |
| 0.42±0.00 0.42±0.08 0.66±0.16 0.43±0.15 14648.272 <0.001 | - - >0.05 |
| 1.60±0.00 2.46±1.75 2.78±1.06 2.79±1.87 454.870 <0.001 | 0.133 1.142 (1.129–1.155) <0.001 |