



Suicidal Ideation and Related Factors of Junior Students During the COVID-19 Epidemic

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Abstract: *Background:* COVID-19 has changed the way junior three students learn, causing a significant effect on their mental health and leading to suicidal ideation among some students. Therefore, there is a need to focus on the current situation of suicidal ideation among junior three students and to identify the relevant influencing factors to promote the positive development of junior three students. *Methods:* From June 13th to June 24th, 2019, to use the Adolescent Suicide Ideation Scale to investigate 3601 junior three students from 17 middle schools in Hubei Province by Online questionnaire survey. *Results:* During the epidemic, the suicidal ideation has significant positive associations with gender ($r=0.09$, $P<0.001$), sedentary time ($r=0.24$, $P<0.001$), parent-child relationship ($r=0.31$, $P<0.001$), peer relationship ($r=0.32$, $P<0.001$), but has significant negative associations with exercise time ($r=-0.13$, $P<0.001$). Multiple linear regression analysis showed that gender, sedentary time, parent-child relationship, and peer relationship can positively predict the level of suicidal ideation of junior three students during the COVID-19 epidemic. *Conclusion:* The level of suicidal ideation of junior three students during the COVID-19 epidemic is related to gender, sedentary time, exercise time, parent-child relationship and peer relationship. The suicidal ideation of females is higher than males. The more sedentary time and the less exercise time, the higher suicidal ideation. The worse interpersonal relationship (parent-child relationship, peer relationship), the higher suicidal ideation.

Keywords: COVID-19, Junior Three Students, Suicidal Ideation

1. Introduction

Suicidal ideation refers to the idea that occurs in an individual to experience suicide in thought or cognition, which is a necessary precondition for committing suicide [1]. Studies have found that drug abuse, family environment and childhood experience are influential factors for adolescents to have suicidal ideation [2, 3]. Other researchers believe that suicidal ideation is closely related to some mental diseases, such as depression and stress [4]. Jiao Bin et al. also found that abrupt stressful life events had indirect negative effects on adolescents' suicidal ideation through negative cognitive emotion regulation and depression [5]. The outbreak of COVID-19 not only has influenced students' study and life seriously, but also brings new challenges to the education trade. Based on the policy and relevant requirements of "suspend classes without stop teaching and stop studying" offered by the Ministry of Education, primary and secondary schools have launched online teaching

plans, the impact of this teaching method changes on the mental health development of adolescents is noteworthy.

In front of public health emergencies, students have been isolated at home for a long time. Studies have found that long-term home life may cause students to have anxiety, depression, psychological stress and other negative emotions [6]. The increase of negative emotions will affect individuals' suicidal ideation. This epidemic has brought a huge impact on the junior three students especially. On the one hand, middle school students are still young, immature, and lack of enough social experience. This is the first time for most of them facing such a serious emergency, so they may choose a negative coping strategies. On the other hand, they are facing the pressure of entering high school. Many students can't adapt to the change of learning environment and learning styles. Studying at home caused students need to spend a lot of time with their parents which leads to new problems appear continuously. In addition, after returning to school, they will face the pressure of the high school entrance examination, time

pressure, learning differences among students and other factors form a cumulative risk factor, which will cause the imbalance of individual mental health situation, and may lead to the increase of suicidal ideation. Therefore, it is very necessary to understand the impact of COVID-19 on the mental health status of the junior three students in the middle school, especially the impact on their suicidal ideation. This study investigated the suicidal ideation and related factors of junior three students during the COVID-19 epidemic in Hubei Province, and tried to find out the protective factors of suicide ideation of junior three students, so as to provide reference for preventing suicide of junior three students, and provide a scientific theoretical basis for further targeted actions.

2. Participants and Methods

2.1. Participants

All the questionnaire contents of this study have been approved by the Ethics Committee of the Department of Psychology. From June 13rd to June 24th, 2019, 3601 junior three students from 17 middle schools in Hubei Province were investigated by Online questionnaire survey. Convenience sampling was carried out by the whole class in this study, and all participants completed questionnaires on mobile phones or computers. A total of 3952 questionnaires were collected, among which the respondents accounted for 97.5% of all the junior three students in the research city. After screening and sorting, 3601 valid questionnaires were confirmed, with a recovery rate of 91.1%.

2.2. Methods

Participants need to access the online questionnaire (<https://www.wjx.cn/jq/77642065.aspx>) by scanning WeChat QR code, who is required to fill the questionnaire according to their actual situation of the last month, which will take about 15 minutes to complete the entire self-assessment.

2.2.1. Questionnaire for General Situation

Questionnaire for General Situation including the participants' gender, school, class, place of origin and other basic information, as well as their exercise time, sedentary time, parent-child relationships and peer relationships etc. The item "The time you spend on daily exercise during the epidemic" is used to measure the students' exercise time. The larger the options, the longer the exercise time; The item "The time you spend on your cell phone, computer, and other electronic devices (excluding online classes and homework) every day during the epidemic" is used to measure the students' sedentary time, the larger the option, the longer the sedentary time; The item "Comparing your relationship with your parents during the epidemic to before" is used to measure the parent-child relationship, the larger the option, the worse the parent-child relationship; The item "Do your friends care about you during the epidemic?" is used to measure the peer relationship, The larger the option, the worse the peer relationship.

2.2.2. Adolescent Suicidal Ideation Scale [7]

Adolescent Suicidal Ideation Scale is a 14-item research instrument which rated on a 5-point scale from 1 (never) to 5 (always) designed to quantify and assess the suicidal intention of adolescents. The retest reliability is 0.91, which means the reliability and validity are good. The scale is consisted by two dimensions: positive suicidal ideation and negative suicidal ideation. The reverse score of the positive suicidal ideation dimension was added to the total score of the negative suicidal ideation dimension to get the total score of suicidal ideation. The higher the total score, the higher the suicidal ideation, whose average score above 3 points means he has a high suicidal ideation.

2.3. Statistical Methods

Using SPSS25.0 for statistical analysis. The measurement data was expressed by (mean \pm standard deviation). Independent sample t-test and variance analysis was used to compare the differences of suicidal ideation among different genders, place of origin, exercise time, meditation time, parent-child relationship, and peer relationship. Pearson phase analysis was used to analyze the correlation between multiple variables and suicide ideation. Multiple linear regression analysis was used to establish a multi-factor model of suicidal ideation. $P < 0.05$ means the difference is statistically significant.

3. Result

3.1. The Basic Information of Participated Students

There are 1,915 (53.2%) males and 1,686 (46.8%) females among the 3,601 students who participated in this survey, 1425 (39.6%) of them came from cities, 866 (24%) of them came from towns and 1310 (36.4%) of them came from rural area. See Table 1 for details.

Table 1. Basic demographic information for valid questionnaires.

Demographic variables		Population	Percentage
Gender	Male	1915	53.2
	Female	1686	46.8
	City	1425	39.6
Place of origin	Town	866	24.0
	Rural area	1310	36.4
Total		3601	100.0

3.2. The Scores of each Dimension of the Suicide Ideation Scale

The Suicide Ideation Scale is (5 \pm 2) points, the maximum is 14 points, and the minimum is 3 points. See Table 2 for the total scores and scores of each dimension of suicide ideation.

Table 2. The total scores and scores of each dimension of suicide ideation.

Dimension	M (min, max)
Positive suicidal ideation	15 (6, 30)
Negative suicidal ideation	11 (8, 40)
Total	5 (3, 14)

3.3. Comparison of Suicide Ideation Scores of Different Demographic Variables

In order to compare the differences in suicide ideation scores between different groups of demographic characteristics, by analysis of variance found that there are significant differences in suicide ideation scores between different genders, exercise time, meditation time, parent-child relationship, and peer relationship. Among them, males' suicidal ideation scores were significantly higher than females'. Suicidal ideation scores for those with less than 0.5 hours daily exercise time were significantly higher than those

above 2 hours daily exercise time, followed by those with 0.5-1 hours daily exercise, and those with 1-2 hours daily exercise time had the lowest suicide ideation score. Students who spend more than 3 hours on mobile phones, computers and other electronic products each day get significantly higher score on suicidal ideation than students who spend 1-2 hours each day, followed by students who spend 2-3 hours each day, and students whose sedentary time is less than 1 hour each day have the lowest suicide ideation score; The more stable and close the parent-child relationship and peer relationship, the lower the score of suicidal ideation. See Table 3 for details.

Table 3. Scores comparison of suicidal ideation among different demographic variables.

Items	Total average score for suicidal ideation	t/F Value	Pairwise comparison P<0.05
Gender			
(1) Male (n=1915)	4.97±1.74	-5.49***	(1)<(2)
(2) Female (n=1686)	5.29±1.82		
Place of origin			
(1) City (n=1425)	5.04±1.81	2.28	
(2) Town (n=866)	5.14±1.70		
(3) Rural area (n=1310)	5.19±1.81		
The time you spend on daily exercise during the epidemic.			
(1) Less than 0.5 hour (n=1538)	5.44±1.89	32.10***	(1)>(4)>(2)>(3)
(2) 0.5-1 hour (n=1485)	4.92±1.61		
(3) 1-2 hours (n=422)	4.67±1.69		
(4) Above 2 hours (n=156)	5.06±1.96		
The time you spend on your cell phone, computer, and other electronic devices (excluding online classes and homework) every day during the epidemic.			
(1) Less than 1 hour (n=924)	4.57±1.53	73.52***	(4)>(3)>(2)>(1)
(2) 1-2 hours (n=1320)	5.02±1.65		
(3) 2-3 hours (n=625)	5.33±1.73		
(4) Above 3 hours (n=732)	5.80±2.09		
Comparing your relationship with your parents during the epidemic to before.			
(1) Getting better (n=976)	4.52±1.58	128.40***	(4)>(3)>(2)>(1)
(2) No change (n=1933)	5.89±1.93		
(3) General (n=546)	5.86±1.95		
(4) Getting worse (n=146)	6.69±2.39		
Do your friends care about you during the epidemic?			
(1) Very much (n=1232)	4.58±1.64	137.90***	(4)>(3)>(2)>(1)
(2) General (n=1654)	5.09±1.56		
(3) A little (n=560)	5.89±1.93		
(4) Not at all (n=155)	6.91±2.31		

Note: ***P<0.001.

3.4. Correlation Analysis of Factors Related to Suicidal Ideation

Pearson correlation analysis was conducted for six variables including gender, exercise time, sedentary time, parent-child relationship, peer relationship and suicidal ideation. The statistical results were shown in Table 4. Suicide ideation has significant correlation with gender, exercise time, sedentary time, parent-child relationship and

peer relationship. Sedentary time, parent-child relationship, peer relationship and suicidal ideation were significantly positively correlated, indicating that the longer the sedentary time, the worse the parent-child relationship and peer relationship, the higher the suicidal ideation score. The exercise time was significantly negatively correlated with suicidal ideation, indicating that the longer the exercise time, the lower the suicidal ideation score.

Table 4. Correlation analysis of factors related to suicidal ideation.

	Gender	Excise time	Sedentary time	Parent-child relationship	Peer relationship
Suicidal Ideation	0.09***	-0.13***	0.24***	0.31***	0.32***

Note: *P<0.05, ***P<0.001.

3.5. Multivariate Linear Regression Analysis of Factors Related to Suicidal Ideation

To establish multiple regression equations by using gender, place of origin, exercise time, sedentary time, parent-child relationship and peer relationship as predictive variables, and using the total average score of suicidal ideation as dependent variables. Variable assignment as follows: gender (male=1, female=2), place of origin (city=1, towns=2, rural area=3), exercise time (less than 0.5 hours=1, 0.5-1 hour=3=2,

1-2 hours=3, above 2 hours=4), sedentary time (less than 1 hour=1, 1-2 hours=2, 2-3 hours=3, above 3 hours=4), the parent-child relationship (getting better=1, no change=2, general=3, getting worse=4), peer relationship (very much=1, general=2, a little=3, not at all=4). As we can see from Table 5, gender, sedentary time, parent-child relationship and peer relationship entered the regression equation, and explained 19.9% of suicidal ideation scores (all $P < 0.05$).

Table 5. Multivariate linear regression analysis of factors related to suicidal ideation.

Predictive Variables	B	Standard Error	β	T Value	P Value
Gender	0.40	0.05	0.11	7.37	<0.001
Place of origin	0.29	0.03	0.17	11.47	<0.001
Parent-child Relationship	0.52	0.04	0.22	14.16	<0.001
Peer Relationship	0.54	0.03	0.25	15.81	<0.001

Note: $R=0.45$, $R^2=0.200$, after adjusting $R^2=0.199$, $F=180.06$.

4. Discussion

The results of this study show that during the COVID-19 epidemic, males' suicidal ideation scores were significantly lower than females' among junior three students in the research city of Hubei Province, indicating that males' mental health status is better than females'. Zhu Xiaolin and others pointed out that the students' mental health status is generally not good, especially in depression, anxiety and other emotional regulation. Females' stress response and anxiety level during the epidemic are significantly higher than males', which is consistent with the result of this study [8].

The study found that there was no significant difference in the scores of suicidal ideation among students in cities, towns and rural area during home isolation study time. This may occur due to students had already returned to school during the survey period, and the students were in the same learning environment, so there was no difference between students from urban or rural area. Wang Lei and others also found that the class environment and school climate can effectively predict the occurrence of violent behavior among middle school students [9, 10].

Although the difference is not significant, it can be seen from the average score that urban students have the lowest level of suicidal ideation, and rural area students have the highest level of suicide ideation. Li Xianxiong and others also found that the mental health level of adolescents in rural area during the epidemic was significantly lower than the adolescents in urban area [11]. This may be because the network environment in rural areas is not good, and online learning further increases the pressure of study on students, leading to higher levels of suicidal ideation.

The results of this study also indicated that there were significant differences in parent-child relationships and peer relationships during the epidemic. The more stable the intimate relationship perceived by the students, the lower the level of suicidal ideation. Research by Zhou Han *et al.* found

that the quality of friendship is a related factor affecting suicidal ideation of middle school students. Student psychological abuse and neglect influence suicide ideation through coping styles, which is consistent with the results of this study [12]. Parents and students staying together at home for a long time have changed the original environment of how they getting along with each other, which is undoubtedly a huge impact on family relationship. However, with the effective control of the epidemic, the students' learning environment has been relatively improved after the school start, which has helped to ease the parent-child relationship and peer relationship.

The results of one-way analysis of variance showed that there were significant differences in different exercise time and sedentary time. During the epidemic, students whose daily exercise time was maintained at 1-2 hours, and sedentary time less than 1 hour had the lowest scores for suicidal ideation. The research by Lu Shuhong and others found that the proportion of people participating in sports reached 36% during the SARS epidemic [13], which shows that people are consciously doing healthy activities. From the results of this study, appropriate daily physical exercise can effectively reduce students' suicidal ideation level, and the best time is to maintain 1-2 hours daily physical exercise. However, too much physical exercise can also lead to higher levels of suicidal ideation. Research by McMahon *et al.* found that frequent participation in sports can effectively improve individual's subjective well-being and reduce the level of anxiety and depression, but if it exceeds the normal activity level, the individual's subjective well-being will decrease [14]. In addition, long hours sedentary time causes mental health hazards to students. The longer the time students spent on electronic products such as mobile phones and computers, the more likely they are to commit suicide. On the one hand, the news about the COVID-19 during the epidemic is constantly being updated. Long-term over-attention will cause personal depression, anxiety and other negative emotions, which will cause serious mental health problems in a long term. On the

other hand, long sedentary time will inevitably lead to lack of sufficient physical exercise time. According to the view of embodied cognition, human psychology or cognition is dependent on the body and its sensorimotor system, and the state of the body affects the cognitive process of the subject [15]. Therefore, the length of physical exercise time and sedentary time during the epidemic is a key factor for students' suicidal ideation.

Regression analysis found that gender, sedentary time, parent-child relationship, and peer relationship had higher predictors of suicidal ideation. It is suggested that schools should be student-oriented and pay more attention to the universality and individual differences among students. According to the needs of students to carry out the corresponding online and offline psychological lectures, to reduce the suicidal ideation of students, help students to maintain a confident and stable positive attitude. Teachers should keep close contact with their parents and to know students' family situation comprehensively, including the quality of their parent-child relationship, and the quality of matrimonial relationship and so on. For parents, they need to understand and accept their children's emotions, identify with their children, value the quality of companionship, and promote their children to be more courageous to face the pressure of entering school. Piaget believes that adolescents have a cooperative and emotional resonance in a good peer relationship, which enables them to gain a broader social cognition. While focusing on learning, students should learn to communicate and get along with others so that they can better integration into the class collective. When encounter difficulties in peers communication, they should choose positive coping methods to solve problems, reduce conflict between each other, shun avoidance as much as possible, and avoid negative cope methods. In addition, the General Administration of Sports and the Ministry of Education issued a notice on deepening the integration of sports education and promoting the healthy development of adolescent which emphasized the "health first" education concept should be established. Physical education classes should be held for all students to help them having fun in it, strengthen their physique, improving their personality and tempering their will in physical exercise, in order to civilize their spirit and strong their body [16]. It is suggested to encourage students to increase the amount of exercise appropriately based on their mental health status after the school start, and indirectly promote the cognitive ability, academic performance, social ability and personality improvement through physical improvement.

5. Conclusion

- (1) The level of suicidal ideation of junior three students during the COVID-19 epidemic is related to gender, sedentary time, exercise time, parent-child relationship and peer relationship.
- (2) The suicidal ideation of females is higher than males.
- (3) The more sedentary time and the less exercise time, the

higher suicidal ideation.

- (4) The worse interpersonal relationship (parent-child relationship, peer relationship), the higher suicidal ideation.

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