

Analysis on Influencing Factors of Depression and Anxiety Among College Students and Their Association with Corona Virus Disease 2019 Risk Perception

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Abstract: *Objective* The purpose of this study was to investigate the influencing factors of depression and anxiety, and explore the relationship between depression and anxiety and risk perception of college students. *Method* Random sampling was used to conduct self-design questionnaire survey among 3084 students in Shandong Institute of Petroleum and Chemical Technology. The survey content includes demographic characteristics, influencing factors, Depression Self-rating Scale, Anxiety Self-rating Scale and Corona Virus Disease 19 risk perception Scale. *Results* According to multivariate Logistic regression, after adjusting for confounding factors, the influencing factors that decrease depression among participants included having breakfast everyday (OR = 0.714, 95%CI: 0.521 ~ 0.979), exercising 3 ~ 4 times per week (OR = 0.632, 95%CI: 0.471 ~ 0.848), exercising more than 4 times per week (OR = 0.618, 95%CI: 0.457 ~ 0.835), sleeping 6 ~ 8 hours per day (OR = 0.613, 95%CI: 0.443 ~ 0.847), sleeping more than 8 hours per day (OR = 0.509, 95%CI: 0.353 ~ 0.732); the influencing factors that increase depression among participants included having night snacks 1 ~ 4 times per week (OR = 1.299, 95%CI: 1.093 ~ 2.543), having night snacks more than 4 times per week (OR = 1.523, 95%CI: 1.062 ~ 2.185), neutral personality (OR = 1.597, 95%CI: 1.298 ~ 1.965), introverted personality (OR = 2.741, 95%CI: 2.117 ~ 3.549), neutral temperament (OR = 1.489, 95%CI: 1.257 ~ 1.763), wild temperament (OR = 4.161, 95%CI: 2.933 ~ 5.904) and high risk perception (OR = 2.509, 95%CI: 2.017 ~ 3.122); the influencing factors that decrease anxiety among participants included sleeping 6 ~ 8 hours per day (OR = 0.568, 95%CI: 0.404 ~ 0.800) and sleeping more than 8 hours per day (OR = 0.438, 95%CI: 0.293 ~ 0.654); the influencing factors that increase anxiety among participants included drinking alcohol more than 4 times everyday (OR = 2.329, 95%CI: 1.020 ~ 5.319), having night snack 1 ~ 4 times every week (OR = 1.239, 95%CI: 1.010 ~ 1.519), having night snack more than 4 times every week (OR = 1.603, 95%CI: 1.081 ~ 2.379), neutral personality (OR = 1.629, 95%CI: 1.271 ~ 2.089), introverted personality (OR = 1.758, 95%CI: 1.292 ~ 2.393), wild temperament (OR = 2.261, 95%CI: 1.574 ~ 3.247) and high risk perception (OR = 3.104, 95%CI: 2.476 ~ 3.892). *Conclusion* During the Corona Virus Disease 2019 pandemic, depression and anxiety among college students are closely related to their dietary habits, alcohol consumption, exercise frequency, sleep duration, personality, temperament, and risk perception level.

Keywords: Corona Virus Disease 2019, Depression, Anxiety, Influencing Factors, Risk Perception, College Students

1. Introduction

Corona Virus Disease 2019 (COVID-19) represents the most extensive global pandemic to afflict humanity in the

past century, posing a significant threat to the life and health of the global population [1]. Emerging in late 2019 in Wuhan, Hubei Province, COVID-19 rapidly spread worldwide, prompting the World Health Organization to declare a global

pandemic on March 11, 2020 [2]. Currently, China faces an epidemic characterized by multiple locations, extensive coverage, high incidence, and frequent occurrences. College students, with their large numbers and high mobility, constitute a crucial demographic for targeted epidemic prevention and control [3]. In response, numerous colleges and universities have implemented campus lockdown measures. Consequently, college students confront a myriad of risks, including infection concerns and disruptions to life and study plans, potentially exacerbating mental strain and psychological issues. As college students are in early adulthood with less developed mental maturity, they constitute a high-risk group for psychological disorders and illnesses [4], particularly during public crises when mental health is vulnerable [5]. Following the 2003 Severe Acute Respiratory Syndrome outbreak, 9%-30% of college students exhibited depressive and anxious symptoms [6]. Risk perceptions refer to people's intuitive evaluations of hazards that they are or might be exposed to, including a multitude of undesirable effects that people associate with a specific cause [7]. Research has shown that the level of risk perceptions has some impact on mental health, reinforcing levels of stress, helplessness and fear [8]. At present, there were few studies on the risk perception and emotional factors of COVID-19 among college students. In view of this, this study adopted the research method of cross-sectional survey to explore the influencing factors of depression and anxiety among college students and their correlation with the risk perception level of COVID-19, so as to provide a basis for the subsequent effective emotional counseling and psychological intervention. Risk perception encompasses individuals' intuitive evaluations of hazards to which they are or might be exposed, including various undesirable effects associated with a specific cause [7]. Research suggests that risk perception levels impact mental health, intensifying stress, helplessness, and fear [8]. Currently, limited studies have investigated the risk perception and emotional factors of COVID-19 among college students. In light of this, our study employed a cross-sectional survey approach to explore the influencing factors of depression and anxiety in college students and their correlation with COVID-19 risk perception levels, providing a foundation for subsequent effective emotional counseling and psychological intervention.

2. Research Objects and Methods

2.1. Participants

From November 2 to 4, 2022, we employed a random sampling method to conduct an anonymous, self-administered questionnaire survey among college students at the Shandong Institute of Petroleum and Chemical Technology. A total of 3,190 students participated in the survey, yielding 3,123 valid questionnaires with an effective recovery rate of 97.9%. Of these, 3,084 participants were included in the study, constituting an effective rate of 96.7%. The sample comprised 1,626 males (52.7%) and 1,458

females (47.3%), with a mean age of 19.5 ± 1.39 years.

All investigators involved in this study received standardized training and demonstrated proficiency in field epidemiological investigation methods. Prior to initiating the survey, investigators informed the students of the study's purpose and significance. Questionnaires were collected on-site upon completion and subsequently organized and recorded for data analysis.

2.2. Research Variables

Self-designed questionnaire was used, with 4 main contents: Demographic characteristics (Household registration, Family structure, Be the only child or not, Paternal education level, Maternal education level, and Family annual income); influencing factors (Number of breakfasts per week, Number of drinks per week, Number of night snacks per week, Smoking or not, Number of exercise per week, Sleeping time per day, Personality, Temperament); Self-rating Depression Scale (SDS) [9], Self-rating Anxiety Scale (SAS) [10], and COVID-19 risk perception scale [11]. The SDS is a self-report measurement psychological scale to evaluate depression. It includes 20 items, 10 of which are reverse scores. The SAS is a psychological scale to evaluate anxiety. Similar to SDS, it also has 20 item, 5 of which are reverse scores. Each item of the 2 scales can be scored 1 to 4 points according the following options: 1 (no or very limited time), 2 (a small amount of time), 3 (for a long time) and 4 (most or all of the time). A SDS/SAS index score is the raw score of all items multiplied by 1.25 to obtain the integer, which can be divided as follows: Depression/anxiety (≥ 50), and no depression/anxiety (< 50). COVID-19 risk perception scale includes 9 items, and each item can be scored 1 to 6 points according the following options: 1 (fully not compliance), 2 (mostly not compliance), 3 (partially not compliance), 4 (partially compliance), 5 (mostly compliance), 6 (fully compliance), which can be divided as follows: High risk perception (≥ 27), and low risk perception (< 27). The three scales adopted in this study have good reliability and validity [11, 12].

2.3. Ethical Approval

This research was approved by ethics committee of Shandong Institute of Petroleum and Chemical Technology (registered number: KY-2022-023). All methods were carried out in accordance with relevant guidelines and regulations. Informed consent was obtained from investigators, and all information was kept strictly confidential.

2.4. Statistical Analysis

EpiData 3.1 was used to establish the database and SPSS 27.0 was used for data analysis. Categorical data were described using frequencies, while continuous data were presented as means \pm standard deviation. Chi-square (χ^2) tests and multiple logistic regression analyses were conducted to examine the influencing factors and their relationships.

3. Results

3.1. Demographic Characteristics of Participants

Univariate analysis showed that family structure, be the only child, maternal education level and family annual

income were the demographic characteristics that affected the depressive mood of participants. And the anxious mood of participants had no relation with their demographic characteristics. (Table 1)

Table 1. Demographic characteristics of the participants.

| Demographic characteristics | Number of participants (%) | Depression symptom | | | Anxiety symptom | | |
|------------------------------|----------------------------|----------------------------------|----------|-------|--------------------------------|----------|-------|
| | | Number of depressed students (%) | χ^2 | P | Number of anxious students (%) | χ^2 | P |
| Household registration | | | 0.007 | 0.932 | | 2.931 | 0.087 |
| Urban household registration | 921 (29.9) | 320 (34.7) | | | 193 (21.0) | | |
| Rural household registration | 2163 (70.1) | 755 (34.9) | | | 396 (18.3) | | |
| Family structure | | | 8.286 | 0.004 | | 0.092 | 0.762 |
| Nuclear family | 2839 (92.1) | 969 (34.1) | | | 544 (19.2) | | |
| others | 245 (7.9) | 106 (43.3) | | | 45 (18.4) | | |
| Be the only child | | | 6.895 | 0.009 | | 0.017 | 0.897 |
| No | 2211 (71.7) | 802 (36.3) | | | 421 (19.0) | | |
| Yes | 873 (28.3) | 273 (31.3) | | | 168 (19.2) | | |
| Paternal education level | | | 5.612 | 0.060 | | 1.986 | 0.370 |
| Junior high school or below | 1691 (54.8) | 618 (36.5) | | | 338 (20.0) | | |
| Senior high school | 939 (30.4) | 316 (33.7) | | | 171 (18.2) | | |
| Above senior high school | 454 (14.7) | 141 (31.1) | | | 80 (17.6) | | |
| Maternal education level | | | 10.124 | 0.006 | | 0.077 | 0.962 |
| Junior high school or below | 2002 (64.9) | 738 (36.9) | | | 385 (19.2) | | |
| Senior high school | 755 (24.5) | 236 (31.3) | | | 143 (18.9) | | |
| Above senior high school | 327 (10.6) | 101 (30.9) | | | 61 (18.7) | | |
| Family annual income | | | 15.740 | 0.001 | | 4.493 | 0.213 |
| < 10000 | 1772 (57.5) | 646 (36.5) | | | 360 (20.3) | | |
| 10000 ~ | 1020 (33.1) | 349 (34.2) | | | 176 (17.3) | | |
| 20000 | 171 (5.5) | 57 (33.3) | | | 29 (17.0) | | |
| > 30000 | 121 (3.9) | 23 (19.0) | | | 24 (19.8) | | |

3.2. Univariate analysis of Depression and Anxiety Influencing Factors Among Participants

Univariate analysis showed that number of breakfast per week, number of drinks per week, number of night snacks

per week, number of exercise per week, sleeping time per day, personality, and temperament were the influencing factors that affect the depressive and anxious mood of participants. (Table 2)

Table 2. Single factor analysis of depression and anxiety influencing factors of participants.

| Influencing factors | Number of participants (%) | Depression symptom | | | Anxiety symptom | | |
|-------------------------------|----------------------------|----------------------------------|----------|-------|--------------------------------|----------|-------|
| | | Number of depressed students (%) | χ^2 | P | Number of anxious students (%) | χ^2 | P |
| Frequency of breakfast | | | 40.502 | 0.000 | | 10.237 | 0.017 |
| Never | 257 (8.3) | 114 (44.4) | | | 62 (24.1) | | |
| 1 ~ 4 times (per week) | 929 (30.1) | 367 (39.5) | | | 193 (20.8) | | |
| 5 ~ 6 times (per week) | 809 (26.2) | 287 (35.5) | | | 153 (18.9) | | |
| Everyday | 1089 (35.3) | 307 (28.2) | | | 181 (16.6) | | |
| Frequency of alcoholic drinks | | | 17.538 | 0.000 | | 35.414 | 0.000 |
| Never | 2520 (81.7) | 858 (34.0) | | | 452 (17.9) | | |
| 1 ~ 4 times (per week) | 530 (17.2) | 194 (36.6) | | | 118 (22.3) | | |
| More than 4 times (per week) | 34 (1.1) | 23 (67.6) | | | 19 (55.9) | | |
| Frequency of night snacks | | | 34.928 | 0.000 | | 30.160 | 0.000 |
| Never | 1774 (57.5) | 550 (31.0) | | | 294 (16.6) | | |
| 1 ~ 4 times (per week) | 1138 (36.9) | 440 (38.7) | | | 239 (21.0) | | |
| More than 4 times (per week) | 172 (5.6) | 85 (49.4) | | | 56 (32.6) | | |
| Smoking | | | 0.160 | 0.689 | | 0.275 | 0.600 |
| No | 2762 (89.6) | 966 (35.0) | | | 524 (19.0) | | |
| Yes | 322 (10.4) | 109 (33.9) | | | 65 (20.2) | | |
| Frequency of exercise | | | 69.992 | 0.000 | | 9.290 | 0.026 |
| Never | 340 (11.0) | 167 (49.1) | | | 82 (24.1) | | |

| Influencing factors | Number of participants (%) | Depression symptom | | | Anxiety symptom | | |
|------------------------------|----------------------------|----------------------------------|----------|----------|--------------------------------|----------|----------|
| | | Number of depressed students (%) | χ^2 | <i>P</i> | Number of anxious students (%) | χ^2 | <i>P</i> |
| 1 ~ 2 times (per week) | 1251 (40.6) | 486 (38.8) | | | 249 (19.9) | | |
| 3 ~ 4 times (per week) | 716 (23.2) | 216 (30.2) | | | 125 (17.5) | | |
| More than 4 times (per week) | 777 (25.2) | 206 (26.5) | | | 133 (17.1) | | |
| Sleeping duration | | | 48.520 | 0.000 | | 43.617 | 0.000 |
| Less than 6 hours (per day) | 201 (6.5) | 106 (52.7) | | | 70 (34.8) | | |
| 6 ~ 8 hours (per day) | 2271 (73.6) | 808 (35.6) | | | 435 (19.2) | | |
| More than 8 hours | 612 (19.8) | 161 (26.3) | | | 84 (13.7) | | |
| Personality | | | 100.783 | 0.000 | | 23.347 | 0.000 |
| Extroversion | 790 (25.6) | 185 (23.4) | | | 108 (13.7) | | |
| Neutral | 1769 (57.4) | 626 (35.4) | | | 357 (20.2) | | |
| Introversion | 525 (17.0) | 264 (50.3) | | | 124 (23.6) | | |
| Temperament | | | 121.873 | 0.000 | | 46.560 | 0.000 |
| Mild | 1358 (44.0) | 366 (27.0) | | | 213 (15.7) | | |
| Neutral | 1538 (49.9) | 586 (38.1) | | | 308 (20.0) | | |
| Wild | 188 (6.1) | 123 (65.4) | | | 68 (36.2) | | |

3.3. Multivariate Analysis of the Relationship Between Depression and Anxiety Influencing Factors and COVID-19 Risk Perception Among Participants

With depression detected in participants as the dependent variable (0= no, 1= yes), according to the inclusion and exclusion criteria ($\alpha = 0.05$), a total of 12 variables including family structure, be the only child, maternal education level, family annual income, frequency of breakfast, frequency of alcoholic drinks, frequency of night snacks, frequency of exercise, sleeping duration, personality, temperament, and risk perception were analyzed by multivariate logistic regression. The results showed that after adjustment for family structure, be the only child, maternal education level, family annual income, the risk of depression among participants who had breakfast everyday was 71.4% (OR = 0.714, 95%CI: 0.521 ~ 0.979) times of the risk who never had breakfast; the risk of depression among participants who had night snacks 1 ~ 4 times per week was 1.229 (OR = 1.229, 95%CI: 1.093 ~ 1.543) times of the risk who never had night snack; the risk of depression among participants who had night snacks more than 4 times per week was 1.523 (OR = 1.523, 95%CI: 1.062 ~ 2.185) times of the risk who never had night snack; the risk of depression among participants who took exercise 3 ~ 4 times per week was 63.2% (OR = 0.632, 95%CI: 0.471 ~ 0.848) times of the risk who never exercised; the risk of depression among participants who took exercise more than 4 times per week was 61.8% (OR = 0.618, 95%CI: 0.457 ~ 0.835) times of the risk who never exercised; the risk of depression among participants who slept 6 ~ 8 hours per day was 61.3% (OR = 0.631, 95%CI: 0.443 ~ 0.847) times of the risk who slept less than 6 hours per day; the risk of depression among participants who slept more than 8 hours per day was 50.9% (OR = 0.509, 95%CI: 0.353 ~ 0.732) times of the risk who slept less than 6 hours per day; the risk of depression among participants with neutral personality was 1.597 (OR = 1.597, 95%CI: 1.298 ~ 1.965) times of the risk with extrovert personality; the risk of depression among participants with introvert personality was 2.741 (OR = 2.741, 95%CI: 2.117 ~ 3.549) times of the risk with extrovert personality; the risk of depression among

participants with neutral temperament was 1.489 (OR = 1.489, 95%CI: 1.257 ~ 1.763) times of the risk with mild temperament; the risk of depression among participants with wild temperament was 4.161 (OR = 4.161, 95%CI: 2.933 ~ 5.904) times of the risk with mild temperament; the risk of depression among participants with a high risk perception was 2.509 (OR = 2.509, 95%CI: 2.017 ~ 3.122) times of the risk with a low risk perception. With anxiety detected in participants as the dependent variable (0= no, 1= yes), according to the inclusion and exclusion criteria ($\alpha = 0.05$), a total of 8 variables including frequency of breakfast, frequency of alcoholic drinks, frequency of night snacks, frequency of exercise, sleeping duration, personality, temperament, and risk perception were analyzed by multivariate logistic regression. The results showed that the risk of anxiety among participants who drank alcohol more than 4 times per week was 2.329 (OR = 2.329, 95%CI: 1.020 ~ 5.319) times of the risk who never drank alcohol; the risk of anxiety among participants who had night snacks 1 ~ 4 times per week was 1.239 (OR = 1.239, 95%CI: 1.010 ~ 1.519) times of the risk who never had night snack; the risk of anxiety among participants who had night snacks more than 4 times per week was 1.603 (OR = 1.603, 95%CI: 1.081 ~ 2.379) times of the risk who never had night snack; the risk of anxiety among participants who slept 6 ~ 8 hours per day was 56.8% (OR = 0.568, 95%CI: 0.404 ~ 0.800) times of the risk who slept less than 6 hours per day; the risk of anxiety among participants who slept more than 8 hours per day was 43.8% (OR = 0.438, 95%CI: 0.293 ~ 0.654) times of the risk who slept less than 6 hours per day; the risk of anxiety among participants with neutral personality was 1.629 (OR = 1.629, 95%CI: 1.271 ~ 2.089) times of the risk with extrovert personality; the risk of anxiety among participants with introvert personality was 1.758 (OR = 1.758, 95%CI: 1.292 ~ 2.393) times of the risk with extrovert personality; the risk of anxiety among participants with wild temperament was 2.261 (OR = 2.261, 95%CI: 1.574 ~ 3.247) times of the risk with mild temperament; the risk of anxiety among participants with a high risk perception was 3.104 (OR = 3.104, 95%CI: 2.476 ~ 3.892) times of the risk with a low risk perception. (Table 3)

Table 3. Multivariate logistic regression analysis of depression and anxiety influencing factors and risk perception level of participants.

| Independent variable | Depression symptom | | Anxiety symptom | |
|-------------------------------|-----------------------|-------|-----------------------|-------|
| | OR (95%CI) | P | OR (95%CI) | P |
| Family structure | | | | |
| Nuclear family | 1.000 | | | |
| others | 1.431 (1.075 ~ 1.906) | 0.014 | | |
| Be the only child | | | | |
| No | 1.000 | | | |
| Yes | 1.189 (0.986 ~ 1.435) | 0.070 | | |
| Maternal education level | | | | |
| Junior high school or below | 1.000 | | | |
| Senior high school | 0.827 (0.679 ~ 1.008) | 0.060 | | |
| Above senior high school | 0.950 (0.708 ~ 1.276) | 0.733 | | |
| Family annual income | | | | |
| < 10000 | 1.000 | | | |
| 10000 ~ | 1.010 (0.846 ~ 1.207) | 0.910 | | |
| 20000 | 0.938 (0.651 ~ 1.350) | 0.938 | | |
| > 30000 | 0.332 (0.187 ~ 0.589) | 0.000 | | |
| Frequency of breakfast | | | | |
| Never | 1.000 | | 1.000 | |
| 1 ~ 4 times (per week) | 0.873 (0.640 ~ 1.192) | 0.394 | 0.952 (0.661 ~ 1.371) | 0.790 |
| 5 ~ 6 times (per week) | 0.811 (0.589 ~ 1.115) | 0.197 | 0.952 (0.654 ~ 1.386) | 0.797 |
| Everyday | 0.714 (0.521 ~ 0.979) | 0.037 | 0.896 (0.618 ~ 1.299) | 0.562 |
| Frequency of alcoholic drinks | | | | |
| Never | 1.000 | | 1.000 | |
| 1 ~ 4 times (per week) | 1.198 (0.963 ~ 1.490) | 0.105 | 1.246 (0.972 ~ 1.596) | 0.083 |
| More than 4 times (per week) | 2.181 (0.877 ~ 5.429) | 0.094 | 2.329 (1.020 ~ 5.319) | 0.045 |
| Frequency of night snacks | | | | |
| Never | 1.000 | | 1.000 | |
| 1 ~ 4 times (per week) | 1.299 (1.093 ~ 1.543) | 0.003 | 1.239 (1.010 ~ 1.519) | 0.040 |
| More than 4 times (per week) | 1.523 (1.062 ~ 2.185) | 0.022 | 1.603 (1.081 ~ 2.379) | 0.019 |
| Frequency of exercise | | | | |
| Never | 1.000 | | 1.000 | |
| 1 ~ 2 times (per week) | 0.843 (0.647 ~ 1.100) | 0.208 | 1.015 (0.740 ~ 1.393) | 0.926 |
| 3 ~ 4 times (per week) | 0.632 (0.471 ~ 0.848) | 0.002 | 0.923 (0.650 ~ 1.310) | 0.653 |
| More than 4 times (per week) | 0.618 (0.457 ~ 0.835) | 0.002 | 0.985 (0.691 ~ 1.405) | 0.935 |
| Sleeping duration | | | | |
| Less than 6 hours (per day) | 1.000 | | 1.000 | |
| 6 ~ 8 hours (per day) | 0.613 (0.443 ~ 0.847) | 0.003 | 0.568 (0.404 ~ 0.800) | 0.001 |
| More than 8 hours | 0.509 (0.353 ~ 0.732) | 0.000 | 0.438 (0.293 ~ 0.654) | 0.000 |
| Personality | | | | |
| Extroversion | | | | |
| Neutral | 1.597 (1.298 ~ 1.965) | 0.000 | 1.629 (1.271 ~ 2.089) | 0.000 |
| Introversion | 2.741 (2.117 ~ 3.549) | 0.000 | 1.758 (1.292 ~ 2.393) | 0.000 |
| Temperament | | | | |
| Mild | 1.000 | | 1.000 | |
| Neutral | 1.489 (1.257 ~ 1.763) | 0.000 | 1.138 (0.929 ~ 1.394) | 0.212 |
| Wild | 4.161 (2.933 ~ 5.904) | 0.000 | 2.261 (1.574 ~ 3.247) | 0.000 |
| Risk perception | | | | |
| Low | 1.000 | | 1.000 | |
| High | 2.509 (2.017 ~ 3.122) | 0.000 | 3.104 (2.476 ~ 3.892) | 0.000 |

4. Discussion

The results showed that college students during the epidemic period had significantly higher detection rates of depression and anxiety, at 34.9% and 19.1%, respectively, compared to non-epidemic periods where detection rates were 8.70% and 5.49% for depression and anxiety, respectively [13]. This suggests that the prolonged duration, extensive scope, and high contagiousness of the COVID-19 epidemic have engendered fear and anxiety among students. Furthermore, the closed management environment of college campuses may also contribute to the development of

depression and anxiety. As such, this study underscores the importance of prioritizing psychological health education for college students during infectious disease outbreaks. Such measures may mitigate the negative impact of epidemics on students' mental health, particularly depression and anxiety.

This study has revealed that poor dietary habits serve as contributory factors for the development of depressive and anxious symptoms. Prior empirical evidence has demonstrated a correlation between elevated depressive states in adolescents and a decreased propensity to adopt salubrious lifestyle habits, including adherence to regular dietary patterns [14]. Generally, depression has been associated with diminished appetite, leading individuals to

forgo meals or abstain from eating entirely. Frequently, late sleep patterns result in missed meals, while stress has been identified as a contributing factor to reduced appetite [15]. Concurrently, irregular dietary habits can culminate in overweight and obesity, which may exacerbate depression severity [16, 17]. Higher education institutions must prioritize and ameliorate the dietary landscape for their students. Health education initiatives should encompass not only standard nutritional and food hygiene education but also emphasize regular meal schedules, empowering students to effectively manage their dietary habits and maintain holistic well-being. The current study's findings highlight excessive alcohol consumption as an additional risk factor for depression and anxiety. Existing research suggests that prolonged, heavy alcohol intake can induce severe depressive and anxious symptoms [18]. The impetus for college students' alcohol consumption is multifaceted, encompassing influences from familial and societal contexts as well as individual sensations of euphoria or anxiety [19]. Throughout their university experience, students may encounter a myriad of challenges and stressors, predisposing them to adverse psychological conditions and subsequent alcohol consumption. It is incumbent upon families, academic institutions, and society at large to bolster psychological counseling services and support, enhance communication with university students, and curtail instances of alcohol use. By implementing alcohol-related health education and tailored intervention strategies, the mental and physical well-being of students can be preserved while minimizing the detrimental impact of alcohol consumption [20]. The present study identifies physical exercise as a protective factor against depression and anxiety among college students. Existing literature indicates that physical activity can attenuate depressive and anxious symptomatology [21]. Exercise has been shown to augment social support networks, facilitate stress reduction, and ultimately alleviate negative emotional states [22]. It is imperative for university students grappling with depression and anxiety to cultivate a proactive mindset toward physical exercise and consistently participate in structured physical activities [23]. The present study identifies sufficient sleep duration as a protective factor against depression and anxiety in the college student population. Existing literature demonstrates a robust association between sleep and the manifestation of depressive and anxious symptoms among students, revealing that those with superior sleep quality exhibit more favorable emotional states compared to their counterparts with suboptimal sleep quality [24]. Adoption of a healthy lifestyle and fostering positive social connections can enhance sleep quality, whereas factors such as caffeine consumption, exposure to stress, and irregular sleep-wake cycles may impair it [25]. It is imperative for higher education institutions to prioritize addressing sleep-related and emotional concerns among students by proactively organizing pertinent lectures and establishing non-profit psychological counseling services. Encouraging students to maintain consistent daily routines and providing assistance in

coping with stress and psychological challenges can promote overall well-being. For students experiencing poor sleep quality or pronounced negative emotions, timely psychological counseling should be administered to mitigate adverse consequences and support comprehensive health. Moreover, this study reveals that neutral and introverted personality traits (relative to extroverted students) constitute risk factors for depression and anxiety among college students, potentially due to introverted individuals' diminished aptitude for communication and self-expression, which may engender negative emotions. Neutral and irritable temperaments (as opposed to mild temperaments) emerge as risk factors for depression in college students, while irritable temperaments (compared to mild temperaments) are identified as risk factors for anxiety. This may be attributable to the diminished psychological adaptability of individuals with low emotional stability. Research findings indicate that individuals characterized by greater extroversion and heightened emotional stability display reduced levels of depression and anxiety [26].

The influence of risk perception on emotional and psychological behavior is notably pervasive, potentially due to risk perception exacerbating depression and anxiety [27] and concurrently impacting mental health [28]. College students exhibit individual variability in risk perception levels concerning COVID-19, offering an ideal research population and framework for examining their depression and anxiety levels. This study's findings reveal a positive correlation between college students' COVID-19 risk perception levels and their depressive and anxious emotions.

5. Conclusion

During the COVID-19 pandemic, the prevalence of depression and anxiety among college students has been closely associated with factors such as dietary habits, alcohol consumption, exercise frequency, sleep duration, personality, temperament, and risk perception level. Higher education institutions must implement focused mental health education and intervention strategies. It is advisable for colleges and universities to disseminate psychological knowledge and administer psychological assessments to gauge the severity of students' psychological concerns and adopt pertinent measures. Institutions should aid students in formulating study and life plans, sustaining healthy routines and dietary practices, and participating in consistent moderate exercise. Additionally, prompt and diverse social activities should be facilitated to bolster students' comprehension of risk perception, effectively alleviate depression and anxiety, and safeguard students' mental and physical well-being and security during significant public health crises.

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