Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Review article

Prevalence of anxiety symptom and depressive symptom among college students during COVID-19 pandemic: A meta-analysis

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ABSTRACT

Background: The global pandemic of COVID-19 has brought huge changes to people's lifestyles, college students have also been affected seriously. Evidence about these significant changes indicated that college students were more prone to feel anxious and depressed. To derive a precise assessment of the prevalence of anxiety symptom and depressive symptom among college students worldwide, we conducted this meta-analysis.
Methods: Based on the guidance of PRISMA, literature was searched in Pubmed, Web of Science, Embase, and PsycArticles (last search November 6, 2020). These articles after the screening were analyzed by a random-effects model to estimate the pooled prevalence of anxiety symptom and depressive symptom. Also, subgroup analysis, sensitivity analysis, and publication bias were performed in this meta-analysis.
Results: The results showed that the pooled anxiety symptom prevalence was 31% (95% CI: 23-39%), pooled depressive symptom prevalence was 34% (95% CI: 27-41%). Subgroup analysis showed that the prevalence of anxiety symptom and depressive symptom among different countries' college students were different, and the pooled depressive symptom prevalence of females was higher compared with males.
Limitations: The prevalence of anxiety symptom and depressive symptom in worldwide college students could be better assessed by a standard and reliable questionnaire.
Conclusions: The results suggest that the prevalence of anxiety symptom and depressive symptom during the COVID-19 pandemic is relatively high. Except for interventions that should be taken to control the pandemic urgently, mental health services are also needed to decrease the risk of anxiety and depression among college students.

1. Introduction

The outbreak of coronavirus disease 2019 (COVID-19) that occurred in Wuhan, China in December 2019 has become a global pandemic which caused 54,771,888 confirmed cases and 1,324,249 confirmed deaths in 220 countries, areas, or territories until November 18, 2020 (World Health Organization, 2020, November 18). With hundreds of thousands of new cases per day, the COVID-19 pandemic has seriously affected our lives from many aspects like eating, daily activities outside, and all things that we were used to (Cheikh Ismail et al., 2020; Helsingen et al., 2020; Romero-Blanco et al., 2020; Werneck et al., 2020). To prevent and control the heavy pandemic, most factories, schools, restaurants, supermarkets, and other public places have been closed, and gatherings of people have been also stopped or reduced. As a protection for college students, universities closed their campus and changed to online teaching under the indications of national policies (Chtourou et al., 2020; Dighe et al., 2020; Narayanan et al., 2020; Silva et al., 2020). Students were barred from entering the campus for their learning courses temporarily during the special period in China, America, France, and several other countries (Ahmed et al., 2020; Dost et al., 2020; Sarwar et al., 2020; Wang et al., 2020b). Recent studies have shown that this kind of change adversely affected the physical and mental health of

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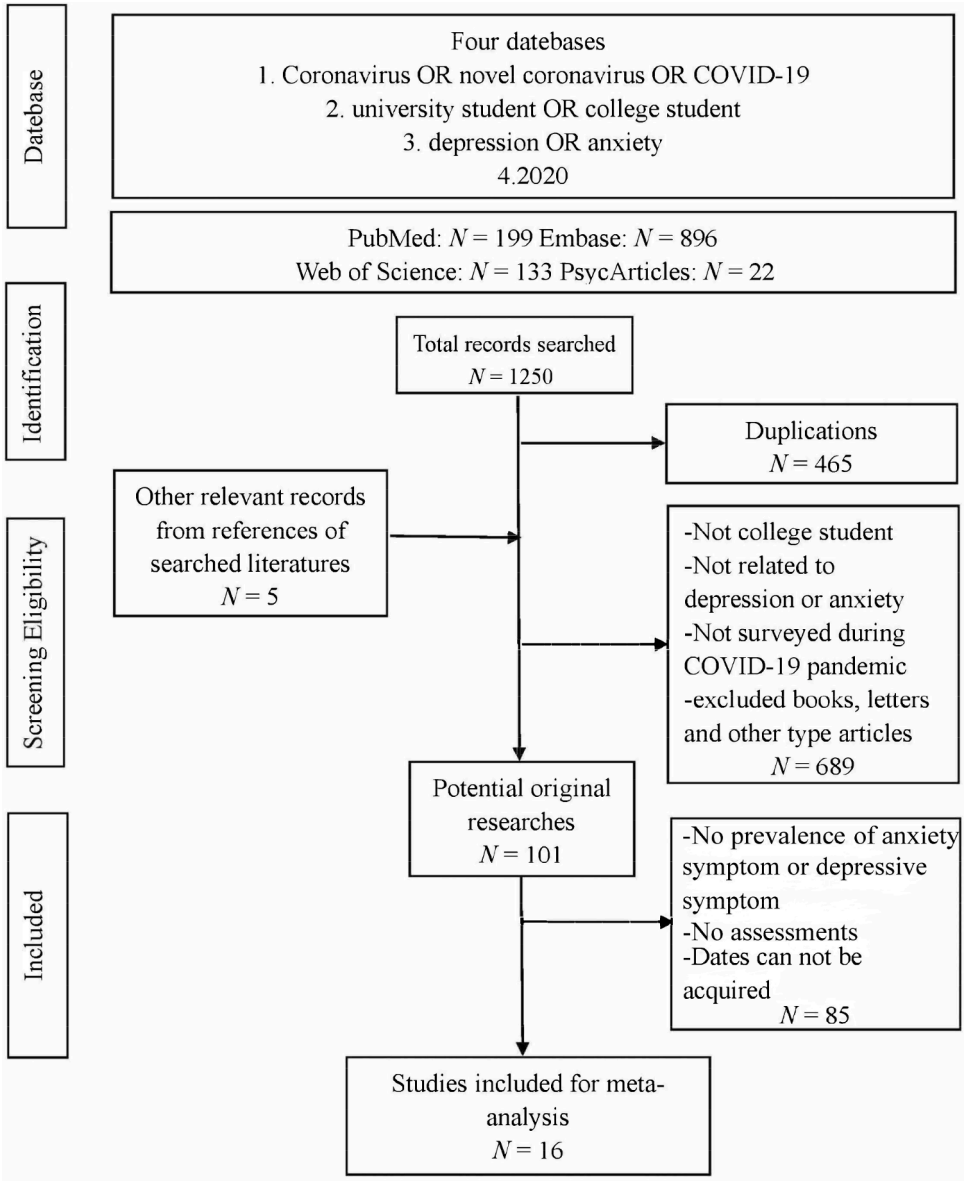

Fig. 1. Flow chart of the progress of acquiring the qualified literature and studies included in the meta-analysis.

college students (Castañeda-Babarro et al., 2020; López-Moreno et al., 2020; Wang et al., 2020d).

Due to the strong transmission ability of the novel coronavirus, the wide range of people infected, the difficulty of prevention and control, and shortages of special drugs and vaccines, it is easy to make people feel panic and anxiety (Saravanan et al., 2020; Singh et al., 2020). During the COVID-19 pandemic, the increased number of suspected and confirmed cases may cause anxiety especially in college students trapped at home without peer support and psychological counseling (Salman et al., 2020). Insufficient knowledge of the pandemic and excessive attention paid to the online information about COVID-19 also increased some students' anxious mood (Zhao and Zhou, 2020). The changes caused by the pandemic to college students such as the reduction of face-to-face communication and physical exercise, the long screen time of online learning may bring adverse influences on the mental health of college students (Feng et al., 2014; Fernández Cruz et al., 2020; Maras et al., 2015; Ruíz-Roso et al., 2020). The pandemic has brought not only the above changes but also specific changes to different college students such as sleep patterns and even changes in family members, fear about the uncertainty of the future such as academic performance (Ma and Miller, 2020).

Many countries have investigated the prevalence of mental health problems such as anxiety symptom and depressive symptom among college students and influencing factors (Islam et al., 2020; Kecojevic et al., 2020; Lopez-Castro et al., 2020; Wang et al., 2020c; Xiao et al., 2020). There was a meta-analysis on the prevalence of anxiety and depression among COVID-19 patients, which showed that the prevalence of this group of people was increased (Deng et al., 2020). However, no studies investigated the prevalence of anxiety symptom and depressive symptom among college students who were also greatly influenced by the pandemic. To better understand the mental health of college students during the COVID-19 pandemic, a meta-analysis was conducted to figure out the prevalence of anxiety symptom and depressive symptom among college students.

2. Methods

We conducted this meta-analysis under the PRISMA guidelines (Shamseer et al., 2015) to estimate the prevalence of anxiety symptom and depressive symptom among college students during the COVID-19

Table 1
The characteristics of 16 studies.

Study	Country	Study design	Response rate (%)	Survey time	Sample size (*N*)	Female (%)	Assessment and cutoff value	
							Anxiety symptom	Depressive symptom
Stephanie bourion Bedes et al. (2020)	France	CS	7.9	5.17-5.17	3936	70.6	GAD-7 mild:5-9 moderate:10-14 severe:15-21	—
Xiaomei Wang et al.(2020)	America	CS	—	5.4-5.19	2031	61.7	GAD-7	PHQ-9 mild:9-14 moderate:15-19 severe:20-27
Huidi Xiao et al.(2020)	China	CS	87.9	2.4-2.12	1994	70.1	GAD-7	PHQ-9
Lopez Castro Teresa et al.(2020)	America	CS	60.1	3.1-3.31	911	69.2	GAD-7	PHQ-9
Essadek Aziz et al.(2020)	French	CS	13.4	4.27-4.30	8004	67.5	GAD-7	PHQ-9
Kamilah Kamaludin et al.(2020)	Malaysia	CS	—	4.20-5.24	983	66.4	SAS total:100 mild:45-59 moderate:60-74 severe:>75	—
Burcu Karasar et al. (2020)	Turkey	CS	CS	April and May	518	56.0	—	BDI mild:10-15 moderate:15-25 severe:>25
Aleksandra Rogo et al.(2020)	Poland	CS	100	3.30-4.30	914	56.9	GAD-7	—
Saraswathi Ilango et al.(2020)	India	LS	90.8	June	217	64.1	DASS-21 mild:8-9 moderate:10-19 severe: >20	DASS-21 mild:10-13 moderate:14-27 severe:>27
Md Akhtarul Islam et al.(2020)	Bangladesh	CS	—	5.6-5.12	476	63.0	GAD-7	PHQ-9
Wang Zhang et al.(2020)	China	CS	80.8	1.31-2.5	44447	54.5	SAS Anxiety:>50	CES-D Depression:>28
Wathelet Marielle et al. (2020)	France	CS	4.3	4.17-5.4	69054	72.8	STAIY-2:20-80 mild:<46 moderate:46-55 severe:>55	BDI-13 mild:4-7 moderate:8-15 severe: >15
Jinghui Chang et al. (2020)	China	CS	91.4	1.31-2.3	3881	63.1	GAD-7	PHQ-9
Wenjun Cao et al.(2020)	China	CS	100	~ -2.23	7142	67.7	GAD-7	—
Chrysi K Kaparounaki et al.(2020)	Greece	CS	—	4.4-4.9	1000	68.0	—	CES-D Depression:>23
Wangjie Tang et al.(2020)	China	CS	69.2	2.20-2.27	2485	60.8	—	PHQ-9

Note. CS, cross-sectional study; LS, longitudinal study; GAD-7, General Anxiety Disorder-7 Item Scale; PHQ-9, Patient Health Questionnaire depression module-9; BDI, Beck Depression. Inventory; SAS, Self-Rating Anxiety Scale; DASS-21, Depression Anxiety Stress Scale-21 Item; STAIY-2, the 22-item Impact of Events Scale-Revised; BDI-13, the 13-item Beck Depression Inventory.
Cells contained '—'mean that the literature did not provide relevant reports about the column.
The GAD-7 and PHQ-9 have an identical cutoff between studies.

Study	Represent	Sample size	response	Valid assessment	Valid statistical methods	Overall score
S* et.al	■	■		■	■	4
X et.al	■	■		■	■	4
H et.al	■	■	■	■	■	5
L et.al	■	■		■	■	4
E et.al		■		■	■	3
K et.al		■		■	■	3
B et.al		■		■	■	3
A et.al	■		■	■	■	4
S et.al	■		■	■	■	4
M et.al		■		■	■	3
W et.al	■	■	■	■	■	5
W et.al		■	■	■	■	4
J et.al		■	■	■	■	4
W et.al	■	■	■	■	■	5
C et.al		■		■	■	3
W et.al	■	■		■	■	4

Fig. 2. Quality rating of included studies using the modified Newcastle-Ottawa Scale. * The first letter of the first author, the order is consistent with Table l.

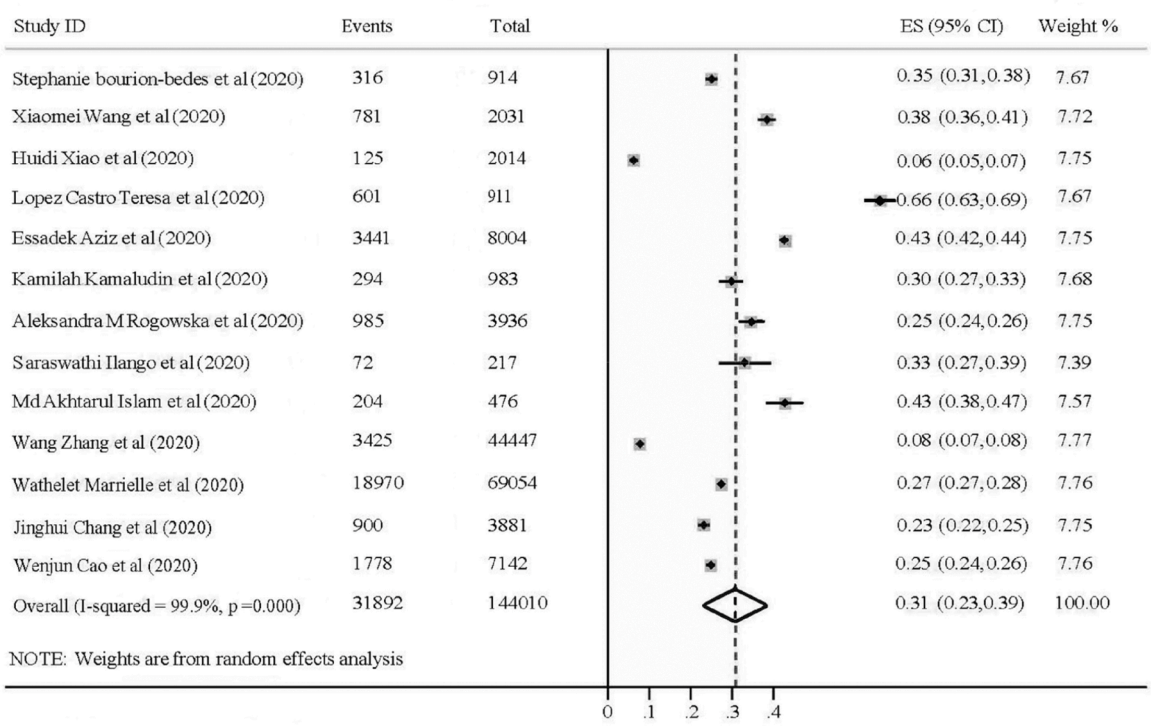

Fig. 3. The pooled prevalence of anxiety symptom.

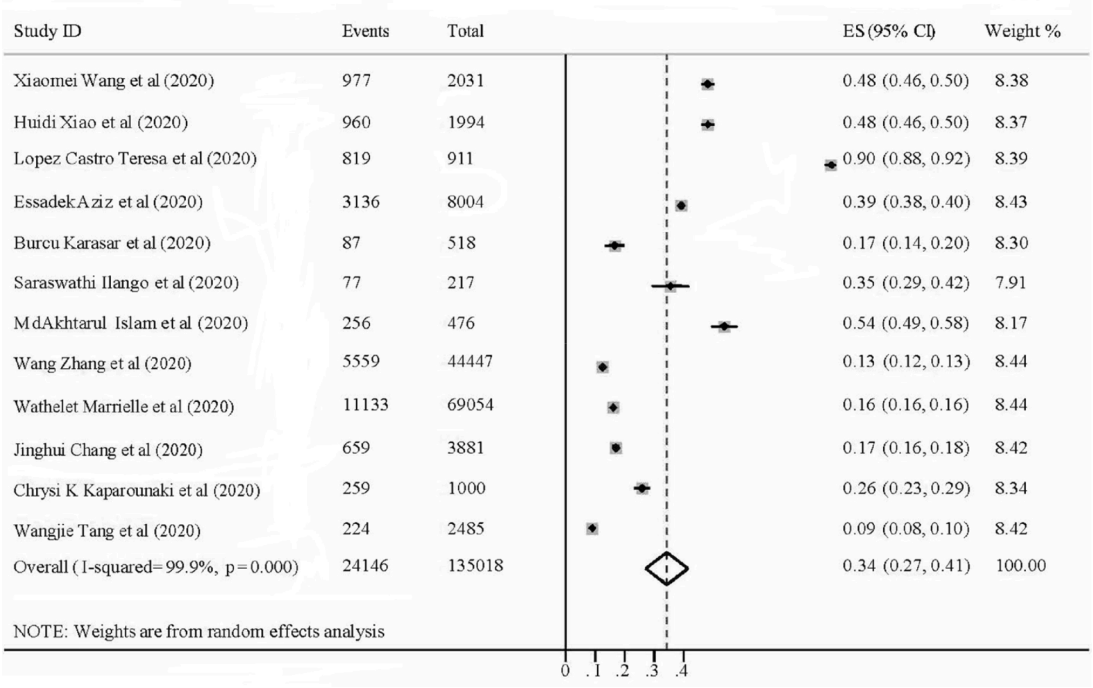

Fig. 4. The pooled prevalence of depressive symptom.

pandemic.

2.1. Literature search

Four electronic databases (PubMed, Web of Science, Embase, and PsycArticles) were searched for literature by using three relevant terms on November 6, 2020. The three terms were (Coronavirus OR novel coronavirus OR COVID-19) AND (university student OR college student) AND (depression OR anxiety). The detailed search strategy was shown in the supplement. The publication time was limited in 2020 and the searching language was limited to English. Potentially studies were added by examining the reference lists.

2.2. Inclusion and exclusion criteria

Duplications were excluded firstly. A preliminary screening was

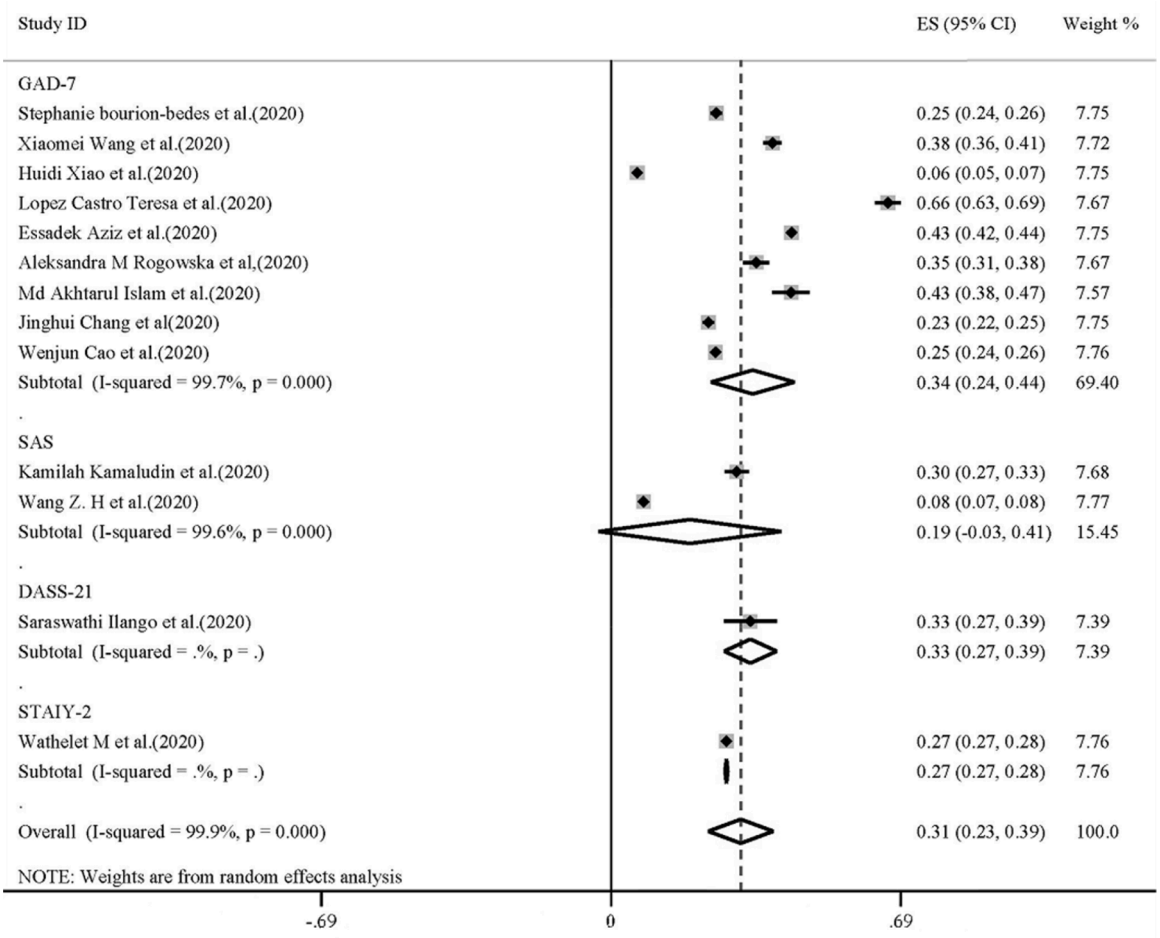

Fig. 5. Subgroup analysis based on assessment tools for estimating anxiety symptom.

carried out by reading the titles and abstracts of the literature, and some literature like inconsistent with the study aim, re-published, books, letters or reviews, and other second creations were excluded. After the preliminary screening, the literature was further screened by two researchers according to the inclusion and exclusion criteria, in case of disagreement, a third researcher was consulted to assist in judgment.

Inclusion criteria were: 1) the study population consisting of college or university students who cannot go to campus due to the COVID-19 pandemic; 2) studies published in English; and 3) the study containing a description of the prevalence of anxiety symptom or depressive symptom or both two. Exclusion criteria were: 1) the college or university students with mental illness already; 2) no evaluation tools for anxiety symptom and depressive symptom but only self-report; 3) the sample size less than 100; and 4) lacking sufficient data required to conduct the basic analysis.

2.3. Data extraction

Data extraction was completed by three researchers. First, a standardized data extraction form was developed, and two researchers extracted the data independently. Any disagreement was resolved through discussion with a third researcher. The extracted data were as follows: 1) the first author of the study; 2) the country surveyed; 3) study design; 4) response rate; 5) survey time; 6) sample size; 7) the percentage of females; 8) the assessment tools and cutoff value for estimating anxiety symptom and depressive symptom; 9) relevant subgroup data. For a longitudinal study in our meta-analysis, we chose the prevalence surveyed during the COVID-19 pandemic. For some studies lacking data, we tried to contact the corresponding authors to gain the data we need.

2.4. Quality assessment

The quality of the literature included in our meta-analysis was assessed by using a modified version of the Newcastle-Ottawa Quality Assessment Scale (NOS) which is suitable for cross-sectional studies. Given that we aimed to know the prevalence of anxiety symptom and depressive symptom, the studies included were all single-arm observational studies. After removing the irrelevant sections of NOS, there were five dimensions needed to evaluate the quality of the included studies (Modesti et al., 2016; Pappa et al., 2020). Those five dimensions were as follows: 1) represent: students were selected by using random sampling; 2) sample size: population >200 was identified as a qualified sample; 3) response: the rate of response was beyond 80%; 4) valid assessment: appropriate tools to evaluate anxiety symptom and depressive symptom; and 5) valid statistical methods: correct and clear statistic methods to describe their data. We used green to indicate that the research meets the requirement of the corresponding dimension. The total score of the study's quality ranged from 1 to 5, and score $\geq$ 3 was rated as a lower risk of bias (Deng et al., 2020).

2.5. Data synthesis and analysis

We conducted meta-analytic calculations with the software Stata. SE 15 by using a random-effects model. The pooled prevalence of anxiety symptom and depressive symptom, 95% confidence intervals were calculated, respectively. The sensitivity analysis was performed to evaluate the robustness and reliability of the pooled prevalence.

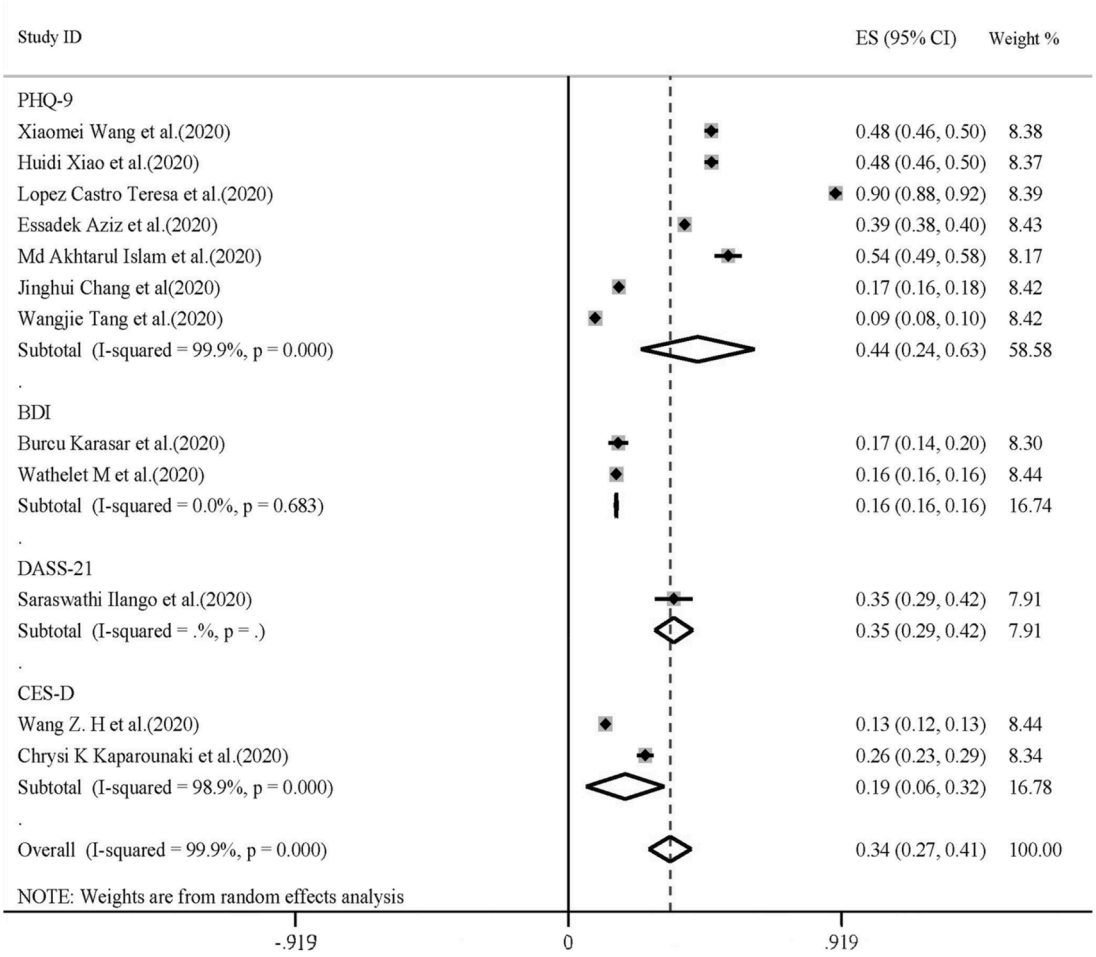

Fig. 6. Subgroup analysis based on assessment tools for estimating depressive symptom.

Heterogeneity was estimated by using Cochran's *Q* test ($p < 0.10$) and the I^2 statistic (75% = high) which were recommended by the Cochrane Handbook. For the source of heterogeneity, we conducted subgroup analysis by gender, assessment tool, and severity of the anxiety symptom and depressive symptom. Finally, we used Egger's regression test (Bowden et al., 2015) to explore whether publication bias existed.

3. Results

3.1. Literature screening

Overall, 1,250 articles were retrieved in four electronic databases, and 5 additional articles were obtained in the references. Totally, 1,255 articles were imported into the software Endnote. After removing 465 duplications, 790 articles were screened by two researchers. By reading the titles and abstracts, 689 articles were eliminated due to these researches' population is not about college student group or researches' purpose is not related to anxiety symptom and depressive symptom or researches were not surveyed during the COVID-19 pandemic. 101 potential original articles were further screened by reading the full text, however, some studies did not report the prevalence of anxiety symptom or depressive symptom, and some other studies did not assess the prevalence through generally accepted scales, and even relevant data were not provided in a few studies, 16 articles (Xiao et al., 2020; Wang et al., 2020b; Bourion-Bédès et al., 2020; Cao et al., 2020; Chang et al., 2020; Essadek and Rabeyron, 2020; Kamaludin et al., 2020; Kaparounaki et al., 2020; Karasar and Canli, 2020; Lopez-Castro et al., 2020; Rogowska et al., 2020; Saraswathi et al., 2020; Tang et al., 2020; Wang et al., 2020c; Wang et al., 2020e; Wathelet et al., 2020) were finally included in the meta-analysis (Fig. 1).

3.2. Study characteristics

Table 1 shows the overall characteristics of the 16 included studies. All included studies cross-sectional studies, except a longitudinal study that investigated the mental health of college students in two periods. Only the second survey conducted during the COVID-19 pandemic was included for analysis (Saraswathi et al., 2020). Included studies were from nine countries (See Table 1). Studies from other countries also investigated the prevalence of anxiety symptom and depressive symptom among college students; however, they did not meet the inclusion criteria. For example, there was a study that surveyed the depressive symptom among British college students by answering 'yes' or 'no', not an authority scale (Savage et al., 2020). All the college students were surveyed online from January to July 2020, respectively. Since the surveys investigated college students who were at a similar age, we did not extract the information about mean age and standard deviation. For the assessment of anxiety symptom, nine studies used the GAD-7 (Lindsay and Michie, 1988), two studies used SAS (Pang et al., 2019), one study in India used DASS-21 (Henry and Crawford, 2005) (21 items) to assess anxiety symptom and depressive symptom of students simultaneously. One research team used STAIY-2 (Wathelet et al., 2020) to investigate the prevalence in France. For the assessment of depressive symptom, seven studies used PHQ-9 (Kroenke et al., 2001), two studies used BDI (Richter et al., 1998), BDI-13 (Pang et al., 2019), and CES-D (Fountoulakis et al., 2001) was used in the other two studies

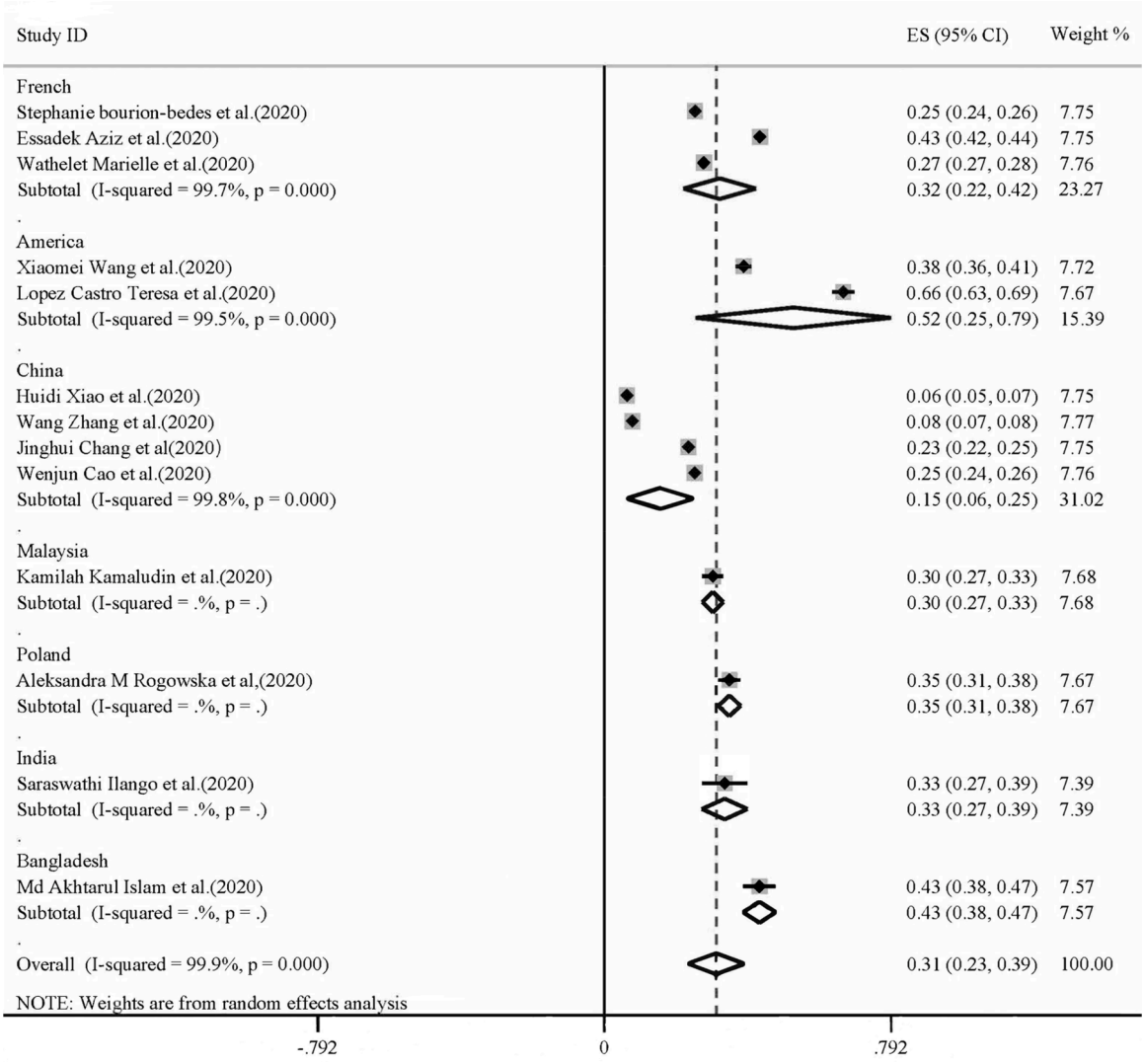

Fig. 7. subgroup analysis based on different countries for estimating anxiety symptom.

(Table 1). Specifically, these scales are tools for screening symptoms of anxiety and depression rather than clinical diagnosis.

3.3. Study quality

The quality of all the studies included in our meta-analysis was evaluated from five dimensions (represent, sample size, response, valid assessment tools, and statistical methods) by using the modified NOS which was used in a previous study (Pappa et al., 2020). The total score for studies that met the five dimensions was 5 points. Three studies were rated full points, and nine studies were rated 4 points, and four studies were rated 3 points (Fig. 2).

3.4. The pooled prevalence of anxiety symptom and depressive symptom

Thirteen of the total studies reported the condition of anxiety symptom among these college students, the pooled prevalence of anxiety symptom of 13 studies ($N = 144,010$) was 31% (95% CI: 23-39%) with high heterogeneity ($I^2 = 99.9\%$, $p < 0.001$) (Fig. 3). Twelve of the total studies reported the condition of depressive symptom among these college students, the pooled prevalence of depressive symptom of 12 studies ($N = 135,018$) was 34% (95% CI: 27-41%) with high heterogeneity ($I^2 = 99.9\%$, $p < 0.001$) (Fig. 4).

3.5. Subgroup analysis

According to the result of subgroup analysis by four assessment tools of anxiety symptom, the pooled prevalence of anxiety symptom with 9 studies used GAD-7 was 34% (95% CI: 24-44%) with high heterogeneity ($I^2 = 99.7\%$, $p < 0.001$) (Fig. 5). Based on the result of subgroup analysis by four assessment tools of depressive symptom, the pooled prevalence of depressive symptom with 7 studies used PHQ-9 was 44% (95% CI: 24-63%) with high heterogeneity ($I^2 = 99.9\%$, $p < 0.001$) (Fig. 6). For subgroup analysis by different countries, the lowest prevalence of anxiety symptom was observed in Chinese college students among which 15% were detected with anxiety symptoms, and the highest was found in American students among which 52% were detected with anxiety symptoms (Fig. 7), the lowest prevalence of depressive symptom surveyed was in Turkey college students among which 17% were detected with depressive symptoms, and the highest was also American students among which 69% were detected with depressive symptoms (Fig. 8). For subgroup analysis by gender, the prevalence of anxiety symptom among male students (36%) was higher than female students (30%), however, the prevalence of depressive symptom among female students (56%) was higher than male students (34%). The proportion of severity of anxiety symptom and depressive symptom was 7% and 5%, respectively (Table 2).

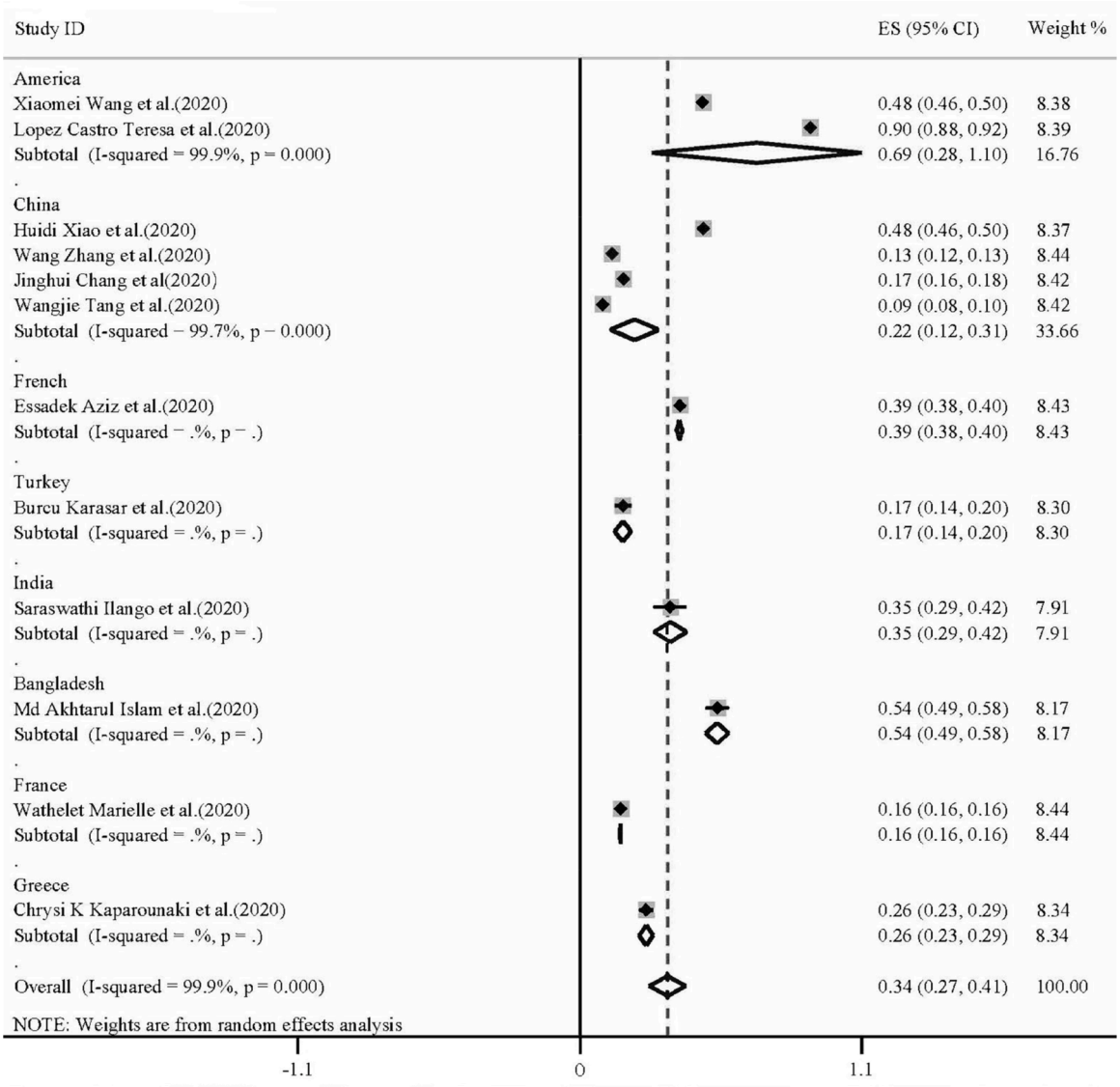

Fig. 8. subgroup analysis based on different countries for estimating depressive symptom.

Table 2
Subgroup analysis based on gender and severity.

		Anxiety symptom	Depressive symptom
Gender	Male	36%, 95%CI: 15-57%	34%, 95%CI: 28-40%
	Female	30%, 95%CI: 24-37%	56%, 95%CI: 43-69%
Severity	Mild	24%, 95%CI: 17-32%	18%, 95%CI: 11-25%
	Moderate	12%, 95%CI: 9-16%	10%, 95%CI: 6-14%
	Severe	7%, 95%CI: 5-9%	5%, 95%CI: 3-8%

Note. CI, confidence interval.

3.6. Sensitivity analysis and publication bias

The results of the sensitivity analysis showed that the pooled anxiety symptom and depressive symptom prevalence did not change significantly after excluding any study, the meta-analysis was considered to be stable (Fig. 9). No publication bias about anxiety symptom was indicated by Egger's regression test ($p = 0.620$), also, there was no publication bias about depressive symptom under the instruction of Egger's regression test ($p = 0.324$). The Egger's regression tests are illustrated in Fig. 10.

4. Discussion

To our knowledge, this is the first meta-analysis to explore the prevalence of anxiety symptom and depressive symptom among college students worldwide during the COVID-19 pandemic. The pooled prevalence of anxiety symptom was 31% (95%CI: 23-39%) in this study compared with 28% (95%CI: 22-34%) in one study (Lasheras et al., 2020), and the pooled prevalence of depressive symptom was 34% (95% CI: 27-41%) compared with 29.6% (95%CI: 29.2-30.7%) among female college students and 24.9% (95%CI: 24.2-25.2%) among male in another meta-analysis (Ibrahim et al., 2013). Studies have shown that the decrease of face-to-face social interaction could increase the risk of anxiety and depression (Shensa et al., 2018; Simone et al., 2019). During the pandemic COVID-2019, college students could not avoid spending lots of time watching and operating computers while learning online. The study by Feng et al showed that the longer students stared at the screen, the higher risk of anxiety and depression (Feng et al., 2014). Due to the influences of the pandemic, people were required to visit crowded places like playgrounds, basketball courts, football fields as little as possible, which reduced the opportunities to exercise for students, the relationship between exercise time and anxiety and depression has also been confirmed (Gallego et al., 2015; Liu et al., 2019; Ogawa et al.,

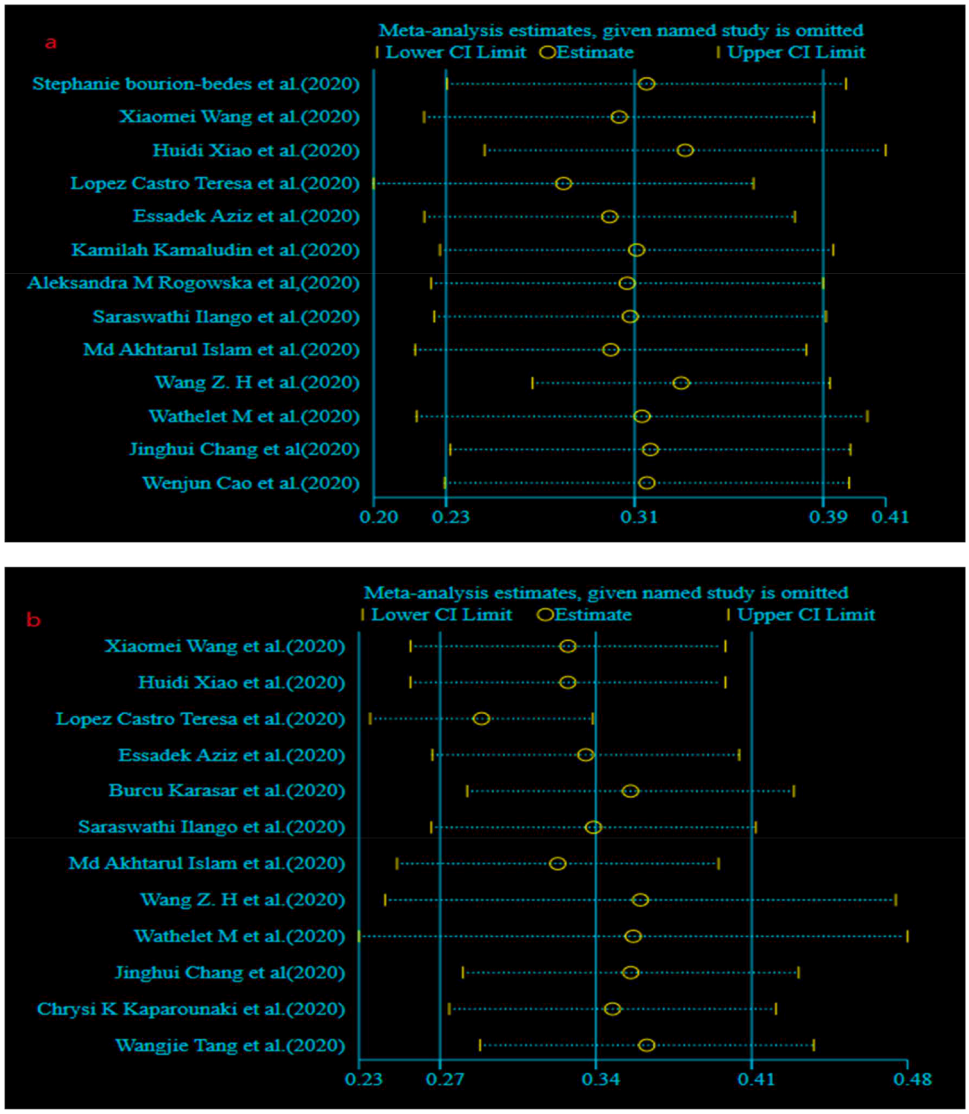

Fig. 9. (a): Sensitivity Analysis of pooled prevalence of anxiety symptom. (b): Sensitivity Analysis of pooled prevalence of depressive symptom.

2019; Philippot et al., 2019). The above negative factors will have a negative impact on the mental health of college students if not eliminated.

This study found that the prevalence of anxiety symptom and depressive symptom among college students in different countries were various from each other. The prevalence of anxiety symptom and depressive symptom of American students (anxiety symptom prevalence: 52%, depressive symptom prevalence: 69%) were both the highest (Lopez-Castro et al., 2020), while the prevalence of anxiety symptom of Chinese students (anxiety symptom prevalence: 15%) was the lowest, and the prevalence of depressive symptom of Turkish students (depressive symptom prevalence: 17%) was the lowest. Although China was the first outbreak site of the COVID-19 (Huang and Zhao, 2020), the spread of the pandemic was well controlled, there were few confirmed cases around the students, that is, the risk of infection was relatively low. The prevalence of anxiety symptom was related to the condition of the pandemic, the countries with better COVID-19 control had a lower prevalence (Xu et al., 2020). With the increasing number of new confirmed cases, inevitably, measures to limit personnel flow like lockdown were required to control the pandemic; however, the measures of restricting freedom could increase mental distress (Pierce et al., 2020). Moreover, outward individuals were more likely to feel anxious due to the increased risk of infection (Mazza et al., 2020). A survey of medical staffs' mental health in 8 European countries showed that the main reason for excessive pressure was the uncertainty when ending the pandemic (Hummel et al., 2021). Another cross-country comparative study showed that the lower confidence in controlling their country's pandemic, the higher level of anxiety among students in the country (Pramukti et al., 2020). In brief, the situation of the pandemic in a country was directly linked to the mental health of students in that country. Once the pandemic was well controlled, people can back to their normal lives which will also help reduce the risk of depression. We also found that the prevalence of anxiety symptom among male college students was close to females, while the prevalence of depressive symptom among females was higher than males. Similarly, a study about the impact of gender on mental health during the pandemic showed that women were more prone to psychological problems (Pieh et al., 2020). Many studies showed that females were more likely to suffer from mental problems (Alvi et al., 2010; Gao et al., 2020). The tendency that women are more vulnerable to psychological problems was probably attributed to the different concentrations of testosterone between men and women, testosterone may have a protective effect against anxiety and depression (McHenry et al., 2014). Our study showed that a high prevalence of anxiety symptom among male college students, probably because they preferred outdoor activities rather than being confined to home (Sallis et al., 2000).

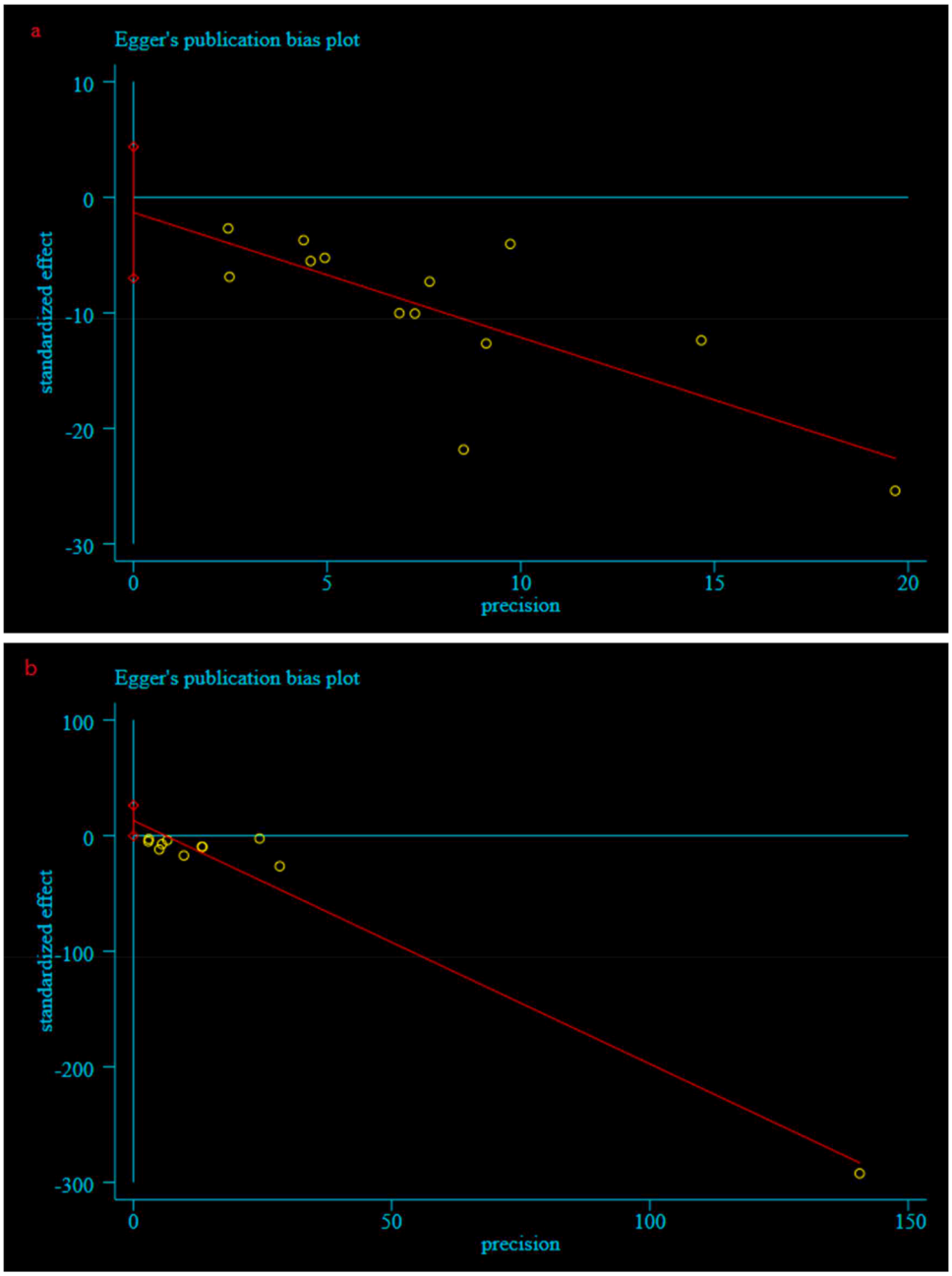

Fig. 10. (a): Egger's regression test of anxiety symptom. (b): Egger's regression test of depressive symptom.

The COVID-19 pandemic as the risk factor that leads to mental problems of college students should be addressed as an urgent matter of public health. Isolation and treatment for infected persons and close contacts, and possible expansion of vaccination populations are effective measures to control the pandemic (Chen et al., 2020; Frederiksen et al., 2020). Given that females are more likely to suffer mental distress, therefore, we should give more attention to females and provide psychological support and material services to reduce their risk of developing depression. For students who have suffered from anxiety and depression, online and telephone support can be provided, which was verified as an effective emergency measure in many countries. Popularizing knowledge about novel coronavirus can also help reduce panic and anxiety among students (Wang et al., 2020a). With the wide use of online learning during the pandemic, the education system must adapt to the model of online learning and help students adapt to this approach. Meantime, it is also necessary to teach students how to deal with negative moods by developing healthy lifestyles like regular exercise, healthy diets, sufficient sleep, and avoidance of alcohol or drug use. These interventions can help minimize their anxiety or depression (Shah et al., 2020).

5. Limitations and strengths

The limitations of our study must be noted in order to better interpret our findings. First, included studies were mainly cross-sectional studies, which could not prove the causation between the COVID-19 pandemic and the increased prevalence of anxiety symptom and depressive symptom among college students. Second, the response rates were less than 80% or no description in half included studies which may lead to selection bias. Third, the heterogeneity of the included studies was relatively high in our meta-analysis, and the heterogeneities of subgroup analysis based on the evaluation tools were also high. We speculated the

reason was that the samples lived in different countries between the studies, college students who lived in countries or regions severely influenced by the pandemic have a higher level and prevalence of anxiety symptom and depressive symptom. For example, a study surveyed in New York, America where the situation of the pandemic was serious indicated the high prevalence of mental health problems (Wathelet et al., 2020). However, the above limitations would not affect our meta-analysis on the prevalence of anxiety symptom and depressive symptom. Though some studies with a low response rate, the sample size was quite large. The reason for the low response may be insufficient publicity or lack of funds. For example, the response rate of a survey in France was only 4.3%, but 69,054 people responded, the reason was that the surveyed subjects were too large (Wathelet et al., 2020). Totally, our study included 144,010 college students. It was quite a large sample for our meta-analysis to figure out the pooled prevalence of anxiety symptom and depressive symptom among college students worldwide. Since the inclusion criteria of our meta-analysis were studies that must have authoritative and acknowledged scales for estimating anxiety symptom and depressive symptom, and excluded those random self-reporting studies, the scales were all with high reliability and validity, which made our evaluation of the prevalence of anxiety symptom and depressive symptom more accurate and reliable. Our study has examined the prevalence during the special period, furthermore, some articles have analyzed the risk factors that may cause mental health problems among students and proposed some solutions to alleviate students' anxiety and depression. Although the heterogeneity is relatively high, it is necessary to conduct this meta-analysis, it can reflect the approximate prevalence of anxiety symptom and depressive symptom worldwide, and describe a general impression of what kind of situation the college students stayed in, with so high prevalence during the pandemic, measures should be taken to help college students go through such hardship.

6. Conclusion

The results of our analysis suggest that the pooled prevalence of anxiety symptom was 31%, and the pooled prevalence of depressive symptom was 34%. The prevalence varies greatly among different countries, which is probably related to the severity of the pandemic in different countries. To better understand the prevalence of anxiety symptom and depressive symptom among college students around the world, future studies can use a standard and reliable questionnaire to conduct surveys reasonably sampled from the world. Meanwhile, we should take measures to reduce the impact of the pandemic on people's mental health urgently.

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Declaration of Competing Interest

The authors declare no financial or other conflicts of interest.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jad.2021.05.109.

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