Prevalence of and factors influencing depression and anxiety among Chinese adolescents: a protocol for a systematic review

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ABSTRACT

Introduction Depression and anxiety are common mental health disorders among adolescents and negatively impact their physical and mental health. Depression and anxiety also exert a tremendous economic burden to society. But in China, there is no systematic review to state the exact prevalence of adolescent depression and anxiety; there is also a lack of systematic reviews of factors that influence depression and anxiety. Hence, in this systematic review, we aim to summarise the current evidence of the prevalence of and factors influencing depression and anxiety among Chinese adolescents.

Methods and analysis This protocol was developed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols guidelines. We will comprehensively search four English databases (PubMed, Web of Science, CINAHL in EBSCO interface, PsycINFO in ProQuest interface) and three Chinese databases (China National Knowledge Infrastructure, WanFang and SinoMed) for studies from inception to 31 August 2022. Screening for eligible studies and data extraction will be conducted by two reviewers independently, and all discrepancies will be resolved through group discussion.

Ethics and dissemination Because this is a review of published studies, no ethical approval is required. The results will be reported in a peer-reviewed journal or disseminated at relevant conferences.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ In this study, we conducted a systematic synthesis of the exact prevalence of depression and anxiety among Chinese adolescents and performed subgroup analysis, including gender, age and assessment tools for depression or anxiety.

⇒ In this study, study screening, quality assessment and data extraction will be completed through Joanna Briggs Institute System for the Unified Management of the Assessment and Review of Information, to maximise transparency, accuracy and significance.

⇒ There is potential limitation arising from publication bias due to methodological inability to include qualitative studies.

INTRODUCTION

Depression and anxiety are common mental health disorders among adolescents. It is estimated that 6.2% of adolescents worldwide have depression and 6.5% have anxiety.1,2 Adolescent depression and anxiety negatively impact their mental health and education, which may affect their psychosocial function, reduce their quality of life and result in poor attendance at school.3,4 A community-based study reported that 44% of adolescents with depression or anxiety had at least one unexcused absence in the previous school term compared with 9% of those without depression or anxiety.5 Depression in adolescents has a bidirectional relationship with chronic illness, including cancer, heart disease, diabetes, arthritis and asthma.6–9 Compared with healthy adolescents, those with depression and anxiety have significantly increased risk behaviours, such as smoking (OR=1.84, p<0.001) and binge eating (OR=2.02, p<0.001), and are 1.6 and 2.0 times more likely to drink alcohol and use drugs.10 Moreover, the suicide rate among adolescents with depression is 1.81 times higher than that in the general population.11

Adolescent depression and anxiety also impose a huge economic burden to society. The USA spends approximately $2 billion a year on healthcare for adolescents with mental health problems.12 The total cost of depression and anxiety in adolescents is higher than that of other mental health problems worldwide.13 Despite the considerable impact of anxiety and depression on adolescents, more than half of them do not receive appropriate treatment,14,15 which may deteriorate into a major disorder that damages physical and mental health in adulthood. Some studies in America showed that people who have had severe depression or anxiety...
during adolescence are more likely to die by suicide in adulthood and have mental illness and hospitalisation.\textsuperscript{16,17}

In 2020, there were 156 million adolescents in China\textsuperscript{18}, extrapolating from the global prevalence of depression and anxiety in adolescents, more than 9 million Chinese adolescents have depression or anxiety. It is a major challenge for China to identify and manage adolescent depression and anxiety. These two conditions usually strike first during adolescence, which means that adolescence is essential for identifying modifiable risk factors and implementing interventions to prevent depression in later life. To develop interventions for adolescent depression and anxiety, it is vital to understand the epidemiological patterns of depression and anxiety in adolescents.

Many recent studies have investigated the prevalence of depression or anxiety among Chinese adolescents; however, the results vary considerably. Because of the differences in assessment tools and target population and small sample sizes, the prevalence of depression and anxiety has been reported to be 4.41\%–75.2\%\textsuperscript{19-25} and 7\%–46.7\%,\textsuperscript{21,22} respectively. Several systematic reviews have described the prevalence of depression or anxiety among Chinese adolescents,\textsuperscript{23-25} but they have not been representative. For example, a meta-analysis of observational studies used only one tool to determine the prevalence of depression at 19.85\%.\textsuperscript{23} A systematic review reported that the prevalence of depression and anxiety among obese adolescents was between 21.73\% and 39.80\%.\textsuperscript{24} Another systematic review focused on the COVID-19 pandemic noted that 28.6\% and 25.5\% of adolescents experienced depression and anxiety.\textsuperscript{25} These data are insufficient to comprehensively understand the prevalence of depression and anxiety among all Chinese adolescents, necessitating a comprehensive, up-to-date systematic review to determine the exact prevalence of Chinese adolescent depression and anxiety.

Approximately 50\% of people with depression or anxiety reported that they first experienced these emotional problems before the age of 15 years and 75\% before the age of 18 years,\textsuperscript{26} but fewer than half of them received appropriate treatment.\textsuperscript{27} Early intervention results in improved outcomes for adolescents,\textsuperscript{28-30} and the first step of intervention, is the identification of risk factors. Therefore, determining the risk factors for depression and anxiety is crucial. Many studies have identified the factors influencing depression and anxiety, including familial and genetic risks, psychosocial risk factors and gene–environment interplay.\textsuperscript{31-35} However, most studies have explored risk factors from only one aspect, and few have summarised the complex and diverse influencing factors. Therefore, we plan to conduct a systematic review to synthesise the data on the prevalence of and risk factors for depression and anxiety among Chinese adolescents.

**METHODS**

This protocol refers to the guidebook of Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols (PRISMA-P),\textsuperscript{36} and it has been registered in PROSPERO (CRD42022299943). This systematic review is expected to start on 1 January 2023 and the anticipated completion date is on 30 June 2023.

### Criteria for included and excluded studies

#### Types of participants

On the basis of the WHO’s definition of adolescents, the target population for this study is those aged 10–19 years old with depression or anxiety. This study will focus on adolescents who have Chinese nationality and reside in mainland China.

#### Types of exposure and outcome

In this study, depressive and anxiety symptoms and depression and anxiety disorder will all be included. The diagnostic instrument for depression and anxiety can be any tool that has been previously tested for good reliability and validity. Studies will be excluded if the participants are diagnosed as having a severe mental illness, including schizophrenia, bipolar disorder and schizoaffective disorder, identified based on the Diagnostic and Statistical Manual of Mental Disorders IV or the International Classification of Diseases-10.

#### Types of studies

The review will include original studies with full texts published in peer-reviewed journals in English or Chinese. Descriptive studies, cross-sectional studies, case–control studies or cohort studies investigating the prevalence and risk factors for anxiety or depression will be included.

#### Search methods of studies

Relevant studies published in English or Chinese will be identified by searching seven databases—four English databases (PubMed, Web of Science, CINAHL in EBSCO interface, PsycINFO in ProQuest interface) and three Chinese databases (China National Knowledge Infrastructure, WanFang and SinoMed)—from inception to 31 August 2022. The search strategy was first developed in PubMed using medical subject headings combined with free-text terms around the four search concepts ‘depression’, ‘anxiety’, ‘adolescent’ and ‘China’, and then adapted for use in the other databases. An example of the search strategies used in PubMed is presented in table 1. The reference lists of the included articles will also be manually searched to identify any potentially relevant study.

#### Study selection

Studies from each database will be grouped, and duplicated records will be removed using EndNote VX9. The remaining articles will be imported into Joanna Briggs Institute (JBI) SUMARI (System for the Unified Management of the Assessment and Review of Information). Two authors (JC and KZ) will independently screen the titles and abstracts, and studies meeting the inclusion criteria will be considered for full-text review, also performed
and through a visual inspection of forest plots. Subgroup
tistical difference between the combined effect size of the
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tistical heterogeneity will be assessed using the I² statistic
assessments and instruments used to measure outcomes. Statis-
Sectional Studies, (2) Checklist for Case Control Studies, (3) Checklist for Cohort Studies and (4) Checklist for Prevalence Studies. These aim to assess a study’s methodological quality and determine whether the researchers address potential bias in its design, implementation and analysis. Each checklist uses different questions to evaluate the quality of the studies. Each item will be judged as ‘yes’, ‘no’, ‘unclear’ or ‘not applicable’. All discrepancies will be resolved through group discussion.

Data extraction
The standardised JBI data extraction sheet from JBI SUMARI will be used to extract data, including title, the first author, published year, study design, study setting, sampling method, sample size, demographic characteristics, assessment tools for anxiety or depression and its cut-off, and main results related to prevalence or influencing factors of anxiety and depression. These data will be extracted independently by two authors (JC and KZ). If information concerning the outcomes of interest is missing, we will contact the study authors to obtain it. Any disagreements will be resolved through group discussion (JC, KZ and CH).

Data analysis
The extracted data will be analysed using Stata software V.14. Heterogeneity between included studies will be assessed based on study design, characteristics of populations and instruments used to measure outcomes. Statistical heterogeneity will be assessed using the I² statistic and through a visual inspection of forest plots. Subgroup analyses will be conducted to find out if there was a statistical difference between the combined effect size of the subgroups. We will perform the following comparisons to identify potential subgroup effects: (1) male and female; (2) adolescents aged 10–14 and adolescents aged 15–19 years; (3) assessment tool for depression or anxiety and its cut-off. In the subgroup analysis of risk factors, we will also compare the influence of different types of articles. If the included studies have acceptable heterogeneity, we will conduct a meta-analysis, but if the heterogeneity is too large (I² ≥90%), we will perform a systematic review without a meta-analysis. If there are no quantitative data for meta-analysis, we will consider conducting a narrative synthesis. We will also examine the publication bias through a visual inspection of funnel plots, the Egger regression test for funnel plot asymmetry and the Begg rank correlation test. If the evidence is sufficient, we will conduct a subgroup analysis using different sex and age groups (eg, <10, 10–14 and 15–19 years), instruments for outcome assessment and the quality of the study.

Quality assessment
Two authors (JC and KZ) will independently assess the quality of the studies using JBI Critical Appraisal Checklists accordingly: (1) Checklist for Analytical Cross-Sectional Studies, (2) Checklist for Case Control Studies, (3) Checklist for Cohort Studies and (4) Checklist for Prevalence Studies. Use of these checklists to appraise the study's methodology and the quality of the study.

Patient and public involvement
Because this is a review study, no patients or members of the public will be involved in the study design or implementation.

DISCUSSION
Adolescent depression and anxiety contribute to a substantial degree of disease and economic burden, and their prevention and treatment represent a major public health priority. Prevalence is an important indicator of disease burden and can provide critical information for health policy, prevention and intervention planning. Factors influencing prevalence provide critical information for developing intervention programmes. There is a strong rationale for updating current evidence on adolescent depression and anxiety prevalence and influencing factors. As mentioned earlier, the available systematic reviews and meta-analyses do not provide a comprehensive picture of the epidemiology of depression and anxiety among Chinese adolescents. Our systematic review will make substantial contributions to the existing literature by including a more comprehensive and detailed search strategy and subgroup analysis. Unlike the study by Rao et al., we will not limit the review to studies using only one assessment tool for depression or anxiety but also include other validated tools. We strongly believe that our data will be crucial for both research and policy and might inform the development of prevention and intervention programmes. Our findings may also help to set prevention priorities, optimise resource allocation and guide future studies to fill knowledge gaps.

ETHICS AND DISSEMINATION
Because this is a review of published studies, no ethical approval is required. The results will be reported in a peer-reviewed journal or disseminated at relevant conferences.

Table 1  Example of the search strategies used in PubMed

<table>
<thead>
<tr>
<th>#</th>
<th>Search phrase</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>depression[T/A] OR depressive disorder[T/A]</td>
</tr>
<tr>
<td>#2</td>
<td>depressi*[T/A] OR depressi* disorder*[T/A] OR depressi* symptom*[T/A]</td>
</tr>
<tr>
<td>#3</td>
<td>anxiety[T/A] OR anxiety disorder[T/A]</td>
</tr>
<tr>
<td>#4</td>
<td>anxi*[T/A] OR anxi* disorder*[T/A] OR anxi* symptom*[T/A]</td>
</tr>
<tr>
<td>#5</td>
<td>adolescent[T/A]</td>
</tr>
<tr>
<td>#6</td>
<td>adolescent*[T/A] OR child*[T/A] OR teen*[T/A] OR youth*[T/A] OR young adult*[T/A]</td>
</tr>
<tr>
<td>#7</td>
<td>China*[T/A]</td>
</tr>
<tr>
<td>#8</td>
<td>China*[T/A] OR Chinese*[T/A]</td>
</tr>
<tr>
<td>#9</td>
<td>(#1 OR #2 OR #3 OR #4) AND (#5 OR #6) AND (#7 OR #8)</td>
</tr>
</tbody>
</table>
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Patient and public involvement Patients and/or the public were not involved in the design, conduct, or reporting, or dissemination plans of this research.

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Provenance and peer review Not commissioned; externally peer reviewed.

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