

School mental health prevention and intervention strategies in China: a scoping review

Diyang Qu,^{a,b} Xue Wen,^{a,b} Xuan Cheng,^{a,b} Anni Zhu,^a Zhijun Wu,^a Liying Che,^a and Runsen Chen^{a,*}

^aVanke School of Public Health, Tsinghua University, Beijing, China

Summary

Student mental health issues remain a significant global concern, imposing considerable health, social, and economic burdens. China has also published numerous national policies prioritizing this area. To further investigate the current prevention and intervention programs, we conducted a scoping review, searching six databases (three in English and three in Chinese) up to May 2024. A total of 77 eligible studies were included. Our findings highlight several gaps in current practices, such as regional disparities in school-based mental health programs, insufficient focus on younger children and developmental issues, limited comprehensive pathways from screening to classification, prevention, and intervention, and a lack of an integrated approach to promoting mental health among children and adolescents. These findings indicate an urgent need for improvements in this field, calling for future studies to help reduce the burden of mental health problems and support the holistic development of children in China.

Copyright © 2024 The Author(s). Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Keywords: Implementing; Review; Prevention and intervention program; Mental health

Introduction

Children's and adolescents' mental health issues have become a significant public health concern, particularly during and after the COVID-19 pandemic. A recent review found that the pooled prevalence estimates of clinically elevated symptoms of depression and anxiety among children and adolescents were 25.2% and 20.5%, globally.¹ The substantial impact of mental health problems among young people leads to broader negative consequences, such as higher risk of antisocial behaviors, severe health behaviors.^{2,3} More importantly, issues that begin in childhood can persist into adulthood, leading to higher levels of unemployment, strained social relationships, and elevated mortality rates later.^{4,5}

Several strategies have been implemented to address mental health issues in children and adolescents. Schools are well-positioned to deliver effective mental health prevention and treatment interventions.⁶ They help foster resilience, prevent mental health issues, and provide effective treatment for those already facing challenges.⁷ In general, a multi-tiered system of support (MTSS) is a population-based and commonly used approach in schools. This approach highlights the importance of proactive, comprehensive, evidence-based support for students with varying levels of need.⁸ Universal, or Tier 1, typically includes a school-wide or class-wide health promotion program integrated into the

curriculum and taught to all students. Selective, or Tier 2, is designed for those identified as at risk due to known risk factors and includes heightened prevention efforts or early intervention, such as students who are experiencing mild functional impairment. Indicated, or Tier 3, is designed for individuals with identified problems who need more intensive services, such as students with more serious mental health concerns, aiming to prevent symptom worsening that could impair their daily functioning.

To date, the Chinese government has highlighted the importance of nurturing students' mental health as a foundation, as indicated in a recent review of policy.^{9,10} The *Healthy China Action Plan*, which is the central element of the Chinese government's health agenda, emphasized the need to promote the well-being of young people through targeted interventions. Moreover, the *Special Action Plan for Comprehensively Strengthening and Improving the Mental Health Work of Students in the New Era* (2023–2025), issued by China's Ministry of Education and 16 other authorities, further underlines the commitment to enhancing mental health care in school settings.¹¹

Despite these initiatives, significant variations exist in the implementation of mental health programs across different regions in Mainland China. For example, while some provincial education bureaus in China have provided guidelines for mental health education class at various educational stages, and other provinces may have different types of guidelines.¹² This disparity highlights the need for a comprehensive review that synthesizes existing evidence and identifies best



The Lancet Regional Health - Western Pacific
2024;53: 101243

Published Online xxx
<https://doi.org/10.1016/j.lanwpc.2024.101243>

*Corresponding author. Vanke School of Public Health, Tsinghua University, No.30, Shuangqing Road, Haidian District, Beijing, China.

E-mail address: runsenchen@tsinghua.edu.cn (R. Chen).

^bContributed equally.

practices to inform policy implementation. Additionally, there remains a lack of clarity regarding the current state of interventions, their implementation nationwide, and their primary target groups. It is also uncertain to what extent the three-tier prevention model is being utilized and which intervention techniques are most commonly employed. Addressing these gaps is crucial for developing more effective and equitable mental health strategies in real-world settings.^{13,14}

Therefore, the purpose of this review is to explore the current prevention and intervention programs implemented in Chinese school settings, as reported in peer-reviewed literature focused on mental health, covering elementary, junior high, high school, and college levels, across a three-tiered framework. Accordingly, this scoping review aims to (1) provide readers with insights into the current programs in Chinese school settings, the quality of these studies, and the common delivery or intervention strategies; and (2) discuss the key findings, practical implications, strengths, and limitations. Finally, this study concludes with recommendations for future research.

Methods

Protocol registration

The study protocol was drafted based on the methods outlined in the PRISMA extension for scoping reviews (PRISMA-ScR) checklist. This study protocol was prospectively registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 02 May 2024 (Identifier: <https://doi.org/10.37766/inplasy2024.5.0007>).

Search strategy and selection criteria

Search terms consisted of three concepts, i.e., mental health, prevention/intervention, school and study regions, linked by a Boolean Operator “AND”. Within each of these concepts, general terms like “mental health”, “school”, “screening, prevention or intervention”, “China” and individual common phases such as “depression, anxiety, self-harm, suicide, behavior problem”, “screening, intervention, prevention, project, program, therapy, solution, service, treatment, training”, or their synonyms were used for search. These terms were used in varying combinations to identify relevant literature in different databases (see [Supplementary](#) for more details).

We employed the Population, Intervention, Comparison, and Outcome (PICO) framework for inclusion and exclusion criteria. Three English-language based databases including PubMed, PsycINFO and Web of Science, as well as three Chinese-language-based databases including Wanfang, Weipu and CNKI, were searched. For papers in Chinese, only articles published in Chinese Core Journals were considered.

The proposed review followed a five-stage framework to ensure a comprehensive and systematic approach: 1)

identifying the research question; 2) identifying relevant studies; 3) selecting studies; 4) charting the data; and 5) collating, summarizing, and reporting the results.

Inclusion criteria

All studies were included in this review if they met the following criteria: 1) Studies conducted exclusively with Mainland Chinese students; 2) Research centered on school-based prevention or intervention programs specifically targeting mental health issues such as depression and anxiety, considering these as primary or secondary outcomes; 3) Only empirical studies published in peer-reviewed journals were considered, including randomized controlled trials, case-control studies, cohort studies, case series, and case reports; 4) Studies were published between January 1, 2000, and May 3, 2024; 5) Articles were in English or Chinese. For papers in Chinese, only articles published in high-quality journals were considered (i.e., Chinese Core Journals).

Exclusion criteria

The exclusion criteria were: 1) Literature reviews lacking empirical data; 2) Conference abstracts, dissertations, theses, or book chapters; 3) Studies with inadequate information provided for data extraction (e.g., missing intervention details); 4) Studies focusing on interventions that did not target mental health outcomes; 5) Studies that used schools as the source of recruitment, but where the intervention was not school-based, were excluded. In line with previous studies, grey materials (i.e., published government documents) were not included.

Source of evidence screening and selection

Data screening and selection were conducted separately for each section, with different reviewers performing the database searches. The reviewers examined the titles and abstracts against the eligibility criteria. Any disagreements between the reviewers were initially resolved by evaluating the entire manuscript and, if necessary, with the assistance of an additional reviewer.

Study inclusion and exclusion were independently assessed by two reviewers, with a third reviewer resolving any disagreements (DQ, XW, XC). Two reviewers independently searched the target databases according to the search strategy and performed a two-step screening process on the retrieved papers and literature (XW, XC). The first step involved screening titles and abstracts based on the inclusion and exclusion criteria, while the second step involved full-text screening of studies that met the research objectives. Any discrepancies or inconsistencies identified during the screening process were resolved in a joint meeting with the third reviewer to determine the cause and reach a consensus (ZW, DQ).

Two reviewers then conducted a quality assessment of the studies included in the scoping review, evaluating

the quality of evidence for each peer-reviewed study (XW, XC). Data management was performed separately for each section, including prevention and intervention. Data were reported through tables and charts for each section. The descriptive information extracted from each study included author names, publication years, and study design. The authors (XW, XC) categorized the studies into three levels—universal, selective, and indicated—based on definitions provided in the introduction and previous studies. Specific variables of interest about the prevention and intervention programs were extracted for each section (e.g., duration, deliverer).

The items used for peer-reviewed articles in the data collection table are presented in the Methods and [Supplementary](#) sections. Each section was recorded and cross-checked by an independent researcher (ZW, DQ), with two independent researchers in total for all sections. Any disagreements were resolved by the senior reviewer (ZW, DQ).

Data extraction

Data were collected on the records (e.g., author names, publication years, language), study design (e.g., population, screening strategies for selective or indicated levels, study type, sample size), and the nature of interventions (e.g., treatment strategies, interventionist, length of follow-up, and measurement outcomes). The data were presented in tabular form and analyzed narratively based on their relevance to the review objectives. We also cite studies included in this review and listed in the [Supplementary Material](#), which are denoted by 's'.

Assessment of risk of bias and grading of evidence

Two independent reviewers (XW, XC) assessed the intervention quality of eligible studies using standardized critical appraisal instruments. For RCT studies, the RoB 2 tool was used to identify sources of bias related to the randomization process, deviations from assigned interventions, missing data, outcome measurement, and the selection of reported results. For single-arm cohort studies, the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Case Series was applied to evaluate the risk of bias. For quasi-experimental studies, the JBI Critical Appraisal Checklist for Quasi-Experimental Studies was used to assess the risk of bias. Any disagreements that arose between the reviewers were resolved through discussion or with the assistance of a third reviewer (DQ). All previous sections were cross-checked by an independent researcher (ZW).

Result

As shown in the PRISMA flowchart ([Fig. 1](#)), our initial literature search yielded 14,877 records. After removing 3632 duplicates and excluding 11,089 irrelevant records, we proceeded to examine 156 full-text articles. Following the full-text screening, 77 articles met the inclusion

criteria. Among these, 36 (46.8%) were Chinese-language research articles. Of the included studies, 49 (63.6%) were randomized controlled trials, 19 (24.7%) were quasi-experimental studies, and 9 (11.7%) were single-arm studies. The characteristics and citations of each study are presented in the [Appendix \(Table B\)](#).

Spatiotemporal distribution and timeline of included publications

Between January 2000 and May 2024, a total of 77 publications were conducted across 26 provinces in Mainland China. Among the 70 publications with specific geographic information, most originated from institutions in the more developed eastern and southwestern provinces of Mainland China. The top eight locations were Beijing (N = 9), Henan (N = 6), Hebei (N = 5), Jiangxi (N = 5), Shandong (N = 5), Sichuan (N = 5), Chongqing (N = 4), and Guangdong (N = 4). As shown in [Fig. 2](#), the number of published studies has sharply increased over the years. Of these 77 publications, 74 (96.1%) were research articles, while 3 (3.9%) were brief reports. Additionally, 41 papers (53.2%) were published in English-language journals, and 36 papers (46.8%) were published in Chinese-language journals.

A notable trend is the concentration of publications in recent years, with a significant number emerging between 2019 and 2024. The year 2022 recorded the highest number of publications, with 11 out of the total 78, closely followed by 2023 with 10 publications. This trend indicates a growing interest and increased output in the field over the past five years ([Fig. 3](#)).

The summary of intervention characteristics

As shown in [Table 1](#), the universal interventions in schools were the most common in the current review. In general, seven of the selected studies focused on primary school students (15.9%),^{S3,S4,S7,S20,S23,S29,S30} fifteen studies focused on junior high school students (34.1%),^{S2,S6,S9,S14–S18,S21,S22,S27,S28,S32,S33,S39} and two studies focused on senior high school students (4.5%).^{S1,S12} Additionally, fourteen studies targeted college students (31.8%),^{S5,S8,S11,S13,S24,S25,S31,S34,S36,S37,S40,S41,S43,S44} and three studies targeted vocational college students (6.8%).^{S19,S26,S38} One study included both primary and junior high school students (2.3%),^{S35} while two studies involved middle school students without specifying the level (4.5%).^{S10,S42}

Selective interventions included five studies focused on primary school students (33.3%),^{S45,S46,S48,S52,S54} two on junior high school students (13.3%),^{S47,S53} and one on senior high school students (6.7%).^{S50} Two studies addressed middle school students without specifying junior or senior high levels (13.3%),^{S55,S57} and one study focused on both senior and junior high school students (6.7%).^{S51} Additionally, one study included a broad range of students aged 6–17 years (6.7%),^{S49} and three studies focused on college students (20.0%).^{S56,S58,S59}

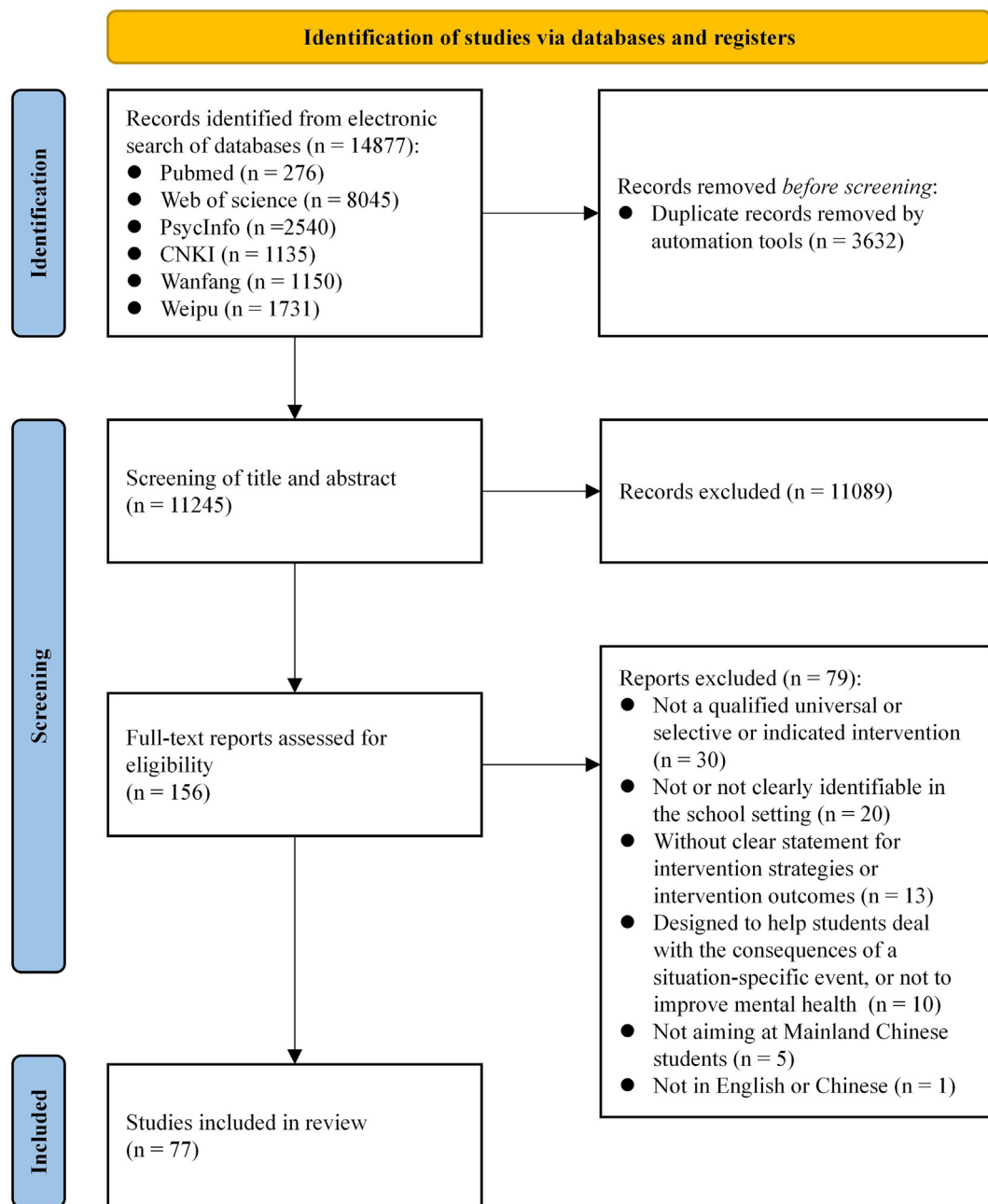


Fig. 1: PRISMA flowchart of studies identified for inclusion in the scoping review on school mental health practices in Mainland China, with full-text screening based on the inclusion and exclusion criteria outlined in the manuscript.

In indicative studies, two of the selected studies focused on junior high school students (11.1%),^{S60,S62} two studies focused on primary school students (11.1%),^{S64,S65} twelve studies focused on college students (66.7%),^{S63,S66–S76} and one study focused on vocational college students (1 study; 5.6%).^{S61} One study did not clearly state whether it belonged to primary or high school students at risk of mental health problems (5.6%).^{S77}

Screening and treatment strategies

As shown in Table 2, the universal interventions encompassed various approaches, including psycho-education (29.5%),^{S4,S6,S7,S9,S11,S19,S23,S27,S28,S31,S37,S43,S44} second-tier psychological strategies such as positive psychology (18.2%),^{S1,S5,S15–S17,S38,S41,S42} cognitive therapy (6.8%),^{S3,S21,S29} mindfulness (6.8%),^{S10,S14,S18} behavior therapy (4.5%),^{S13,S24} acceptance and commitment therapy (4.5%),^{S22,S32} and social emotional learning

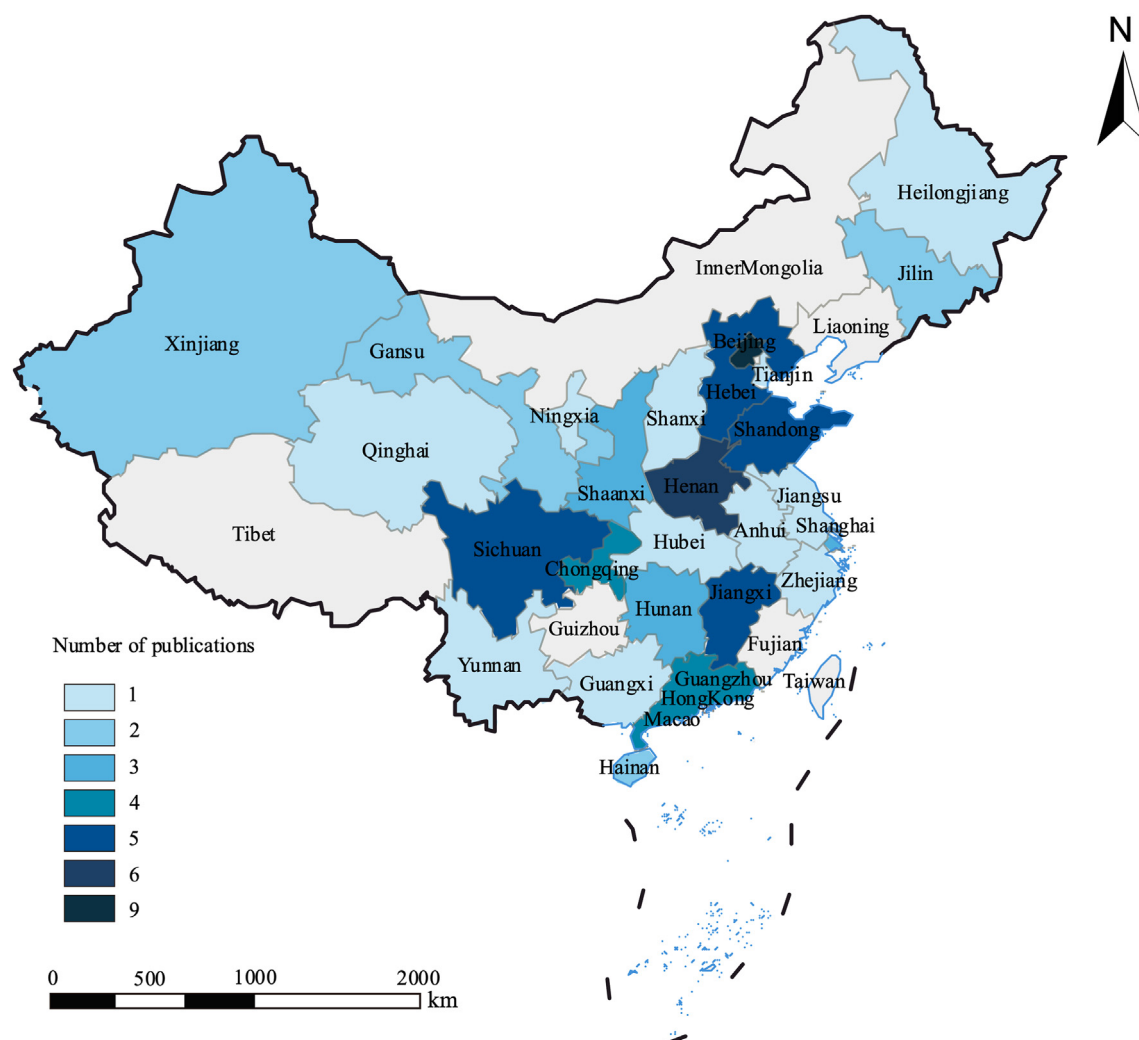


Fig. 2: The spatiotemporal distribution of included publications.

(2.3%),^{S20} along with indirect methods such as art therapy (4.5%)^{S8,S36} and sport-related activities (9.1%),^{S2,S25,S26,S34} as well as some multi-dimensional strategies combining different methods (13.6%). For example, one study combined intervention, cognitive behavioral therapy, and mindfulness-related treatment (2.3%),^{S12} another combined referral with other strategies (4.5%),^{S30,S39} and another combined psychoeducation with other strategies (6.8%).^{S33,S35,S40}

In selective interventions, children with specific conditions were selected. For instance, four studies targeted impoverished children, including those with low resilience (26.7%),^{S47,S48,S50,S58} and three studies targeted left-behind children (20.0%).^{S52,S55,S56} Additionally, one study focused on rural boarding school students from special families with mental health problems (this study falls between selective and indicative, as it recruited students with an MHRSP score ≥ 10)

(6.7%).^{S54} One of the selected studies focused on migrant children (6.7%),^{S45} and one study focused on children with mild to moderate physical disabilities (6.7%).^{S59} One study focused on children with at least one HIV-positive parent (6.7%).^{S49} Surprisingly, there is one study focused on children with myopia (6.7%).^{S46} In addition, it is worth noting that there are three studies focused on children with earthquake experience (20.0%).^{S51,S53,S57} The primary outcomes are varied, ranging from resilience, loneliness, to anxiety, depressive and problematic behaviors.

A variety of approaches were used at this level, including resilience-based training (33.3%),^{S45,S47,S49,S50,S55} social-emotional learning,^{S48,S54} cognitive-related therapy,^{S52,S56} trauma-related interventions (each 13.3%),^{S51,S57} and smaller contributions from interpersonal skills training,^{S53} sport-related activities,^{S59} mixed strategies,^{S58} and myopic intervention (each 6.7%).^{S46}

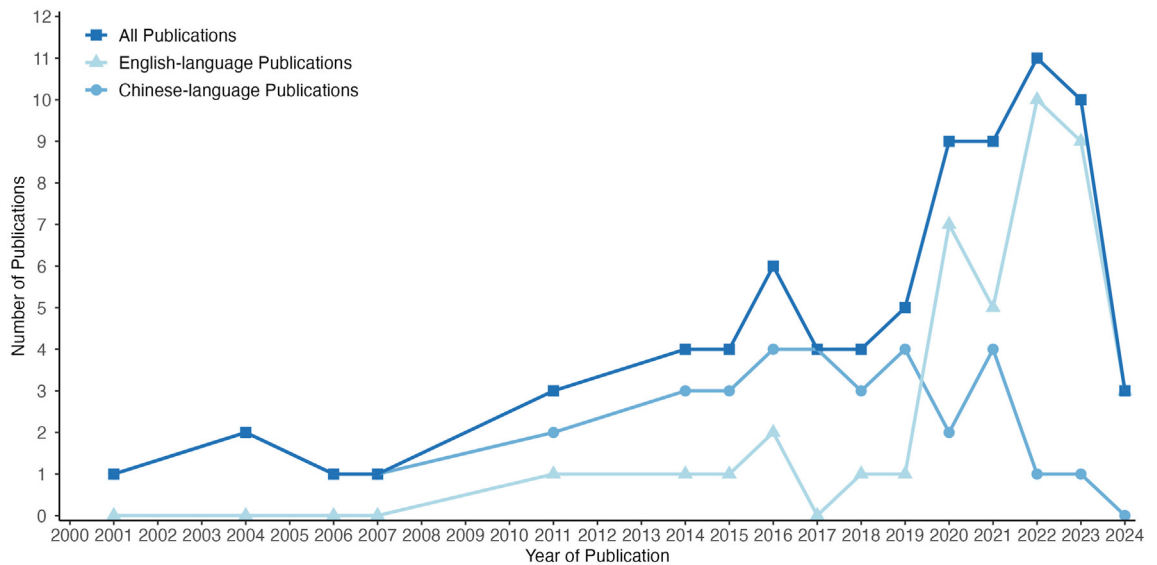


Fig. 3: Annual number of articles included in the analysis published from 2001 to 2024.

In indicative interventions, the majority of studies included programs primarily focused on students with emotional problems, including depressive (38.9%)^{S62,S63,S69,S72,S73,S75,S76} and anxiety symptoms (33.3%).^{S60,S66,S68,S70,S71,S74} Specifically, two studies targeted post-traumatic stress disorder (PTSD; 11.1%),^{S64,S65} while one study focused on non-suicidal self-injury behaviors and suicidal ideation (5.6%).^{S61} Additionally, there are two studies (11.1%)^{S67,S77} that labeled students with multiple mental health problems or those with obsessive symptoms, interpersonal sensitivity, depression, and hostility factors as scoring >3 points, ranking them among the top four students in each category. Several measurements were used to identify students at risk, including the SCL-90, MSSMHS et al.

Moreover, indicative-level interventions included psychological strategies such as cognitive therapy (5.6%),^{S63} positive psychology (11.1%),^{S76,S77} emotional regulation training (5.6%),^{S75} trauma-focused content (11.1%),^{S64,S65} sport-related activities (27.8%)^{S62,S69,S71,S73,S74} and art therapy (5.6%),^{S70} integrative strategies combining sport, mindfulness, and psychoeducation (5.6%)^{S60} combined sport-related activities with other interventions (16.7%),^{S67,S68,S72} along with other methods such as mood thermometers, professional referrals (5.6%),^{S61} and local culture interventions (5.6%).^{S66}

The study design of studies in three tiers

Tier 1 universal intervention

Deliver strategies. As shown in Table 3, most studies (42; 95.5%) used group delivery methods,^{S1–S29,S31,S32,S34–S44} while a few combined individual and group formats (2; 4.5%).^{S30,S33} Regarding frequency, 31 studies (70.5%)

delivered programs weekly,^{S1–S5,S7,S8,S10–S15,S17–S22,S26,S29,S31,S32,S34,S36–S39,S41–S43} 7 studies (15.9%) implemented them monthly,^{S6,S9,S16,S23,S24,S30,S44} and 1 study (2.3%) delivered programs daily.^{S27} Five studies (11.4%) lacked sufficient data on frequency.^{S25,S28,S33,S35,S40}

Three studies (6.8%) provided sessions lasting 30 min or less,^{S14,S24,S43} 17 studies (38.6%) offered sessions between 30 and 60 min,^{S1,S2,S6–S8,S10,S12,S15–S18,S20–S22,S29,S32,S34} and 10 studies (22.7%) delivered sessions between 60 and 120 min.^{S3–S5,S13,S19,S27,S31,S37,S38,S42} Two studies (4.5%) had sessions over 120 min,^{S11,S41} while 12 studies (27.3%) did not provide sufficient data on session duration.^{S9,S23,S25,S26,S28,S30,S33,S35,S36,S39,S40,S44}

Interventionist. Regarding Tier 1 program delivery, 11 studies (25.0%) were delivered by mental health teachers or professional counselors,^{S1,S4,S5,S11,S17,S19,S23,S31,S32,S37,S38} while 11 studies (25.0%) were delivered by teachers (e.g., head teachers, PE teachers).^{S7,S8,S10,S13–S16,S26,S33,S34,S39} Seven studies (15.9%) featured researchers as interventionists,^{S3,S12,S18,S21,S29,S30,S42} and three studies (6.8%) involved non-mental health specialists (e.g., coaches, librarians, peer leaders).^{S2,S35,S36} Another three studies (6.8%) used graduate students as interventionists.^{S9,S22,S27} Four studies (9.1%) involved mixed interventionists,^{S6,S40,S43,S44} and five studies (11.4%) did not specify the delivery format.^{S20,S24,S25,S28,S41}

Sample size and follow-up. The sample size of intervention groups for all studies ranged from 28 to 3402. It is worth noting that there is one study with a sample size higher than 800: this study^{S31} had 3402 participants in the intervention group using a single-arm design. One study had a sample size under 30 (2.3%),^{S11} twelve

Intervention characteristics	Universal (k = 44)		Selective (k = 15)		Indicated (k = 18)	
	n (%)	Ref.	n (%)	Ref.	n (%)	Ref.
School settings						
Primary	7 (16)	S3,S4,S7,S20,S23,S29,S30	5 (33)	S45,S46,S48,S52,S54	2 (11)	S64,S65
Junior	15 (34)	S2,S6,S9,S14-S18,S21,S22,S27,S28,S32,S33,S39	2 (13)	S47,S53	2 (11)	S60,S62
Senior	2 (4)	S1,S12	1 (7)	S50	0 (0)	–
College	14 (32)	S5,S8,S11,S13,S24,S25,S31,S34,S36,S37,S40,S41,S43,S44	3 (20)	S56,S58,S59	12 (67)	S63,S66-S76
Others	6 (14)	S10,S19,S26,S35,S38,S42	4 (27)	S49,S51,S55,S57	2 (11)	S61,S77
Treatment strategies						
Sport related activities	4 (9)	S2,S25,S26,S34	1 (7)	S59	5 (28)	S62,S69,S71,S73,S74
Art and expressive therapy	2 (5)	S8,S36	0 (0)	–	1 (6)	S70
Psycho-education	13 (30)	S4,S6,S7,S9,S11,S19,S23,S27,S28,S31,S37,S43,S44	0 (0)	–	0 (0)	–
Positive psychology	8 (18)	S1,S5,S15-S17,S38,S41,S42	0 (0)	–	2 (11)	S76,S77
Cognitive related therapy	3 (7)	S3,S21,S29	2 (13)	S52,S56	1 (6)	S63
Behavior therapy	2 (5)	S13,S24	0 (0)	–	0 (0)	–
Mindfulness related treatment	3 (7)	S10,S14,S18	0 (0)	–	0 (0)	–
Emotional related treatment	0 (0)	–	0 (0)	–	1 (6)	S75
Acceptance and Commitment Therapy	2 (5)	S22,S32	0 (0)	–	0 (0)	–
Social emotion learning	1 (2)	S20	2 (13)	S48,S54	0 (0)	–
Resilience-based training	0 (0)	–	5 (33)	S45,S47,S49,S50,S55	0 (0)	–
Trauma-related intervention	0 (0)	–	2 (13)	S51,S57	2 (11)	S64,S65
Interpersonal skills	0 (0)	–	1 (7)	S53	0 (0)	–
Mix interventions	6 (14)	S12,S30,S33,S35,S39,S40	1 (7)	S58	5 (28)	S60,S61,S67,S68,S72
Others	0 (0)	–	1 (7)	S46	1 (6)	S66
Frequency						
Daily	1 (2)	S27	2 (13)	S55,S56	0 (0)	–
Weekly	31 (70)	S1-S5,S7,S8,S10-S15,S17-S22,S24,S26,S29,S31,S32,S34,S36-S39,S41-S43	8 (53)	S45,S47,S48,S50,S52,S53,S58,S59	15 (83)	S60,S62-S67,S69-S76
Monthly	7 (16)	S6,S9,S16,S23,S24,S30,S44	4 (27)	S46,S49,S54,S57	2 (11)	S61,S77
Unclear	5 (11)	S25,S28,S33,S35,S40	1 (7)	S51	1 (6)	S68
Interventionist						
Specialists	11 (25)	S1,S4,S5,S11,S17,S19,S23,S31,S32,S37,S38	4 (27)	S50,S54,S56,S57	3 (17)	S61,S70,S75
Non-specialist	3 (7)	S2,S35,S36	2 (13)	S46,S52	2 (11)	S60,S62
Students	3 (7)	S9,S22,S27	4 (27)	S45,S47,S48,S53	4 (22)	S63-S65,S67
Teachers	11 (25)	S7,S8,S10,S13-S16,S26,S33,S34,S39	4 (27)	S49,S51,S55,S59	5 (28)	S66,S68,S69,S73,S74
Researchers	7 (16)	S3,S12,S18,S21,S29,S30,S42	0 (0)	–	0 (0)	–
Mix	4 (9)	S6,S40,S43,S44	0 (0)	–	0 (0)	–
Unclear	5 (11)	S20,S24,S25,S28,S41	1 (7)	S58	4 (22)	S71,S72,S76,S77
Sample size^a						
≤30	1 (2)	S11	1 (7)	S50	5 (28)	S67,S69,S74-S76
30~300	29 (66)	S1-S5,S8-S10,S12-S15,S17-S22,S24,S26,S29,S32-S34,S37,S38,S40-S42	11 (73)	S45,S47-S49,S52-S56,S58,S59	12 (67)	S60,S62-S66,S68,S70-S73,S77
>300	13 (30)	S6,S7,S16,S23,S25,S27,S28,S30,S31,S35,S36,S43,S44	3 (20)	S46,S51,S57	1 (6)	S61
Unclear	1 (2)	S39	0 (0)	–	0 (0)	–
Follow up						
Non-follow-up	33 (75)	S1,S2,S5,S7,S9-S11,S13-S16,S18-S21,S23-S28,S30,S31,S33-S42	9 (60)	S46,S50,S51,S54-S59	12 (67)	S60,S62,S66-S71,S73-S75,S77
≤6M	5 (11)	S4,S8,S17,S22,S32	6 (40)	S45,S47-S49,S52,S53	5 (28)	S63-S65,S72,S76
6~12M	6 (14)	S3,S6,S12,S29,S43,S44	0 (0)	–	1 (6)	S61

Notes. The references demoted by 's' were listed in [Supplementary Materials](#). ^aThe sample size was coded based on the Intention-to-treat Analysis and referred to the sample size of the intervention group.

Table 1: Intervention characteristics at three levels.

studies had a sample size ranging from 30 to 100 (27.3%), [S2,S4,S5,S8,S10,S14,S15,S17,S19,S22,S32,S42](#) 17 studies had a sample size higher than 100 but lower than 300 (38.6%), [S1,S3,S9,S12,S13,S18,S20,S21,S24,S26,S29,S33,S34,S37,S38,S40,S41](#) and 12 study had a sample size higher than 300 but lower

than 800 (27.3%). [S6,S7,S16,S23,S25,S27,S28,S30,S35,S36,S43,S44](#) It is worth noting that one RCT study did not provide sample size information (1 study; 2.3%). [S39](#)

In addition, 33 studies (75.0%) only reported the post-intervention measurement without any other short-

Intervention outcomes	Universal (k = 44)		Selective (k = 15)		Indicated (k = 18)	
	n (%)	Ref.	n (%)	Ref.	n (%)	Ref.
Mental health outcomes						
Multiple mental health symptoms	14 (32)	S23,S25–S28,S31,S33,S35–S40,S42	7 (47)	S50,S51,S54,S56–S59	2 (11)	S67,S77
Depression	9 (20)	S1,S5,S6,S12,S15–18,S41	3 (20)	S45,S49,S53	7 (39)	S62–S65,S69,S72,S73,S75,S76,
Anxiety	5 (11)	S5,S12,S15,S18,S21	2 (13)	S46,S49	7 (39)	S60,S62–S66,S68,S70,S71,S73,S74
Problematic behaviors	6 (14)	S3,S18,S20,S23,S29,S30	2 (13)	S48,S52	0 (0)	–
Suicidal ideation	2 (5)	S43,S44	0 (0)	–	0 (0)	–
Well-being & Happiness	4 (9)	S1,S5,S13,S18,S41	1 (7)	S60	2 (11)	S72,S76
Life satisfaction	5 (11)	S1,S5,S7,S8,S11,S16	1 (7)	S55	0 (0)	–
Self-esteem	2 (5)	S19,S25	2 (13)	S45,S50	1 (6)	S70
Self-efficacy	2 (5)	S13,S17	0 (0)	–	0 (0)	–
Resilience	4 (9)	S10,S14,S32,S41	5 (33)	S45,S47,S50,S55,S56	2 (11)	S72,S76
PTSD	0 (0)	–	1 (7)	S53	2 (11)	S64,S65
NSSI	0 (0)	–	0 (0)	–	1 (6)	S61
Other health outcomes						
Health behavior	2 (5)	S13,S34	0 (0)	–	0 (0)	–
Sleep quality	2 (5)	S24,S34	0 (0)	–	2 (11)	S62,S71

Notes. Ref., References, and the references demoted by 's' were listed in [Supplementary Materials](#).

Table 2: Summary of intervention outcomes.

or long-term follow-up.^{S1,S2,S5,S7,S9–S11,S13–S16,S18–S21,S23–S28,S30,S31,S33–S42} Five studies had a follow-up time of less than 6 months (11.4%).^{S4,S8,S17,S22,S32} Six studies had a follow-up time of 6–12 months (13.6%).^{S3,S6,S12,S29,S43,S44}

Control group. Four studies (4 studies; 9.1%) used a single-arm design,^{S5,S19,S31,S37} meaning they did not include any control group. The majority of studies (40 studies; 90.9%) included one control group.^{S1–S4,S6–S18,S20–S30,S32–S36,S38–S44} For instance, within these 40 studies, twenty studies (45.5%) reported a waitlist or blank control,^{S3,S7,S8,S10,S14,S17,S20,S23,S24,S27,S30,S33,S35,S36,S39–S44} 13 studies (29.5%) used treatment as usual,^{S1,S11–S13,S15,S16,S18,S22,S26,S29,S32,S34,S38} and four studies (9.1%) used other types of intervention strategies (e.g., broadcasting gymnastics, distributed educational leaflets or psychological supporting measures),^{S2,S6,S9,S21} three studies did not provide details about the control group content (3 study; 6.8%) [Table 3](#).^{S4,S25,S28}

Tier 2 selective intervention

Frequency and format. As shown in [Table 4](#), almost all of the studies (13 studies; 86.7%)^{S45,S47–S53,S55–S59} included group- or class-wide delivery, while only one study included a program delivered to individuals (6.7%),^{S46} and one study mixed the format of individually and group-wide delivered formats (6.7%).^{S54}

Regarding the frequency with which the programs were implemented, eight studies included programs delivered weekly (53.3%),^{S45,S47,S48,S50,S52,S53,S58,S59} four studies included programs implemented monthly (26.7%),^{S46,S49,S54,S57} and two studies included programs delivered daily (13.3%).^{S55,S56} One study provided insufficient data on the frequency of implementation (6.7%).^{S51}

In addition, one study provided programs lasting 30 min or less per session (6.7%),^{S59} and eight studies included programs delivered for over 60 min but less than or equal to 90 min per session (53.3%).^{S45,S47,S48,S50–S52,S55,S57} Two studies included programs lasting over 90 min–120 min per session (13.3%).^{S49,S53} Interestingly, one study mixed group interventions lasting 60–90 min with individual interventions lasting 30 min (6.7%).^{S54} Meanwhile, three studies provided insufficient data on the duration of implementation (20.0%).^{S46,S56,S58}

Interventionist. With regard to the format of Tier 2 program delivery, four studies included programs delivered by students specializing in mental health or those from non-mental health disciplines (26.7%),^{S45,S47,S48,S53} and four studies featured programs mainly delivered by professional counselors or mental health educators (26.7%).^{S50,S54,S56,S57} In addition, two studies were delivered by non-mental health specialists (e.g., coaches or optometrists) (13.3%).^{S46,S52} Four studies employed school teachers as their interventionists for the implementation of their delivery formats (e.g., PE teachers or trained teachers) (26.7%),^{S49,S51,S55,S59} and one study did not provide any clear statement regarding the delivery format (6.7%).^{S58}

Sample size and follow-up. The sample size of intervention groups for all studies ranged from 28 to 1922. It is worth noting that there are two studies with sample sizes higher than 500: one study^{S46} with 1922 samples in the intervention group using an RCT design, and one study^{S51} with 1028 samples in the intervention group

No	Authors	Language ^a	Settings ^b	Size (I: [AC/AC]:C) ^c	Treatment(I) ^d	Treatment(C)	Study type	Follow	Primary outcomes ^e
1	Desan 2021	E	SS	288:292	POS	Traditional psychology curriculum	RCT	NA	Positive attitude
2	Bao 2015	E	JS	80:80	SP	Broadcast gymnastics	RCT	NA	Self-concept
3	Hong 2011	E	PS	208:209	CRT	Blank	RCT	6	Problematic Behavior
4	Fang 2021	E	PS	88:101	EDU	Unclear	Quasi	5	Social and Emotional Health, Bullying victimization, School belonging
5	Zhang 2020	E	CS	61:NA	POS	NA	Single-arm	NA	Hope trait, Life satisfaction, Well-being & Happiness, Depression, Anxiety
6	Yang 2023a	E	JS	428 38:751	EDU	Psychological supporting measures	RCT	12	Depression
7	Long 2023	E	PS	482:537	EDU	Wait list	RCT	NA	Life satisfaction, Self-confidence
8	Duan 2014	E	CS	99:112:37:37	ART	Blank	RCT	2.5	Life satisfaction, Values
9	Peng 2022	E	JS	184:144	EDU	Educational leaflets with general health information	Quasi	NA	Awareness of bullying, Experience of bullying
10	Liu 2023a	E	MS	92:97	MRT	Blank	RCT	NA	Resilience, Stress, Trait mindfulness
11	Yang 2023b	E	CS	28:27	EDU	Normal teaching activities	RCT	NA	Meaning in Life, Life satisfaction, affect
12	Tang 2024	E	SS	148:131	INT + CBT + MRT	Routine course on career development	RCT	6	Depression, Anxiety
13	Yang 2020	E	CS	263:269	BT	Normal teaching activities	RCT	NA	Health behavior, Well-being & Happiness, Self-efficacy
14	Liu 2024	E	JS	62:63	MRT	Blank	RCT	NA	Learning burnout, Dispositional mindfulness, Resilience
15	Zhao 2019a	E	JS	84:89	POS	Routine moral education course	RCT	NA	Depression, Anxiety
16	Zhu 2020	E	JS	630:599	POS	Normal self-study class, Normal class meeting	Quasi	NA	Life satisfaction, Depression, Delinquency, Positive youth development
17	Zhao 2023	E	JS	92:59	POS	Wait list	RCT	3	Depression, Self-efficacy, Character strengths
18	Zhou 2023	E	JS	184:184:184	MRT	Routine mental health education course	RCT	NA	Well-being & Happiness, Problematic Behavior, Anxiety, Depression, Coping Style, Loneliness
19	Qian 2022	E	VCS	62:87:NA	EDU	NA	RCT	NA	Self-esteem, Self-Acceptance
20	Shi 2024	E	PS	198:199	SEL	Blank	Quasi	NA	Social emotional skills, Problematic Behavior
21	Xia 2022	E	JS	163:161	CRT	Mental health class	RCT	NA	Mindset
22	Liu 2023b	E	JS	40:50:46	ACT	Routine mental health education course	RCT	2	Learning behavior
23	Liu 2023	E	PS	386:381	EDU	Blank	Quasi	NA	Problematic Behavior, Multiple mental health symptoms (MHRSP), Self-cognitive ability, Learning adaptability
24	Li 2022d	E	CS	193:171	BT	Blank	RCT	NA	Sleep quality
25	Zhou 2020	E	CS	800:350:350	SP	Unclear	Quasi	NA	Self-esteem, Multiple mental health symptoms (MHI-60), Emotional state, Will quality
26	Nam 2020	E	VCS	183:183	SP	Traditional PE course	Quasi	NA	Multiple mental health symptoms (SCL-90)
27	Wang 2023	C	JS	305:305	EDU	Blank	RCT	NA	Multiple mental health symptoms (MMHI-60)
28	Chen 2014	C	JS	302:572	EDU	Unclear	RCT	NA	Multiple mental health symptoms (MSSMHS)
29	Lin 2007	C	PS	208:209:204	CRT	Routine health education course	RCT	6	Problematic Behavior
30	Zhai 2004	C	PS	738:744	EDU + Refer	Blank	RCT	NA	Problematic Behavior
31	Zhang 2021	C	CS	3402:NA	EDU	NA	Single-arm	NA	Multiple mental health symptoms (CCSMHS)
32	Liu 2021	C	JS	33:40:37	ACT	Routine mental health education course	RCT	2	Psychological flexibility, Career resilience
33	Zhao 2021	C	JS	145:135	EDU + Others	Wait list	Quasi	NA	Multiple mental health symptoms (GHQ-12), Multiple mental health symptoms (SCL-90)
34	Gu 2020	C	CS	293:293	SP	Traditional PE course	RCT	NA	Health behavior, Sleep quality
35	Li 2020	C	PS, JS	729:829	EDU + BT	Blank	Quasi	NA	Multiple mental health symptoms (MMHI-60)
36	Cheng 2017	C	CS	736:1252	ART	Blank	Quasi	NA	Multiple mental health symptoms (CCSMHS)
37	Zhu 2015	C	CS	150:NA	EDU	NA	Single-arm	NA	Multiple mental health symptoms (SCL-90)
38	Wen 2015	C	VCS	191:178	POS	Routine freshman adaptation education	Quasi	NA	Psychological adjustment, Multiple mental health symptoms (SCL-90)

(Table 3 continues on next page)

No	Authors	Language ^a	Settings ^b	Size (I: [AC/AC]:C) ^c	Treatment(I) ^d	Treatment(C)	Study type	Follow	Primary outcomes ^e
(Continued from previous page)									
39	Ding 2014	C	JS	NC: NC: NC: NC	Refer + POS	Blank	RCT	NA	Multiple mental health symptoms (SCL-90), Emotional ability
40	Wang 2017	C	CS	212:196	EDU + POS + INT	Blank	RCT	NA	Multiple mental health symptoms (SCL-90)
41	Wu 2019	C	CS	278:192	POS	Blank	Quasi	NA	Depression, Resilience, Well-being & Happiness, Psychological harmony
42	Li 2018	C	MS	32:32	POS	Blank	Quasi	NA	Multiple mental health symptoms (GHQ-12)
43	Yang 2015	C	CS	692:677	EDU	Blank	RCT	6	Suicidal ideation
44	Chao 2016	C	CS	603:614	EDU	Blank	RCT	6	Suicidal ideation

NA, Not applied; NC, Not clear; I, Intervention group; AC, Active control group; C, control group. ^aE, English; C, Chinese. ^bPS, Primary school student; JS, Junior high school children; SS, Senior high school student; MS, Middle school student (Unclear); CS, College student; VCS, Vocational college students. ^cThe sample size was coded based on the Intention-to-treat Analysis. ^dPOS, Positive psychology; CRT, Cognitive related therapy; EDU, Psychoeducation; SP, Sport related activities; RBT, Resilience-based training; MRT, Mindfulness related treatment; TRI, Trauma-related intervention; SEL, Social emotion learning; INT, Interpersonal skill training. ^eMMHI-60, Mental Health Inventory of Middle School Students, CCSMHS, Chinese College Students Mental Health Scale, MSSMHS, Middle School Student Mental Health Scale, MHRSP, Mental Health Rate Scale for Pupil, MHI-60, Student Mental Health Scale.

Table 3: Information on the characteristics of universal studies.

using a single-arm design. One study had a sample size under 30 (6.7%),^{S50} six studies had a sample size ranging from 30 to 60 (40.0%),^{S47,S52,S53,S56,S58,S59} five studies had a sample size higher than 60 but lower than 300 (33.3%),^{S45,S48,S49,S54,S55} and one study had a sample size higher than 300 but lower than 500 (6.7%).^{S57}

Meanwhile, nearly 9 studies (60.0%)^{S46,S50,S51,S54-S59} reported only the post-intervention measurement without any other short- or long-term follow-up. In addition, six studies (40.0%)^{S45,S47-S49,S52,S53} reported follow-up measurements: one studies at 1 month (1 study; 6.7%),^{S45} two studies at 3 months (2 studies; 13.3%),^{S47,S52} three studies with follow-up periods ranging from 4 to 6 months (3 studies; 20.0%).^{S48,S49,S53}

Control group. Three studies (3 studies, 20.0%)^{S48,S51,S54} used a single-arm design, meaning they did not include any control group. The majority of studies (12 studies; 80.0%)^{S45-S47,S49,S50,S52,S53,S55-S59} included one control group. For instance, within these 12 studies, seven studies (46.7%) reported a waitlist or blank control,^{S45,S47,S53,S55,S57-S59} two studies (13.3%) used treatment as usual,^{S46,S50} and three studies (20.0%) used other types of intervention strategies (e.g., group intervention, storytelling).^{S49,S52,S56}

Tier 3 Indicated intervention.

Frequency and format. As shown in Table 5, almost all of the studies (15 studies; 83.3%)^{S60,S62,S63,S66-S77} included group- or class-wide delivery, while only one study included a program delivered to individuals (5.6%),^{S61} and two study mixed the format of individually and group-wide delivered formats (11.1%).^{S64,S65}

Regarding the frequency with which the programs were implemented, 15 studies included programs delivered weekly (83.3%),^{S60,S62-S67,S69-S76} while two studies included programs implemented monthly (11.1%).^{S61,S77} One study provided insufficient data on the frequency of implementation (5.6%).^{S68}

In addition, one study provided programs lasting 30 min or less per session (5.6%),^{S62} and ten studies included programs delivered for over 30 min but less than or equal to 60 min per session (55.6%).^{S64-S67,S69,S71-S74,S76}

Two studies included programs lasting around 120 min per session (11.1%).^{S63,S70} Meanwhile, five studies provided insufficient data on the duration of implementation (27.8%).^{S60,S61,S68,S76,S77}

Interventionist. With regard to the format of Tier 3 program delivery, three studies included programs delivered by professional counselors or school mental health teachers (16.7%).^{S61,S70,S75} Two studies featured programs mainly delivered by coaches due to the sport-focused content (11.1%).^{S60,S62} Four studies were delivered by students specializing in mental health or social work (22.2%),^{S63-S65,S67} and five studies were delivered by school PE teachers or teachers who had received training (27.8%).^{S66,S68,S69,S73,S74} Additionally, four studies did not provide any clear statement regarding the delivery format (22.2%).^{S71,S72,S76,S77}

Sample size and follow-up. The sample size of intervention groups for all studies ranged from 7 to 1832. It is worth noting that 1832 is the only study with a sample size greater than 300, utilizing a single-arm design.^{S61} Specifically, 5 studies had a sample size under 30 (27.8%),^{S67,S69,S74,S75,S76} 8 studies had a sample size ranging from 30 to 60 (44.4%),^{S60,S62,S63,S65,S70-S73} and 4 studies had a sample size higher than 60 but lower than 300 (22.2%).^{S64,S66,S68,S77}

Meanwhile, nearly 12 studies (66.7%) reported only the post-intervention measurement without any other short- or long-term follow-up.^{S60,S62,S66-S71,S73-S75,S77} Among these, six studies reported follow-up measurements: four studies (22.2%) at 3 months,^{S64,S65,S72,S76} one study (5.6%) at 6 months, and one study (5.6%)^{S61} at 12 months.^{S63}

No	Authors	Language	Settings	Population	Size (I:C)	Treatment(I)	Treatment(C)	Study Type	Follow	Primary outcomes
1	Tam 2020	E	PS	Immigrant children	127:158	RBT	Wait list	RCT	1	Depression
2	Guan 2018	E	PS	Myopic student	1922:929	Others	Prescription	RCT	NA	Anxiety
3	Li 2022a	E	JS	Poverty, Low resilience	38:38	RBT	Blank	RCT	3	Resilience, Core Self-evaluations, Coping Style
4	Li 2022b	E	PS	Poverty	190:NA	SEL	NA	Single-arm	5	Problematic Behavior
5	Jiang 2022	E	PS, JS, SS	Affected by parental HIV	200:195	RBT	After-school activities	RCT	6	Depression, School Anxiety, Loneliness
6	Liu 2016	E	PS	Left-behind children	34:34	CRT	Fun activities of storytelling, games, and video watching	RCT	3	Problematic Behavior
7	Li 2019	C	PS	Rural boarding students with incomplete family structure, Mental health problem	105:NA	SEL	NA	Single-arm	NA	Multiple mental health symptoms (MHRSP)
8	Zhao 2019b	C	MS	Left-behind children	97:88	RBT	Blank	RCT	NA	Life satisfaction, Resilience
9	Zhang 2018	C	CS	Left-behind children	48:44	CRT	Group psychological counseling	RCT	NA	Resilience, Social support, Multiple mental health symptoms (CCSMHS)
10	Chen 2004	C	CS	Poverty	41:42	EDU + INT + CRT	Blank	RCT	NA	Multiple mental health symptoms (SCL-90), Social support
11	Qin 2021	C	CS	Mild to moderate physical disability	54:54	SP	Wait list	RCT	NA	Multiple mental health symptoms (SCL-90)
12 ^a	Niu 2021	E	SS	Earthquake experience	28:28	RBT	Normal self-study class	RCT	NA	Resilience, Multiple mental health symptoms (MMHI-60), Self-esteem, Interpersonal skills
13 ^a	Tanaka 2020	E	JS, SS	Earthquake experience	1028:NA	TRI	NA	Single-arm	NA	Multiple mental health symptoms (SCL-90), Psychotic like experience
14 ^a	Wang 2011a	C	JS	Earthquake experience	47:40	INT	Blank	Quasi	4	PTSD, Depression
15 ^a	Wang 2011b	C	MS	Earthquake experience	470:458	TRI	Blank	Quasi	NA	Multiple mental health symptoms (MSSMHS)

POS, Positive psychology; CRT, Cognitive related therapy; EDU, Psychoeducation; SP, Sport related activities; RBT, Resilience-based training; MRT, Mindfulness related treatment; TRI, Trauma-related intervention; INT, Interpersonal skill training. ^aStudents who have experienced the earthquake.

Table 4: Information on the characteristics of selective studies.

Control group. Three studies (16.7%) used a single-arm design, meaning they did not include any control group^{S61,S74,S75}. The majority of studies (15 studies; 83.3%) included one control group.^{S60,S62–S73,S76,S77} For instance, within these 15 studies, eight studies (44.4%) reported a waitlist or blank control,^{S62,S66,S67,S69–S71,S73,S76} one study (5.6%) was unclear,^{S72} four studies (22.2%) used treatment as usual,^{S60,S64,S65,S68} and one study (5.6%) used traditional psychology intervention strategies.^{S77} Additionally, one study (5.6%) reported having two control groups,^{S63} using a supportive group as the active control and a blank control.

The overall quality of published studies

The risks of bias assessment of included studies are summarized, with detailed information available in Fig. 4. The RoB 2 assessment of RCTs (k = 49) revealed that only two studies (4.1%) had an overall low risk of bias (see Fig. 4). A significant issue was bias arising from the randomization process, which led to 41 RCTs (83.7%) being rated as having a high risk of bias. Additionally, one RCT (2.0%) was identified as having some concerns regarding bias.

For quasi-experiments (k = 19) and single-arm studies (k = 9), the JBI assessment indicated that the overall quality was acceptable (see Figs. 5 and 6). This suggests that while the majority of RCTs had significant bias concerns, the quasi-experimental and single-arm studies generally met acceptable quality standards.

It is important to note that the randomization standards for RCTs are indeed very stringent, and many studies did not clearly describe their randomization procedures. This lack of detailed information likely contributed to the higher risk of bias ratings observed in many RCTs. In contrast, quasi-experiments and single-arm studies do not adhere to the same rigorous randomization requirements, which may explain why they generally received acceptable quality assessments. This distinction underscores why different types of studies can have varying quality evaluations.

Discussion

Schools play an important role in the mental health care system for youth. In high-income countries, the three-tiered approach is well-established¹⁵; however, its implementation in Mainland China remains unclear. This

No	Language	Settings	Population	Screening strategies ^a	ITT Size (I:C)	Treatment(I) ^b	Treatment(C)	Study Type	Follow	Primary Mental Health vOutcomes
1	E	JS	Anxiety	SAS ≥ 61	36:36	SP + MRT + EDU	Routine health education support and normal activities in daily life and learning	RCT	NA	Anxiety
2	E	VCS	Mental health problem; Self-harm	Self-developed >10 or with ST	1832:NA	CRT*+Refer	NA	Single-arm	12	NSSI, Emotional distress
3	E	JS	Depression	SDS/80 > 0.50	34:35	SP	Blank	RCT	NA	Depression
4	E	CS	Depression	40 ≤ SDS ≤ 56	60:60: 60	CRT	Supportive group	RCT	6	Depression
5	E	PS	PTSD	PCL-5 ≥ subthreshold	118:116	TRI	Routine mental health service	RCT	3	PTSD
6	E	PS	PTSD	PCL-5 ≥ subthreshold	45:42	TRI	Routine mental health service	RCT	3	PTSD
7	E	CS	Anxiety	SAS ≥ slight	214:214	Others	Blank	Quasi	NA	Anxiety
8	C	CS	Mental health problem	SCL-90-D ≥ 3	7:8:8	CRT + SP	Blank	Quasi	NA	Multiple mental health symptoms (SCL-90)
9	C	CS	Anxiety	NC	300:300	SP + EDU	Routine mental health education course	RCT	NA	Anxiety
10	C	CS	Depression	CES-D ≥ 20	18:17	SP	Blank	Quasi	NA	Depression
11	C	CS	Anxiety	IAS ≥ standard	32:32	ART	Wait list	Quasi	NA	Social anxiety
12	C	CS	Anxiety	SAS>50	34:36	SP	Blank	RCT	NA	Sleep quality, Negative affect, Anxiety
13	C	CS	Depression	SCL-90-D > 3	32:32	SP + POS	Unclear	RCT	3	Depression, Resilience, Well-being & Happiness
14	C	CS	Depression	SAS & SDS >50	31:31:31:31	SP	Blank	RCT	NA	Anxiety, Depression
15	C	CS	Anxiety	SCL-90-A ≥ 22.8, MAS ≥15	24:24:24	SP	NA	Single-arm	NA	Anxiety
16	C	CS	Depression	CES-D > 16, 7 < HAMD ≤17	24:NA	ERT	NA	Single-arm	NA	Depression
17	C	CS	Depression	SCL-90-D ≥ 3	22:23	POS	Blank	RCT	3	Well-being & Happiness, Depression, Resilience
18	C	MS	Mental health problem	MSSMHs ≥2	213:216	POS	Psychological intervention based on prevention and treatment	RCT	NA	Multiple mental health symptoms (MSSMHs)

^aCRT*, mood thermometer; POS, Positive psychology; CRT, Cognitive related therapy; EDU, Psychoeducation; SP, Sport related activities; MRT, Mindfulness related treatment. TRI, Trauma-related intervention; INT, Interpersonal skill training; ART, Art intervention. ^bSAS, Self-Rating Anxiety Scale; ST, Suicide Thought; SDS, Self-Rating Depression Scale; PCL-5, PTSD Checklist for DSM-5; SCL-90-A, Symptom Checklist-90 Anxiety Subscale; SCL-90-D, Symptom Checklist-90 Depression Subscale; CES-D, Center for Epidemiologic Studies Depression Scale; NC, Not Clear; HAMD, Hamilton Depression Rating Scale; IAS, Interaction Anxiousness Scale; MAS, Manifest Anxiety Scale; MSSMHs, Middle School Students Mental Health Scale.

Table 5: Information on the characteristics of indicated studies.

scoping review represents the first attempt, to our knowledge, to synthesize evidence across a broad spectrum of school-based prevention and intervention programs targeting Chinese students. In total, 77 articles were included and we further categorized the interventions into three levels: universal, indicative, and selective, following the three-tiered framework. This comprehensive approach allowed us to fulfill the objectives of the scoping review methodology as outlined by Arksey and O'Malley.¹⁶

Timing of publication rates

The publications demonstrate a trend of rapid development in recent years. For instance, from 2001 to 2010, the number of published articles was relatively low, totaling only 8 out of 78 (10.3%). Between 2011 and 2020, the annual number of publications gradually increased, with

significant peaks in 2016 (5 articles) and 2020 (6 articles), totaling 35 out of 78 (44.9%). From 2021 to 2024, the number of publications significantly rose, with a total of 35 articles, reaching a peak in 2021 (7 articles) and 2022 (11 articles), which may be due to the impact of the pandemic. Interestingly, the publications in Chinese Journals and English Journals are split evenly. Taken together, it is evident that in recent years, there has been a marked upward trend in the number of published articles, particularly from 2021 onwards, indicating increased attention from researchers and practitioners in Mainland China towards the mental health area.¹⁷ This is also in line with the evolution of mental health related policies in mainland China.¹⁸

Geographic locations

The practice in limited resources setting remains a big concern. Most studies were conducted in Beijing, the

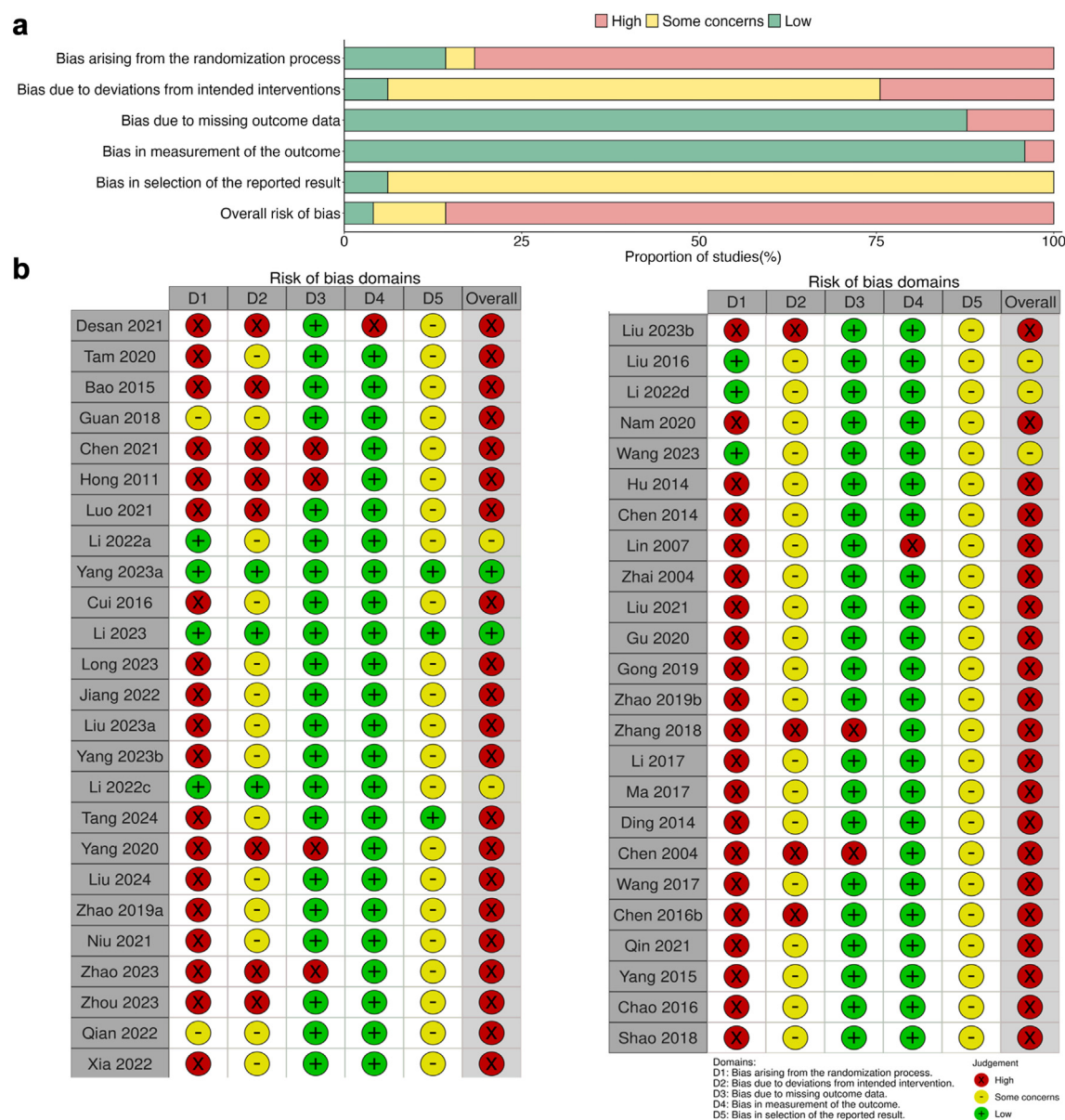


Fig. 4: The risk of bias analysis by using the Rob-2: adherence by RCT study (k = 49). a. The proportion of judgments for each domain; b. The detailed judgments for each domain.

capital of China, appearing 11 times in the selected papers, followed by Henan (7 times) and Guangdong (6 times). In addition, other cities vary from Western regions (e.g., Shaanxi) to Eastern regions (e.g., Shanghai), both showing a steady contribution to research and highlighting regional diversity. Clearly, the distribution reveals a concerning fact that research activities are still heavily concentrated in economically developed provinces. Although this understanding is preliminary and may also be influenced by the lack of precise location data in some articles, the pattern of only

a few programs being launched in underdeveloped regions remains significant. Therefore, expanding current policies into these resource-limited regions and scaling up efforts in these cities is crucial for future implications to prevent the widening disparity where the rich become richer and the poor become poorer.¹⁹

Targeted populations

Meanwhile, these findings underscore a broad interest in mental health interventions across various educational stages, with a strong emphasis on junior high

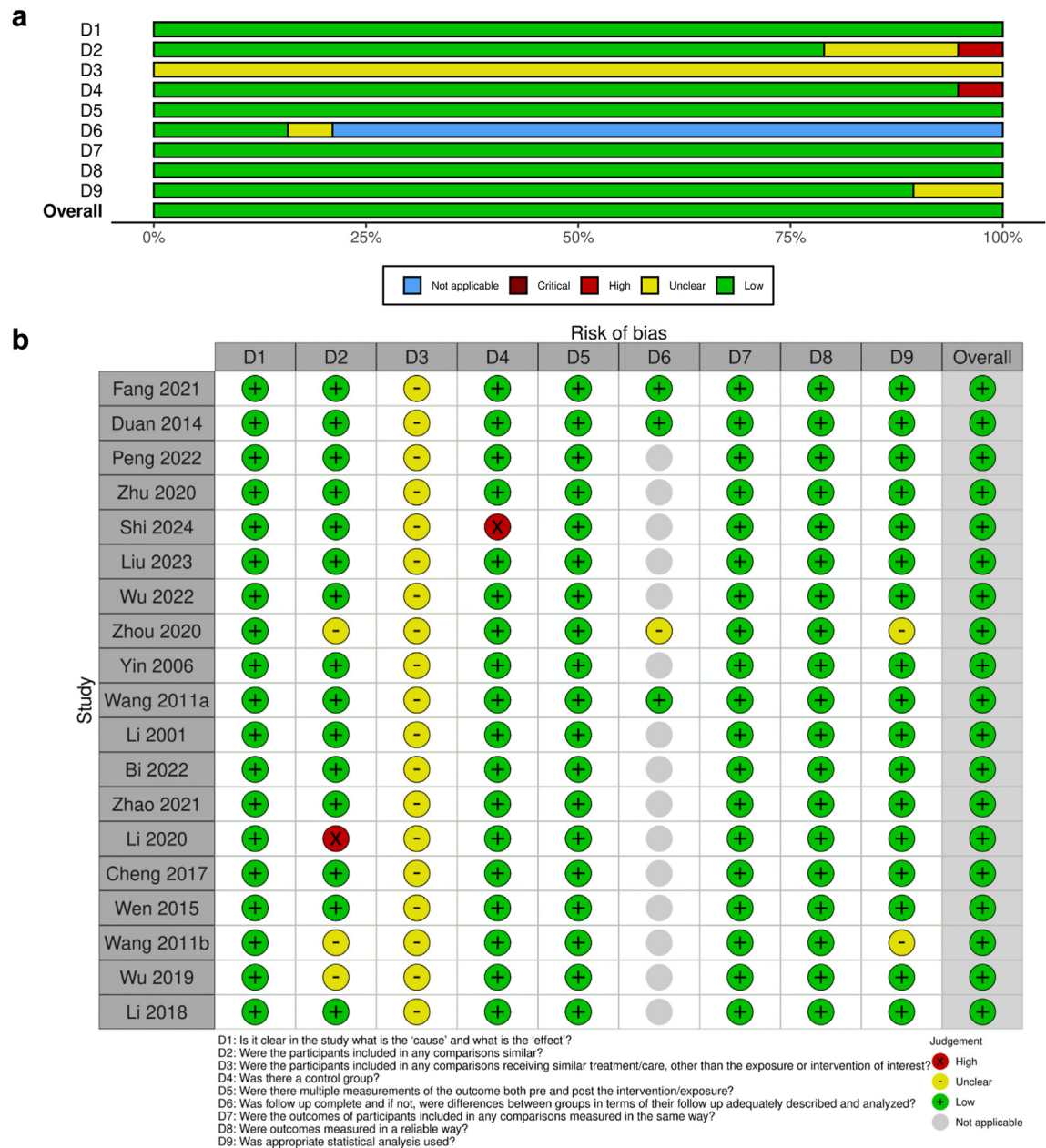


Fig. 5: The risk of bias analysis by using the JBI for quasi experiments study (k = 19). a. The proportion of judgments for each domain; b. The detailed judgments for each domain.

school and higher education levels. However, students at lower levels, such as elementary school students or even younger children, are largely overlooked. It is worth noting that a previous review showed the intervention in low-to middle-income countries still predominantly focus on younger children,⁷ highlighting an important direction for future studies in mainland China. In addition, the presence of unclear descriptions, such as 'middle school students', indicates some

ambiguity in the specific educational level of the participants. Therefore, greater clarity in terminology is highly needed in this area.

Notably, the findings of studies focusing on migrant children, students with myopia, children from poverty-stricken areas, students affected by parental HIV, those with low resilience, earthquake survivors, left-behind children at the selective level, and students with anxiety, depression, and PTSD symptoms at the indicative level, all

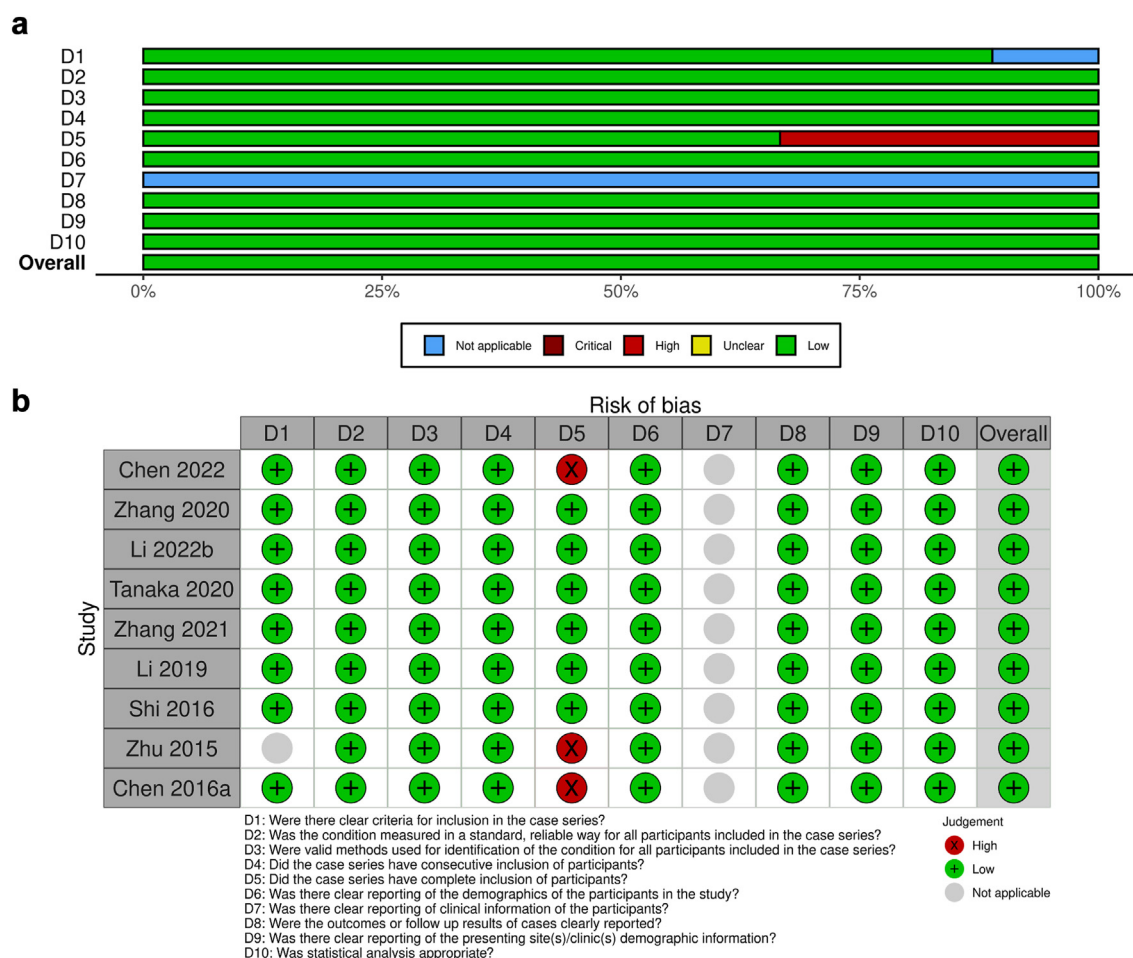


Fig. 6: The risk of bias analysis by using the JBI for single-arm studies (k = 9). a. The proportion of judgments for each domain; b. The detailed judgments for each domain.

align with previous research conducted in diverse cultural contexts, particularly in low- and middle-income countries.¹⁹ However, we have observed a significant lack of research addressing students with a family history of suicide and psychiatric disorders,^{20,21} students who have experienced bullying,²² students from dysfunctional families, and those with developmental disorders such as Attention-deficit/hyperactivity disorder (ADHD) or Autism spectrum disorder (ASD), as well as sleep problems. One possible explanation is that studies focused on these problems, for example, ADHD or ASD, are often conducted outside of school systems, with participants being recruited separately.²³ However, this gap underscores substantial deficiencies in school-based prevention efforts.

Research design

The quality of the included studies varies. For example, a large proportion (64%) are randomized controlled

trials (RCTs) or controlled trials (CT), but many still used non-active control groups, such as waitlist, blank, or treatment-as-usual intervention strategies. These approaches inherently amplify the possibility of observing significant differences between the groups. In other words, comparing 'doing something' with 'doing nothing' may not provide sufficient evidence of the effectiveness of the intervention and may only demonstrate the non-harmful effects of the program. Moreover, although several studies attempt to use active controls, these groups often involve activities unrelated to mental health (e.g., reading books), thus the claims of having a 'high impact on improving mental health' remain questionable and require further investigation.^{24–27} Furthermore, the application of several quality assessments, including JBI for single-arm or quasi-experimental designs^{28,29} and ROB2 for RCTs,³⁰ reveals significant issues such as inadequate reporting of blinding, poor data analysis strategies, and

insufficient description of how missing data were handled, which remain problematic areas in the included studies. For instance, many studies lack any statement regarding how group allocation was concealed, who was blinded in the study, and the necessity to report data analysis details; the majority used per-protocol (PP) analysis without further sensitivity checks.³¹ Therefore, there is a serious call for future studies to improve their reporting standards and detail their methodologies more thoroughly.

The missing of assessment and screening

Although the majority of studies target programs at the universal level, we found almost no articles focusing on the preliminary screening stage. This may be because, although several schools already conducted screening as part of their mental health routines as initiated by the government,³² these screenings are rarely treated as part of prevention or intervention efforts, nor are the effects of screening validated as part of the intervention process. In fact, to date, the government has not listed the standardized measures for screening, representing a significant gap in global actions. In addition, the experience of high-income countries, reveals various challenges, including optimizing the screening process, ensuring privacy protection, addressing ethical issues, and managing significant parental concerns about whether suicide risk screening could potentially exacerbate the risk for students.^{33,34} To date, the experience of the Screening in High Schools to Identify, Evaluate, and Lower Depression (SHIELD) program in the U.S. shows the value of universal screening and specific risk assessment.^{35,36} This program aims to identify high school students at risk for depression through a standardized universal screening process. During this process, students identified as requiring further professional support are referred to follow-up interventions, which may include school-based services and community resources. By utilizing RCTs, SHIELD has shown the effectiveness of early identification and targeted intervention, offering valuable insights for similar initiatives. However, determining which standardized screening process and measurements to use, as well as navigating the delicate balance between providing protection and avoiding potential harm, remain challenging today. Therefore, addressing these issues requires extensive and rigorous testing, emphasizing the need for heightened attention and focused efforts to adapt such screening programs to the Chinese context.

The need for a more systematic three-tiered intervention action in schools

The distribution of studies across the three levels is not equal. Nearly half of the selected studies focus on universal interventions (57%), with fewer studies addressing selective (19%) and indicated levels (23%). This

distribution may be due to the stringent inclusion criteria we applied during the selection process. For example, at the indicated level, only studies conducted at the class or school level and identified mental health issues listed in the Diagnostic and Statistical Manual of Mental Disorders (DSM) were included. Another possible explanation is that the natural percentage of students decreases from universal to selective to indicated levels, resulting in intervention strategies and attention being proportionally aligned.³⁷

Alternatively, the development of such school-level programs may still be in its early stages.¹⁰ Notably, no studies have yet reported the implementation of a clear tiered approach under the three-tier intervention model in school systems, revealing a gap in the research. One possible explanation could be that while schools in mainland China may have already offered mental health programs as policy requirements, only a small number have been evaluated using a structured psychological intervention design framework. For example, one of the included studies focusing on junior high school students offered a comprehensive approach that included bi-monthly group lectures on mental health, individualized counseling sessions tailored to students' needs, and training for class teachers to integrate mental health education into their daily teaching. Additionally, teachers and parents were actively involved to create a robust support system for students' mental well-being.³⁸ However, the specific steps of screening and intervention process have not yet been clearly outlined.

Another possible explanation is that comprehensive school mental health services remain limited. Following the recommendations from a previous review of 81 trials of school-based depression and anxiety prevention programs, a stepped-care approach may be beneficial. This approach involves implementing universal interventions for all students, followed by selective or indicated interventions to provide additional support to those at a higher risk or experiencing multiple psychological symptoms.³⁹ Given this, there is a pressing need for significant improvements in school-based mental health services in the future.

Additionally, collaboration between schools, families, and communities is often overlooked in the studies reviewed. For instance, one of the few studies focusing on children affected by parental HIV in Mainland China implemented programs at three levels: the child, the caregiver, and the community.⁴⁰ This intervention included peer-group sessions to enhance children's intrapersonal and interpersonal skills, parenting training to improve positive parenting practices, and monthly family visits alongside community advocacy activities to strengthen cohesion. These efforts highlight a critical area for future interventions, emphasizing the significance of strong partnerships between schools, families, and communities to better address students' overall well-being.

Another significant finding of this review relates to concerns regarding the providers of mental health services in schools. While professionals predominantly deliver these courses or interventions, as supported by previous studies, only a few studies in this review highlight the potential to train laypeople.^{27,41,42} Specifically, professionals train a group of non-specialists, who then apply their skills in local schools. This approach could be an effective strategy to scale these programs, particularly given the limited resources available.^{43,44} Notably, school head teachers or homeroom teachers, referred to as *ban zhu ren*, are often assigned pastoral responsibilities for the students in their classes.⁴⁵ In one universal intervention reviewed, the head teacher received training and then delivered pre-recorded short videos during weekly psychology lessons.⁴¹ This strategy has also shown its effectiveness and noteworthiness in previous studies conducted in Kenya, Ethiopia, as well as in high-income countries.⁴⁶ However, several concerns should also be considered when designing such programs. These include contextualizing the program to fit local needs rather than relying on a 'one size fits all' approach, conducting feasibility checks to ensure delivery quality, and addressing other dimensions of implementation science, including acceptability, adoption, appropriateness, feasibility, penetration, sustainability, cost instruments, and fidelity,⁴⁷ which are also key to transitioning these programs into real-world settings. For instance, another study included in this review recruited 15 laypeople as interventionists, with the fidelity of video-recorded therapy sessions monitored by five trained observers.⁴²

Design of the intervention

Most studies focus on class or group interventions with weekly sessions, typically lasting 45–60 min, despite varying patterns in frequency and duration. It is perplexing that such settings at universal level do not align with the traditional understanding of a full-semester course in the curriculum, and do not align with the one-to-one intervention for students at risk. This situation suggests that these programs may not be fully integrated into the regular school system. Once these programs are implemented, ensuring a no-harm policy for students who cannot easily opt out of in-school interventions becomes crucial. Additionally, there is a need to safeguard the safety and autonomy of at-risk students.⁴⁸

Furthermore, the effectiveness of these programs has largely been demonstrated through short-term follow-ups (less than 3 months) or relatively short-term follow-ups (less than 6 months) with smaller sample sizes. Only a few studies have employed longer-term designs and larger sample sizes to assess the lasting impact of these interventions, which limits the generalizability of the findings. Although the results generally suggest positive outcomes for current prevention and intervention programs, longer-term evidence through sequential testing

is crucial to confirm their effectiveness in school settings, consistent with findings from previous studies in a review of school-based universal-level interventions.⁴⁹ Furthermore, even when rigorous experiments show longer-term efficacy, they are not sufficient to ensure real-world effectiveness. Various perspectives, such as participants' receptivity, willingness to engage, and effectiveness in utilizing these strategies, must be taken into consideration.⁵⁰ These aspects have also been emphasized in the recent WHO manual.⁴³

Intervention strategies

Psychoeducation and psychological strategies dominate school-based mental health interventions, with a diverse yet largely unstandardized range of techniques. Most focus on traditional or third-wave cognitive-behavioral approaches, such as mindfulness practices, and fourth-wave methods like Acceptance and Commitment Therapy (ACT) and positive psychology (e.g., growth mindset, resilience). Social and Emotional Learning (SEL), interpersonal skills training, and some trauma-based strategies are also common. A smaller subset explores alternative methods, including sports, arts, and reading activities, reflecting efforts to broaden intervention approaches.

However, concerns remain regarding the effective application of these strategies in different contexts. While cognitive-behavioral therapy (CBT) and related training have consistently proven effective in treating depressive problems in children and adolescents, the efficacy of other strategies still requires further investigation, possibly through meta-analyses.⁵¹ On the other hand, the varying findings highlight a promising future, that is, the development of a comprehensive intervention that incorporates several strategies from CBT, positive psychology, and focuses on the multi-dimensional development of children.⁵² An example of this is the P.A.T.H.S program in Hong Kong.⁵³ This approach could help overcome the current limitations of seeking a single 'best' intervention strategy, focusing instead on better serve the needs of children.

In addition, several studies have utilized sports, art, or even an intriguing inclusion of an ophthalmological examination,⁵⁴ as well as integrative strategies that combine sports with evidence-based interventions, revealing a shift from a fixed perspective to more mind-body interaction strategies.^{55,56} This also demonstrates the efforts schools are making to incorporate these interventions into the normal routine. However, there is an absence of national-level data on the effectiveness and corresponding contexts of these programs, which presents challenges for establishing a standard for implementation in schools nationwide.

The selection of questionnaire and cross-cultural considerations in school-based research

Many studies take a multi-dimensional approach, assessing various mental health symptoms instead of

focusing solely on depression or anxiety. They often use localized tools like the MMHI-60 and MSSMHS to capture a broader range of issues, such as obsessive-compulsive and paranoid symptoms. This approach contrasts with studies in high-income countries, which typically rely on tools like the DASS, PHQ-8/9, CES-DC, or CDI. The preference for locally developed questionnaires may reflect cultural relevance, but it also makes cross-cultural comparisons challenging due to differences in measurement. Hence, more research is needed to bridge these gaps. Additionally, at the indicative level, addressing non-suicidal self-injury (NSSI) and self-harm has become a priority,⁵⁷ underscoring the need for effective prevention programs as these issues become more common.

The lacking of crisis intervention

There are four studies targeting on students with the experience of earthquake. For example, one study focuses on adolescents who survived the 8.1-magnitude Yushu earthquake in 2010. It employed an “innovative resilience intervention,” notably integrating disaster coping competence training within the broader framework of resilience training.⁵⁸ The methodology stands out for its systematic development process, which included focus groups with local adolescents and teachers, followed by a pilot study. Although not emphasized in the current study, this is still one of the few that adopted a comprehensive implementation science framework, progressing from definition to refinement. Another highlight of this study is the incorporation of cultural elements into the resilience intervention. Specifically, the program integrated Buddhist stories and scenarios with traditional strategies such as relaxation and stress reduction training. This approach not only acknowledges but leverages the cultural context of the participants, enhancing the relevance and potential effectiveness of the intervention. Additionally, another study also demonstrates potential for real-world scalability through the use of a ‘Training of Trainers’ (TOT) format.⁵⁹ This method, which is infrequently reported in many studies, effectively multiplies the reach of the intervention by equipping local trainers with the skills necessary to disseminate trauma-related practices. Such a strategy not only enhances the sustainability of the intervention but also empowers local communities by building enduring capacity for disaster response.⁶⁰

Implications for actions by following the policy calling

To effectively address the mental health needs of children and adolescents, a multi-faceted approach involving collaboration between government, education systems, schools, teachers, families, and social sectors is essential. This is also indicated in a current global policy review of school-based mental health promotion actions.⁶¹ At the distal level, the government and education systems

already play a pivotal role in this framework by building national platforms for promoting collaboration, allocating resources to low-resource areas, and enhancing supervision processes across different systems. For example, the Ministry of Education of the People’s Republic of China jointly issued with other 16 departments a Special Action Plan for Comprehensively Strengthening and Improving the *Mental Health Work of Students in the New Era (2023–2025)*. This plan not only highlights the mental health system (i.e., integrating mental health courses into the routines) in school education but also emphasizes the importance of monitoring, services, and interventions to improve students’ mental health.⁶² The plan also explicitly proposes the idea of connecting family and social resources to carry out comprehensive mental health education.

By strengthening these foundational elements, a more cohesive and well-supported mental health strategy can be implemented. For example, publishing a national standardized practical manual is essential. This manual should include screening methods for mental health problems,⁶³ clear cut-off points for data to identify at-risk students, interviewing strategies and steps for further assessing and confirming at-risk students, and different types of interventions that match personalized assessment outcomes.⁶⁴ Furthermore, establishing a systematic and structured guideline for school organization and supervision processes for these programs would effectively bridge the gap between knowledge and practice, as it would ensure that schools are adequately equipped to address mental health concerns and provide necessary interventions.

Strengthening collaboration mechanisms between families, schools, and communities is essential.⁶⁵ For example, the compulsory educational mental health support system in Japan, in which a full-time Yogo teacher (school nurse) and three types of mental health specialists (school counselors, advisors, and social workers) who typically work in school. These professionals collaborate to provide comprehensive psychological counseling within the school setting. Although this system operates with a lower budget compared to Western countries,⁶⁶ it effectively bridges the gap between schools, communities, and families, offering a practical model that can be learned from.

To effectively prioritize mental health in schools, several crucial steps need to be taken: providing resources to teachers and students, fostering a supportive and inclusive school environment, and building a three-tier intervention system. However, successful implementation of these steps requires careful consideration of several factors. Firstly, as mentioned above, the clear requirements and step-by-step guidelines, adjusted to fit local education systems, might be helpful and essential. These guidelines can support schools in developing robust mental health programs, particularly helpful in resource-limited regions, as our review highlights that

mental health practices in low-resource areas are often overlooked compared to more affluent regions like Beijing. This disparity further raises critical questions about the feasibility of policy implementation in resource-limited areas. Significantly, the availability and accessibility of resources across all schools are inequitable, leading to an inability to address these needs effectively.¹⁰ To address these challenges, it is necessary to establish not only clear guidelines, equality for all schools, and support systems, but also standardized, low-demand solutions for professionals in the short-term. For example, digital-based courses with [Supplementary Materials](#) that teachers can deliver in the classroom can provide a scalable and accessible approach to mental health education. Additionally, training laypeople may extend the reach of mental health interventions. Last but not least, the literacy and involvement of head teachers and school leaders in mental health initiatives are crucial. For example, a previous study suggests that head teachers with crisis intervention related experiences are more proactive in fostering supportive health environments.⁶⁷ Therefore, enhancing the mental health literacy of school leaders should be prioritized to ensure they can effectively guide their schools in the initiatives of mental health practice.⁶⁸

For the training of teachers and parents, which is still lacking in the included studies of this review, there should be an emphasis on supporting them to develop a sense of professional efficacy to manage their own mental health issues effectively, as several studies point out how this impacts students' mental health.⁶⁹ Additionally, in line with the non-specialist training format, acquiring mental health intervention and crisis intervention skills would definitely enhance their ability to take effective actions.^{70,71}

Furthermore, there should be a strong emphasis on interventions targeting bullying, friendships, and social contagions, as these areas are critical components of students' social and emotional well-being. Bullying, for instance, can have profound and negative long-lasting effects on mental health, leading to issues such as anxiety, depression, and even self-harm.⁷² Therefore, interventions addressing bullying should not only focus on the victims but also involve the bullies and bystanders, fostering a culture of empathy and respect within the school environment.^{73,74}

Last but not least, children and adolescents themselves should be provided with mental health intervention programs based on different risk levels and be taught self-help skills. In addition, as mentioned above, establishing screening standards and clarifying how screening results match interventions are crucial for ensuring that these programs are effective and responsive to the needs of the population.

Limitations

There are several limitations to this review that should be highlighted. Firstly, despite the comprehensive scope

of this scoping review, grey literature was excluded due to potential ethical and quality concerns. Additionally, this review did not include studies that, while recruiting school students for interventions, were not conducted within actual school settings or systems. This restriction was made to ensure that the focus remained on interventions directly integrated into school environments. Secondly, given the descriptive nature of scoping reviews, it was unable to perform a meta-analysis of the prevention and intervention programs across different levels. The variability in intervention strategies and therapeutic mechanisms among the included studies further limited the ability to provide detailed insights beyond general trends. Thirdly, although this review employed broad search terms such as problem or disorder to identify relevant studies related to mental health prevention or intervention programs, there is still a lack of studies specifically addressing ADHD or ASD. Furthermore, very few studies specifically addressed sleep problems, which remains a significant concern within the scope of this review. Therefore, future research could enhance this field by addressing these gaps. Specifically, including grey literature, expanding the focus to encompass a broader range of mental health issues, and conducting more detailed meta-analyses, providing deeper insights and more credible evidence for effective school-based interventions.

Conclusion

This scoping review is the first to synthesize evidence on school-based prevention and intervention programs for mental health in Mainland China. Research in this field has grown significantly since 2021, yet several critical challenges still remain. Notably, there is a regional imbalance, with a concentration of studies in more developed areas, while less attention is given to low-resource settings. In these areas, using non-specialists or laypeople to deliver interventions has been proposed as a strategy to address human resource shortages; however, its effectiveness requires further evaluation. In addition to regional disparities, research often lacks a focus on younger children and developmental issues, such as ADHD and ASD, which require more attention in future studies. Standardized guidelines, including detailed protocols for implementation, outcome measurement, and rigorous study designs such as RCTs, are urgently needed to ensure interventions are effectively tested before real-world implementation. Moreover, tailored pathways that integrate screening, classification, and targeted prevention require further development in future studies. Additionally, stronger collaboration among parents, teachers, and communities is needed to strengthen support systems for students. Addressing these challenges is crucial for enhancing the quality and reach of school-based mental health services, ultimately supporting the well-being of students across Mainland China.

Contributors

DYQ: Conceptualisation, Investigation, Methodology, Project administration, Writing—original draft, Writing—review & editing; **XW:** Conceptualisation, Data curation, Formal analysis, Investigation, Methodology, Visualisation, Writing—original draft; **XC:** Conceptualisation, Data curation, Formal analysis, Investigation, Project administration, Visualisation, Writing—original draft; **ZJW:** Data curation, Validation, Writing—original draft; **ANZ:** Investigation, Validation, Visualisation, Writing—review & editing; **LYC:** investigation, Validation, writing—review & editing; **RSC:** Conceptualisation, Data curation, Investigation, Methodology, Project administration, Resources, Funding, Supervision, Writing—review & editing.

Editor note

The Lancet Group takes a neutral position with respect to territorial claims in published maps and institutional affiliations.

Declaration of interests

We declare no competing interests.

Acknowledgements

RSC acknowledges support from the Humanity and Social Science Youth foundation of Ministry of Education (22YJCZH018), DYQ received support from Shuimu Tsinghua Scholar and China Postdoctoral Science Foundation grant 2023M732003.

Appendix A. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.lanwpc.2024.101243>.

References

- Racine N, McArthur BA, Cooke JE, Eirich R, Zhu J, Madigan S. Global prevalence of depressive and anxiety symptoms in children and adolescents during COVID-19: a meta-analysis. *JAMA Pediatr*. 2021;175(11):1142–1150.
- Barican JL, Yung D, Schwartz C, Zheng Y, Georgiades K, Waddell C. Prevalence of childhood mental disorders in high-income countries: a systematic review and meta-analysis to inform policymaking. *BMJ Ment Health*. 2022;25(1):36–44.
- Kieling C, Baker-Henningham H, Belfer M, et al. Child and adolescent mental health worldwide: evidence for action. *Lancet*. 2011;378(9801):1515–1525.
- Mulraney M, Coghill D, Bishop C, et al. A systematic review of the persistence of childhood mental health problems into adulthood. *Neurosci Biobehav Rev*. 2021;129:182–205.
- Johnson D, Dupuis G, Piche J, Clayborne Z, Colman I. Adult mental health outcomes of adolescent depression: a systematic review. *Depress Anxiety*. 2018;35(8):700–716.
- Weare K, Nind M. Mental health promotion and problem prevention in schools: what does the evidence say? *Health Promot Int*. 2011;26(suppl_1):i29–i69.
- Fazel M, Patel V, Thomas S, Tol W. Mental health interventions in schools in low-income and middle-income countries. *Lancet Psychiatr*. 2014;1(5):388–398.
- Power TJ, Laracy SD. Multi-tiered, evidence-based systems of support. In: Forman SG, Shahidullah JD, eds. *Handbook of Pediatric Behavioral Healthcare: An Interdisciplinary Collaborative Approach*. Cham: Springer International Publishing; 2018:17–29.
- Chen R, Zhang W, Wu X. Mental health policy and implementation from 2009 to 2020 in China. *SSM Ment Health*. 2023;4:100244.
- Chen T-J, Dong B, Dong Y, et al. Matching actions to needs: shifting policy responses to the changing health needs of Chinese children and adolescents. *Lancet*. 2024;403:1808.
- Yuan W, Jiang Z, Liu Y, Chen Z, Chu X, Song Y. Comprehensively strengthen and improve students' mental health system in the New Era. *China CDC Weekly*. 2024;6(29):719.
- Department of Education of Guangdong Province. *Guangdong Provincial Department of Education on mental health education activity course content guide for primary and secondary schools Guang Dong*. Department of Education of Guangdong Province; 2016. Available from: https://edu.gd.gov.cn/zwgknew/jyzcfg/dfjyzcfg/content/post_3381947.html.
- Stoiber KC, Gettinger M. Multi-tiered systems of support and evidence-based practices. *Handbook of response to intervention: the science and practice of multi-tiered systems of support*. Springer; 2015:121–141.
- Sulkowski ML, Michael K. Meeting the mental health needs of homeless students in schools: a multi-tiered system of support framework. *Child Youth Serv Rev*. 2014;44:145–151.
- Fazel M, Hoagwood K, Stephan S, Ford T. Mental health interventions in schools in high-income countries. *Lancet Psychiatr*. 2014;1(5):377–387.
- Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *Int J Soc Res Methodol*. 2005;8(1):19–32.
- Zhang H, Du Y. Chinese school curricula should include mental health education. *Lancet Psychiatr*. 2018;5(8):e18.
- Li H, Zhou Q, Zhu H, et al. The evolution of mental health related policies in China: a bibliometric analysis, 1987–2020. *Front Public Health*. 2022;10:964248.
- Grande AJ, Hoffmann MS, Evans-Lacko S, et al. Efficacy of school-based interventions for mental health problems in children and adolescents in low and middle-income countries: a systematic review and meta-analysis. *Front Psychiatr*. 2023;13:1012257.
- Qin P, Agerbo E, Mortensen PB. Suicide risk in relation to family history of completed suicide and psychiatric disorders: a nested case-control study based on longitudinal registers. *Lancet*. 2002;360(9340):1126–1130.
- Brent DA, Oquendo M, Birmaher B, et al. Familial pathways to early-onset suicide attempt: risk for suicidal behavior in offspring of mood-disordered suicide attempters. *Arch Gen Psychiatr*. 2002;59(9):801–807.
- Huang H, Hong JS, Espelage DL. Understanding factors associated with bullying and peer victimization in Chinese schools within ecological contexts. *J Child Fam Stud*. 2013;22:881–892.
- Liu Q, Hsieh W-Y, Chen G. A systematic review and meta-analysis of parent-mediated intervention for children and adolescents with autism spectrum disorder in mainland China, Hong Kong, and Taiwan. *Autism*. 2020;24(8):1960–1979.
- Liu J, Liu S, Yan J, Lee E, Mayes L. The impact of life skills training on behavior problems in left-behind children in rural China: a pilot study. *Sch Psychol Int*. 2016;37(1):73–84.
- Peng Z, Li L, Su X, Lu Y. A pilot intervention study on bullying prevention among junior high school students in Shantou, China. *BMC Publ Health*. 2022;22(1):262.
- Tang X, Jia S, Zhuang X, Wong DFK. Preventing depressive symptoms in Chinese adolescents: a pilot cluster randomized controlled trial. *Res Soc Work Pract*. 2024;34(4):360–371.
- Zhao Y, Yu F, Wu Y, Zeng G, Peng K. Positive education interventions prevent depression in Chinese adolescents. *Front Psychol*. 2019;10:1344.
- Munn Z, Stone JC, Aromataris E, et al. Assessing the risk of bias of quantitative analytical studies: introducing the vision for critical appraisal within JBI systematic reviews. *JBI Evid Synth*. 2023;21(3):467–471.
- Barker TH, Habibi N, Aromataris E, et al. The revised JBI critical appraisal tool for the assessment of risk of bias for quasi-experimental studies. *JBI Evid Synth*. 2024;10:11124.
- Nejadghaderi SA, Balibegloo M, Rezaei N. The Cochrane risk of bias assessment tool 2 (RoB 2) versus the original RoB: a perspective on the pros and cons. *Health Sci Rep*. 2024;7(6):e2165.
- Tripepi G, Chesnaye NC, Dekker FW, Zoccali C, Jager KJ. Intention to treat and per protocol analysis in clinical trials. *Nephrology*. 2020;25(7):513–517.
- Kong L-Z, Lai J-B, Hu S-H. China initiates depression screening in children and adolescents. *Lancet Psychiatr*. 2022;9(2):107–108.
- Simon GE, Richards JE, Whiteside U. Reframing the key questions regarding screening for suicide risk. *JAMA*. 2023;329(23):2026–2027.
- Hughes JL, Horowitz LM, Ackerman JP, Adrian MC, Campo JV, Bridge JA. Suicide in young people: screening, risk assessment, and intervention. *BMJ*. 2023;381:e070630.
- Sekhar DL, Batra E, Schaefer EW, et al. Adolescent suicide risk screening: a secondary analysis of the SHIELD randomized clinical trial. *J Pediatr*. 2022;251:172–177.
- Sekhar DL, Pattison KL, Confair A, et al. Effectiveness of universal school-based screening vs targeted screening for major depressive disorder among adolescents: a trial protocol for the screening in high schools to identify, evaluate, and lower depression (SHIELD) randomized clinical trial. *JAMA Netw Open*. 2019;2(11):e1914427.

- 37 Vetter JB, Fuxman S, Dong YE. A statewide multi-tiered system of support (MTSS) approach to social and emotional learning (SEL) and mental health. *Social Emotional Learn*. 2024;100046.
- 38 Zhao ZX, Wang JB. Influence of school mental health education combined with family intervention on the mental health of middle school students. *Chinese J Sch Health*. 2021;42(3):408.
- 39 Werner-Seidler A, Perry Y, Calear AL, Newby JM, Christensen H. School-based depression and anxiety prevention programs for young people: a systematic review and meta-analysis. *Clin Psychol Rev*. 2017;51:30–47.
- 40 Jiang Y, Li X, Harrison SE, et al. Long-term effects of a resilience-based intervention on mental health of children affected by parental HIV in China: testing the mediation effects of emotion regulation and coping. *Child Youth Serv Rev*. 2022;133.
- 41 Yang Y, Wang H, Sha W, et al. Short video-based mental health intervention for depressive symptoms in junior high school students: a cluster randomized controlled trial. *Psychol Res Behav Manag*. 2023;4169–4181.
- 42 Li J, Li J, Zhang W, Wang G, Qu Z. Effectiveness of a school-based, lay counselor-delivered cognitive behavioral therapy for Chinese children with posttraumatic stress symptoms: a randomized controlled trial. *Lancet Reg Health West Pac*. 2023;33:100699.
- 43 Use DoMHaS. *Psychological interventions implementation manual: integrating evidence-based psychological interventions into existing services*. 1211 Geneva 27. Switzerland: World Health Organization; 2024. Available from: <https://www.who.int/health-topics/mental-health>.
- 44 Kakuma R, Minas H, Van Ginneken N, et al. Human resources for mental health care: current situation and strategies for action. *Lancet*. 2011;378(9803):1654–1663.
- 45 Yao M, Kadetz PI, Sidibe AM, et al. Teachers' perceptions of student mental health in eastern China: a qualitative study. *Int J Environ Res Public Health*. 2021;18(14):7271.
- 46 Barnett ML, Puffer ES, Ng LC, Jaguga F. Effective training practices for non-specialist providers to promote high-quality mental health intervention delivery: a narrative review with four case studies from Kenya, Ethiopia, and the United States. *Glob Ment Health (Camb)*. 2023;10:e26.
- 47 Proctor E, Silmere H, Raghavan R, et al. Outcomes for implementation research: conceptual distinctions, measurement challenges, and research agenda. *Adm Pol Ment Health*. 2011;38:65–76.
- 48 Foulkes L, Andrews JL, Reardon T, Stringaris A. Research recommendations for assessing potential harm from universal school-based mental health interventions. *Nature Mental Health*. 2024;2(3):270–277.
- 49 Dray J, Bowman J, Campbell E, et al. Systematic review of universal resilience-focused interventions targeting child and adolescent mental health in the school setting. *J Am Acad Child Adolesc Psychiatry*. 2017;56(10):813–824.
- 50 Chen P, Teo DW, Foo DX, et al. Real-world effectiveness of a social-psychological intervention translated from controlled trials to classrooms. *NPJ Sci Learn*. 2022;7(1):20.
- 51 Zhou X, Hetrick SE, Cuijpers P, et al. Comparative efficacy and acceptability of psychotherapies for depression in children and adolescents: a systematic review and network meta-analysis. *World Psychiatry*. 2015;14(2):207–222.
- 52 Hayes SC, Hofmann SG. "Third-wave" cognitive and behavioral therapies and the emergence of a process-based approach to intervention in psychiatry. *World Psychiatry*. 2021;20(3):363–375.
- 53 Shek DT, Sun RC. Development, implementation and evaluation of a holistic positive youth development program: project PATHS in Hong Kong. *Int J Disabil Hum Dev*. 2009;8(2):107–118.
- 54 Guan H, Wang H, Du K, et al. The effect of providing free eye-glasses on children's mental health outcomes in China: a cluster-randomized controlled trial. *Int J Environ Res Public Health*. 2018;15(12).
- 55 Zenner C, Herrnleben-Kurz S, Walach H. Mindfulness-based interventions in schools—a systematic review and meta-analysis. *Front Psychol*. 2014;5:89024.
- 56 Felver JC, Celis-de Hoyos CE, Tezanos K, Singh NN. A systematic review of mindfulness-based interventions for youth in school settings. *Mindfulness*. 2016;7:34–45.
- 57 Qu D, Wen X, Liu B, et al. Non-suicidal self-injury in Chinese population: a scoping review of prevalence, method, risk factors and preventive interventions. *Lancet Reg Health West Pac*. 2023;37:100794.
- 58 Niu Y, Jiang X, Ashong Z, et al. Developing a resilience intervention approach for adolescents living with natural hazards risks: a pilot randomized controlled trial. *Int J Disaster Risk Reduc*. 2021;58:102190.
- 59 Tanaka E, Iso H, Tsutsumi A, Kameoka S, You Y, Kato H. School-based psychoeducation and storytelling: associations with long-term mental health in adolescent survivors of the Wenchuan earthquake. *Epidemiol Psychiatr Sci*. 2019;29:e65.
- 60 Pearce J, Mann MK, Jones C, Van Buschbach S, Olff M, Bisson JI. The most effective way of delivering a Train-the-Trainers program: a systematic review. *J Continuing Educ Health Prof*. 2012;32(3):215–226.
- 61 Margaretha M, Azzopardi PS, Fisher J, Sawyer SM. School-based mental health promotion: a global policy review. *Front Psychiatry*. 2023;14.
- 62 Fan Z, Zhu H, Gao C. Implementing the special action plan to comprehensively strengthen and improve students' mental health work. *Chinese J Sch Health*. 2023;44(6):805.
- 63 Walker HM, Small JW, Severson HH, Seeley JR, Feil EG. *Multiple-gating approaches in universal screening within school and community settings*. 2014.
- 64 Gould MS, Marrocco FA, Hoagwood K, Kleinman M, Amakawa L, Altschuler E. Service use by at-risk youths after school-based suicide screening. *J Am Acad Child Adolesc Psychiatry*. 2009;48(12):1193–1201.
- 65 Ministry of Education of the people's republic of China. In: *Seventeen departments including the Ministry of Education jointly issued a special action plan to strengthen and improve students' mental health in the new era*. 2023.
- 66 Nishio A, Kakimoto M, Horita R, Yamamoto M. Compulsory educational mental health support system in Japan. *Pediatr Int*. 2020;62(5):529–534.
- 67 Dadaczynski K, Rathmann K, Hering T, Okan O. The role of school leaders' health literacy for the implementation of health promoting schools. *Int J Environ Res Public Health*. 2020;17(6).
- 68 Duggal C, Bagasrawala L. *The critical role of schools in adolescent mental health care: organizing systems and developing pathways*. Positive Schooling and Child Development: International Perspectives; 2018:149–183.
- 69 Harding S, Morris R, Gunnell D, et al. Is teachers' mental health and wellbeing associated with students' mental health and wellbeing? *J Affect Disord*. 2019;242:180–187.
- 70 Stickl Haugen J, Sutter CC, Tinstman Jones JL, Campbell LO. *Teachers as youth suicide prevention gatekeepers: an examination of suicide prevention training and exposure to students at risk of suicide*. *Child & Youth care forum*. Springer; 2022.
- 71 Franklin CGS, Kim JS, Ryan TN, Kelly MS, Montgomery KL. Teacher involvement in school mental health interventions: a systematic review. *Child Youth Serv Rev*. 2012;34(5):973–982.
- 72 Moore SE, Norman RE, Suetani S, Thomas HJ, Sly PD, Scott JG. Consequences of bullying victimization in childhood and adolescence: a systematic review and meta-analysis. *World J Psychiatry*. 2017;7(1):60–76.
- 73 Tiofi MM, Farrington DP. Bullying prevention programs: the importance of peer intervention, disciplinary methods and age variations. *J Exp Criminol*. 2012;8:443–462.
- 74 Silva JId, Oliveira WAd, Mello FCMd, Andrade LSd, Bazon MR, Silva MAI. Anti-bullying interventions in schools: a systematic literature review. *Ciência Saúde Coletiva*. 2017;22:2329–2340.