Systematic Review

Effects of Evidence-Based Intervention on Teachers’ Mental Health Literacy: Systematic Review and a Meta-Analysis

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Abstract: The development of mental health among students has become a crucial objective and focus in numerous countries, with teachers serving as the primary guardians of their mental well-being. As such, enhancing teachers’ mental health literacy has emerged as a key strategy and priority in this endeavor. The purpose of this study is to conduct a comprehensive analysis of the experimental effects associated with improving teachers’ mental health literacy. The study seeks to provide substantiated evidence and innovative strategies for enhancing teachers’ mental health literacy. A systematic search was conducted using five English databases (PubMed, Web of Science, EBSCO, Springer Link, ProQuest) and three Chinese databases (WanFang, CNKI, and VIP) to identify controlled trials evaluating the immediate effect and tracking effect of the intervention experiment on enhancing teachers’ mental health knowledge, anti-stigma, willingness, or behavior to seek help. Relevant peer-reviewed articles (n = 20) were selected for further analysis through the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA-P), with a total of 7446 subjects. The findings revealed that the immediate effect of the intervention on teachers’ mental health literacy, knowledge, stigma, and assistance-seeking had significant moderate to substantial effects. The tracking effect value for knowledge was only moderately significant, and the others were not significant. The analysis of subgroup moderating variables revealed that differences in national economic development level and cultural type did not have a significant impact on the intervention of teachers’ mental health literacy. The results of this review revealed that intervention experiments can effectively improve teachers’ mental health literacy. Hence, it is prudent to pay more attention to the intervention of teachers’ mental health literacy and strengthen the scientific design of experiments to improve the effectiveness of the intervention.

Keywords: teachers; mental health literacy; evidence-based intervention; meta-analysis

1. Introduction

With the acceleration of modernization, adolescent mental health problems have become a worldwide challenge. According to existing studies, mental disorders account for about one-third of the burden of adolescent disease globally, and up to 50% of mental disorders appear before the age of 18 years. If not treated immediately during this period, it can directly lead to poor academic achievement, relationship problems, depression, and suicide [1–6]. In spite of this, nearly 70–80% of adolescents still do not receive the mental health services they need [7,8]. In developing countries, the gap between the mental health needs of adolescents and their actual access to help is large [9]. One of the important reasons for the above phenomenon is the low level of mental health literacy (MHL) of teachers and students, which is mainly manifested as the lack of knowledge related to mental health, the insufficient ability to identify mental disorders, the serious social stigma and self-stigma of mental diseases, and the low willingness to seek help [10].

Mental health literacy is the basis for increasing mental health knowledge, reducing the stigma of mental illness, and changing the attitude toward seeking help. School is an
ideal place to improve the mental health literacy of teachers and students [11–14]. Teachers are typically seen as the ‘gatekeepers’ of students’ mental health since they have the most contact with them throughout their years in school. They, therefore, assist in identifying and supporting students with mental health needs. Teachers with a high level of mental health literacy are better able to identify students with psychological disorders and guide them to early treatment. As teachers help students in such a way, it increases their confidence in managing their own and students’ mental health issues [15]. Therefore, improving teachers’ mental health literacy is of great significance to school mental health education and the future growth of students.

2. Literature Review and Research Questions

2.1. Teachers’ Mental Health Literacy

The concept of mental health literacy was first proposed by Jorm et al.; who referred to knowledge and beliefs about mental disorders [11]. With the rise of positive psychology, the concept of mental health literacy is constantly evolving and expanding. In terms of content, it mainly includes understanding how to obtain and maintain positive mental health, understanding mental disorders and their treatment, reducing the stigma associated with mental disorders, and improving the effectiveness of seeking help [16,17]. The structural dimension includes “self-others”, that is, individuals’ knowledge, attitude, and behavior (habits) in promoting their own and others’ mental health [18]. It also entails coping with their own and others’ mental diseases [19]. In general, improving mental health literacy is the key to promoting mental health, which can make individuals aware of their own and others’ mental health needs and seek effective care in a timely manner to promote mental health. Specifically, it includes increasing mental health knowledge, increasing the willingness to ask for help, adopting help-seeking behaviors, and reducing the stigma of mental illness [12,20,21].

Besides parents, teachers know students best; hence, teachers have a crucial influence on their mental health. Teachers have a unique opportunity through daily contact with the student, both in and outside the classroom, to teach mental health education and positively influence students’ campus life. Hence, they can identify students at risk of psychological barriers and work with others to provide necessary interventions to promote their psychological health and academic success. Indeed, teachers have the opportunity and responsibility to educate students about mental health [22,23]. Research on teachers’ mental health based on interpersonal interaction theory shows that teachers’ good mental health literacy is not only an important factor influencing teachers’ professional development and positive mental health, but also has a significant impact on students’ mental health through teacher relationship with students [24,25]. Generally, teachers actively support all students in the classroom, establish a good relationship between themselves and students, design positive peer interaction, and teach students positive problem-solving and self-management strategies, which can not only improve the happiness of teachers and students but also be an essential result of effective classroom teaching [26].

2.2. Intervention of Teachers’ Mental Health Literacy

In the past two decades, the World Health Organization (WHO), the United Nations Educational, Scientific and Cultural Organization (UNESCO), and other international organizations have called for school mental health to be taken as the priority of public mental health, with the core issue being the improvement of teachers’ and students’ mental health literacy [9,27]. Many countries have used teachers’ mental health literacy as the basis for an intervention project. The teachers’ mental health literacy is used to ensure that high-quality, evidence-based mental health promotion and prevention programs are in place. This is achieved by training teachers to improve their mental health literacy, mental health knowledge, ability to recognize their own and students’ psychological disorders, reduce stigma and increase willingness to get help, as well as help teachers in a meaningful way to teach mental health [28,29].
For example, in recent years, various countries have carried out intervention projects to improve the mental health literacy of teachers and students, such as Canada’s “Gatekeeper” program, “High School Mental Health Curriculum Guide”, “School Mental Health Assistance Program (SMH ASSIST)”, “Adolescent Mental Health First Aid Program (YMHFA)” and “School Mental Health Program (SBMH)” in the United States, and “Short Video-based Education Program” in Japan. Some of the teachers’ mental health literacy among developing countries entails: “Teacher Mental Health Training” project in Yunnan Province, China, the “Comprehensive Approach to Addressing Adolescent Depression in Malawi and Tanzania” project based on Canadian curriculum resources in Tanzania and Malawi, the “School-based Teacher Mental Health Training Project” in Pakistan, the “School Mental Health Knowledge Popularization Program” in Malaysia, and the “Teacher as Escort Pilot Study (TAPS)” in Haiti. In the above projects, the improvement of mental health knowledge and help-seeking behavior mainly uses educational lectures, interactive seminars, paper materials, online materials, role plays, situational experiences, games, and practical assignments as interventions. Changing stigmatization attitudes is mainly in the form of “contact”, including direct contact with people having mental illness, or watching the true stories of people with mental illness via video [30].

According to the existing teacher mental health literacy studies, due to the lack of education and training, the majority of teachers believe that they lack the knowledge, skills, and confidence to identify and assist students who may have mental health issues; they also believe that stigma is the greatest barrier to seeking help [26,27]. In the experiment of teachers’ mental health knowledge intervention, the main educational intervention methods, such as lectures and seminars with a mental health knowledge theme, focused on the knowledge and recognition of mental disorders. Melissa et al. (2018) systematically reviewed eight middle school teachers’ mental health literacy intervention experiments and showed that middle school teachers’ immediate intervention effect on knowledge related to students’ internalization disorders (e.g.; anxiety, depression, low self-esteem) was significant (d = 0.57–3.1) [10]. Although the tracking effect decreased, the effect size was still large (d = 0.52–1.74). Satoshi Yamaguch et al. (2018) conducted a meta-analysis of 16 mental health literacy intervention experiments involving kindergarten to high school teachers, and the results of 11 studies showed that the immediate intervention effect of teachers’ mental health knowledge significantly improved (d = 0.4–2.3) and the tracking effect also decreased (d = 0.4–1.3) [15].

The experimental results of the intervention showed that through education and exposure (including video exposure), the effect of intervention contact with cases was greater than the non-contact intervention (d_{contact} = 0.4 = 0.0; d_{non-contact} = 0.4). However, some experimental results showed that the intervention measures failed to significantly reduce the stigma [31,32] of teachers with psychological disorders. Although existing meta-analyses have systematically investigated the overall effect size of the stigma interventions for teachers’ psychological disorders, as well as the effect size differences due to experimental design differences, these meta-analyses have unfortunately ignored other moderating variables such as economic situation of the country, cultural differences, and whether the intervention effect will be affected.

The state of national economic development has a direct impact on the attention given by the nation to school’s mental health degrees and the available resources. According to the existing studies included in the meta-analysis, the majority of mental health literacy interventions in schools across the nation or province are in developed countries. Most of the intervention projects implemented in developing countries are based on existing intervention projects in developed countries. Furthermore, cultural differences significantly affect all aspects of mental health literacy [31–37]. In terms of stigma, some less developed countries in Africa and Latin America generally believe that mental disorders are the punishment and retribution of demonic possession or due to personal sin [38] or as a result of the manifestation of human weakness, lack of willpower, or malingered [39]. In Asian cultures, mental illness is stigmatized more severely and is frequently referred to as
“epilepsy” and “madness” [40], indicating the uncomfortableness and incurability of the individual. The stigma associated with mental illness is not just a societal issue, but results in a severe and unpleasant personal stigma, in which an individual’s illness affects not only himself but also the entire family [41,42]. Severe stigma can impair the willingness to seek care; therefore, most patients choose to help themselves or seek assistance from either family members or close friends rather than experts [42,43]. More so, in the experimental intervention studies that have been conducted so far, the aspects of mental health literacy change over time. The results of Belinda (2021), Anthony (2010), and other studies showed that the mental health measurement effect was less than the immediate measurement effect when measuring teachers’ knowledge, attitudes, and willingness to seek help [44,45].

In the meta-analysis of teachers’ mental health help-related studies, Satoshi Yamaguchet et al. (2018) conducted a systematic review of five related studies [15], three of which improved the confidence of teachers to talk with students about mental health problems through the intervention [33–35]. Among the relevant influencing factors, subgroup analysis of whether there were tracking measurements in the experimental intervention design showed that the effect of the tracking measurements was significantly lower than that measured immediately after the experiment.

In conclusion, the effectiveness of mainly taking educational training and contact as an intervention for teachers’ mental health literacy has been confirmed by several meta-analyses abroad. However, the existing meta-analysis failed to thoroughly examine the regulatory factors affecting the effect of teachers’ mental health literacy interventions. For example, in relatively backward developing countries, cultural differences will have a certain impact on the intervention effect. In addition, the original literature included in the existing meta-analyses was incomplete because they did not include non-English-speaking studies.

2.3. Research Questions

Although many countries have carried out evidence-based research on mental health literacy interventions of school teachers, the effects of the intervention are different. Moreover, it is difficult to accurately grasp the overall effect of intervention measures on teachers’ mental health literacy due to the differences in culture, economy, and experimental design. Therefore, we comprehensively searched Chinese and English databases for experimental studies on improving teachers’ mental health literacy and posed two research questions: (1) By combining intervention experiments to improve teachers’ mental health literacy in various countries, the total scores of teachers’ mental health literacy, mental health knowledge, stigma, and help-seeking (including immediate effect size and follow-up effect size) were extracted as outcome variables and tested for main effects. (2) The economic development of countries (developed countries vs. developing countries) and cultural differences (Western culture vs. non-Western culture) were used as subgroup-moderating variables to investigate whether the above variables would have an impact on the intervention effect of teachers’ psychological literacy. It is expected to fill the gaps in existing research in this field.

3. Research Methods

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses guideline was employed in conducting this meta-analysis [46], Please refer to Appendix of the Supplementary Materials for details.

3.1. Search Strategy

Three reviewers conducted independent literature searches using the following English and Chinese databases: Web of Science (all years), ProQuest, EBSCO, Pub-Med, Wanfang, Springer Link, the Chinese National Knowledge Infrastructure (CNKI), and the Chinese Scientific Journal (VIP). The time bound for all the search was all years. Differences between the reviewers (LYY, LC, JYL) were debated in order to reach a consensus. Discrep-
ancies pertaining to the inclusion were resolved by consulting a second group of reviewers for additional insight (LWJ, MAA, AZN). The following keywords: teachers, mental health literacy, knowledge, attitudes, help-seeking, seeking care, and experimental interventions were thoroughly searched both in Chinese and English.

3.2. Inclusion and Exclusion Criteria

The meta-analysis included only the literature that matched the following criteria: school-based intervention experiments on teacher mental health literacy; and ordinary teachers, non-school mental health teachers, mental health experts, and professionals in mental health institutions; the data of the experimental results were extracted, including the total score of the teacher’s mental health literacy scale, the score of mental health knowledge, the score of stigma, and the score of help, or the score of one of them; experimental results must report pre-test data; studies included in the meta-analysis must be peer-reviewed journal articles or dissertations; experimental data must include sample size, mean and standard deviation, or independent sample (t-test value and effect size d value) was reported. The above data were used to calculate the overall effect value.

3.3. Study Selection, Data Extraction and Coding

Three reviewers (LYY, LC, JYL) evaluated each study’s title, abstract, and full text independently. Conflicting ideas were addressed until a consensus was reached, and discrepancies regarding inclusion were handled with the assistance of the other reviewers (LWJ, MAA, AZN). Information from all original papers was collected and summarized by three reviewers. The first is a summary of the studies’ most fundamental features (i.e.; author, country, type of experiment, date of publication, type of data measurement, time of data measurement, teacher teaching method, and measurement questionnaire). The second is individual background information (i.e.; school period, sample size, duration of intervention). The third is outcome parameters. For more information, refer to the Appendix A.

The study used the technique of simultaneous coding to eliminate the possibility of selection bias in the data retrieval and coding process of the meta-analysis (Table 1).

Table 1. Code Table.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outcome variable</td>
<td>Knowledge = 1; Stigma = 2; Help-seeking = 3</td>
</tr>
<tr>
<td>The type of country</td>
<td>Developed countries = 1; Developing countries = 2</td>
</tr>
<tr>
<td>Culture type</td>
<td>Non-Western culture = 1; Western culture = 2</td>
</tr>
</tbody>
</table>

3.4. Publication Bias and Sensitivity Testing

Using a funnel plot and Egger’s linear regression, the publication bias of the original studies included in the meta-analysis was evaluated. In the event that the effect values exhibit uniform distribution around the apex of the inverted funnel in a funnel chart, the probability of publication bias from a subjective evaluation perspective is reduced. When the p value in Egger’s linear regression is not significant (p < 0.001), it suggests that the explanation is unbiased, and thus, publication bias does not exist. An over-sensitivity analysis was conducted to assess the stability of the outcomes obtained from the meta-analysis. Thus, the effect value of each original study was removed separately, followed by a recalculation of the combined effect size. The results of the meta-analysis were relatively stable if the combined effect magnitude did not change substantially [47].

3.5. Combined Effect Size Calculation

Using students’ mental health literacy intervention, immediate effect, and tracking effects of stigma and help-seeking as outcome variables, the main effect test was conducted...
to ascertain what effect these intervention projects had on students’ mental health knowledge, stigma, and willingness to obtain help. Thus, the main effect of whether ordinary teachers (not full-time or part-time mental health teachers) play a major role in student’s mental health literacy was of interest. Cohen’s \( d \), the standardized mean difference, was employed as the combined effect size of the intervention. In cases where the mean and standard deviation were not reported, the independent sample \( t \)-test value or the effect size \( d \) value was determined. Subsequently, the overall effect value was calculated via the CMA3.0 software, which is a comprehensive meta-analysis tool. In comprehending the evaluation standard of the effect size, the following ways serve as a guideline: When \( d \leq 0.2 \), the absolute value of the combined effect size is deemed to be small. Within \( 0.79 \geq d \geq 0.21 \), the effect size is regarded as medium and large, respectively [43,48].

3.6. Model Selection and Heterogeneity Testing

Meta-analyses mainly used fixed-effect or random-effects models. The former assumes that the true effect size is the same between different studies, and that the difference between results is due to random error. The latter assumes that the true effect size can be different between studies, and the difference between results is affected not only by random effects error, but also by demographic variables of different samples and differences in experimental design. Through the literature review, this paper finds that national development degree and cultural differences may affect teachers’ mental health literacy, so it intends to use random effect model for estimation. The suitability of the random effects model was assessed through a heterogeneity test, which involved examining the \( I^2 \) value and determining the significance of the Cochran \( q \) value (\( p < 0.001 \)). In the event that the \( Q \) test yields significant results or the value of \( I^2 \) exceeds 75% (where 25%, 50%, and 75% correspond to low, moderate, and high heterogeneity, respectively), it can be inferred that there exists a considerable degree of heterogeneity among the studies. In this instance, it would be more suitable to opt for the random effects model. Alternatively, if necessary, the fixed effects model may be chosen [49].

4. Results

After conducting a comprehensive search across various databases, a total of 9201 studies were retrieved. Following the elimination of 1945 redundant or extraneous records based on their titles, the remaining 7256 studies were subjected to scrutiny based on the established eligibility criteria. The disqualification criteria for the studies included: (1) subjects that were inconsistent, (2) study content that was inconsistent, non-empirical, or non-experimental, and (3) studies that lacked primary data and complete text. Following the aforementioned criteria for screening, a total of 20 valid sources of literature were acquired, consisting of 1 Chinese and 19 English sources (Figure 1).

4.1. Description of Included Studies

As the Supplementary Materials show, according to the meta-analysis process, after the literature search and screening, 20 original pieces of literature were finally included (a total of 60 effect sizes with a sample number of 7446 teachers). Among them were 3 randomized control experimental studies (RCT) and 17 non-randomized control experimental studies. There were four studies with follow-up measurements and sixteen without. We sampled ten experiments, each conducted in both developing countries and developed countries. Two studies were centered on kindergarten teachers, three on primary school teachers, and ten on middle school teachers (including high school). There were four studies on comprehensive primary and secondary school teachers, one study on adult school teachers, and one study that did not specify the learning period of teachers. The original study characteristics are detailed in Appendix A.
4.1. Description of Included Studies

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4.2. Publication Bias and Heterogeneity Testing

According to the funnel diagram in Figures 2 and 3, the immediate effect amount and the tracking effect amount of the intervention measures were not evenly distributed on both sides of the total effect. From the subjective judgment, it indicates the possibility of publication deviation between the immediate effect and the tracking effect. According to the objective test of the safety factor of the immediate effect and tracking effect in Figures 4 and 5, the p value of both the immediate intervention effect and the tracking intervention effect was not significant at the alpha value of 0.05 ($p < 0.05$), indicating that there is no publication deviation between the immediate effect and the tracking effect.

![Funnel Plot of Standard Error by Hedges's g](image)

Figure 2. Publication bias funnel plot of the immediate effect. (The circles in the graph represent the immediate effect size of each intervention.).
Figure 2. Publication bias funnel plot of the immediate effect. (The circles in the graph represent the immediate effect size of each intervention.).

Figure 3. Tracking effect publication bias funnel plot. (The circles in the figure represent the tracking effect size for each intervention.).

Figure 4. Instant effect publication bias loss safety factor.

Figure 5. Tracking effect publication bias loss safety factor.

The results of the heterogeneity test of the studies included in the meta-analysis are shown in Table 2. The Cochran Q test results were significant ($p < 0.001$), and $I^2$ was greater than 75%, indicating that the study selected as a random effect model for meta-analysis is accurate. The 20 studies included in the meta-analysis suggest that there are regulatory variables and analysis.

Table 2. Heterogeneity test and random effect model analysis.

<table>
<thead>
<tr>
<th>k</th>
<th>Point Estimate</th>
<th>95%CI</th>
<th>Two-Tailed Test</th>
<th>Heterogeneity Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>0.715</td>
<td>0.587 - 0.843</td>
<td>10.984</td>
<td>0.000</td>
</tr>
<tr>
<td>Teachers' mental health literacy</td>
<td>2938.038</td>
<td>59</td>
<td>0.000</td>
<td>98.022</td>
</tr>
</tbody>
</table>
4.3. Main Effects and Sensitivity Tests

Table 3 displays the overall status of mental health literacy, mental health knowledge, stigma, the immediate effects of seeking help, and the tracking effects. Instant measurements of a total of 53 effect sizes were found. Among them, mental health knowledge, stigma, and help effect were 25, 16, and 12, respectively. All the intervention effects were significant medium to large effect quantities ($g$ Overall status of mental health literacy = 0.715; $g_{\text{knowledge}}$ = 0.981; $g_{\text{stigma}}$ = 0.466; $g_{\text{help-seeking}}$ = 0.529, $p < 0.001$). A total of seven effect measures were followed, of which knowledge, stigma and help were four, two and one, respectively, except for the moderate effect size of knowledge intervention ($g = 0.681$, $p < 0.001$). The overall status of mental health literacy and stigma interventions’ tracking effect was insignificant ($p > 0.001$). In addition, because the help effect size was less than two, the combined effect size of the immediate help effect could not be calculated (the effect number must be $\geq 2$). From the comparison of immediate effect and tracking effect data, the overall status of teachers’ mental health literacy and stigma tracking effect decreased from a significant medium-large effect to an insignificant level. As compared with instant intervention, it decreased from a significant large effect ($d = 0.981$, $p < 0.001$) to a significant moderate effect ($d = 0.681$, $p < 0.001$). The sensitivity analysis revealed that the collective impact of knowledge, attitude, help-seeking behavior, and the overall status of mental health literacy effect and tracking effect size did not change after removing each effect value. This indicated that the immediate effect size and tracking effect size of the three were stable (Table 3).

Table 3. Main effect test.

<table>
<thead>
<tr>
<th>Outcome Variable</th>
<th>k</th>
<th>g (95%CI)</th>
<th>Sensitivity Test</th>
<th>Heterogeneity Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>g (95%CI)</td>
<td>Q(r) df P I²</td>
<td></td>
</tr>
<tr>
<td>Immediate effect size</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall status of mental health literacy</td>
<td>53</td>
<td>0.715 (0.579,0.850)</td>
<td>0.715 (0.579,0.850)</td>
<td>2949.110 52 0.000 98.237</td>
</tr>
<tr>
<td>Knowledge</td>
<td>25</td>
<td>0.981 (0.644,1.318)</td>
<td>0.981 (0.644,1.318)</td>
<td>2121.936 24 0.000 98.869</td>
</tr>
<tr>
<td>Stigma</td>
<td>16</td>
<td>0.466 (0.286,0.645)</td>
<td>0.466 (0.286,0.645)</td>
<td>358.016 15 0.000 95.810</td>
</tr>
<tr>
<td>Help-seeking</td>
<td>12</td>
<td>0.529 (0.262,0.796)</td>
<td>0.529 (0.262,0.796)</td>
<td>18.306 11 0.000 93.899</td>
</tr>
<tr>
<td>Trace effect size</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall status of mental health literacy</td>
<td>7</td>
<td>0.618 (0.370,0.867)</td>
<td>0.618 (0.370,0.867)</td>
<td>15.238 6 0.018 60.625</td>
</tr>
<tr>
<td>Knowledge</td>
<td>4</td>
<td>0.681 (0.382,0.981)</td>
<td>0.681 (0.382,0.981)</td>
<td>8.425 3 0.000 64.392</td>
</tr>
<tr>
<td>Stigma</td>
<td>2</td>
<td>0.197 (−0.192,0.586)</td>
<td>0.197 (−0.192,0.586)</td>
<td>0.074 1 0.785 0.000</td>
</tr>
<tr>
<td>Help-seeking</td>
<td>1</td>
<td>/</td>
<td>/</td>
<td>/</td>
</tr>
</tbody>
</table>

4.4. Subgroup Regulatory Variables Test

According to the recommendations of Fu (2011) and Higgins et al. (2003) [50,51], due to the limited number of included studies (knowledge, stigma, 4, 2, 1, respectively), only subgroup adjustment variables, including national development types (developed countries vs. developing countries), and cultural types (non-western culture vs. western culture), are shown in Table 4.

The results of the subgroup analysis showed that the national development type and cultural type did not have significant regulatory effects on teachers’ mental health knowledge, stigma, and help-seeking intervention ($p > 0.001$). The regulatory effect was not significant; however, from the perspective of the effect quantity data (point estimate): (1) the intervention effect of teachers’ mental health knowledge is a large effect in developed countries and western cultural countries ($g_{\text{developed countries}} = 1.178$, $g_{\text{Western culture}} = 1.176$); and in both developing countries and non-western cultural countries ($g_{\text{developed countries}} = 0.768$, $g_{\text{Non-Western culture}} = 0.731$); (2) In the stigma intervention, development types and cultures of different countries belong to the medium effect value $g_{\text{developed countries}} = 0.435$, $g_{\text{developed countries}} = 0.768$,

$g_{\text{Non-Western culture}} = 0.731$; (2) In the stigma intervention, development types and cultures of different countries belong to the medium effect value $g_{\text{developed countries}} = 0.435$, $g_{\text{developed countries}} = 0.768$,
developed countries = 0.503, g_{non-Western culture} = 0.476, g_{Western culture} = 0.458); (3) Help-seeking interventions had medium effects in both developed and developing countries, and in Western and non-western cultures (g_{developed countries} = 0.517, g_{developing countries} = 0.535, g_{non-Western culture} = 0.564, g_{Western culture} = 0.475).

Table 4. Analysis of the subgroup regulatory variables.

<table>
<thead>
<tr>
<th>Subgroups</th>
<th>Regulated Variable</th>
<th>k</th>
<th>Point Estimates</th>
<th>95% CI</th>
<th>Two-Tailed Test</th>
<th>Heterogeneity Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower Limit</td>
<td>Upper Limit</td>
<td>Z</td>
</tr>
<tr>
<td>Knowledge for help</td>
<td>Developed country</td>
<td>13</td>
<td>1.178</td>
<td>0.660</td>
<td>1.697</td>
<td>4.457</td>
</tr>
<tr>
<td></td>
<td>Non-Western culture</td>
<td>11</td>
<td>0.731</td>
<td>0.511</td>
<td>1.026</td>
<td>4.524</td>
</tr>
<tr>
<td></td>
<td>Western culture</td>
<td>14</td>
<td>1.176</td>
<td>0.692</td>
<td>1.659</td>
<td>4.761</td>
</tr>
<tr>
<td></td>
<td>Developed country</td>
<td>8</td>
<td>0.435</td>
<td>0.197</td>
<td>0.674</td>
<td>3.574</td>
</tr>
<tr>
<td></td>
<td>Non-Western culture</td>
<td>6</td>
<td>0.476</td>
<td>0.232</td>
<td>0.702</td>
<td>3.821</td>
</tr>
<tr>
<td></td>
<td>Western culture</td>
<td>10</td>
<td>0.458</td>
<td>0.235</td>
<td>0.682</td>
<td>4.018</td>
</tr>
<tr>
<td>Stigma</td>
<td>Developed country</td>
<td>5</td>
<td>0.517</td>
<td>0.061</td>
<td>0.972</td>
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<td>Developing country</td>
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<td>Non-Western culture</td>
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<tr>
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<td>Western culture</td>
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<td>0.473</td>
<td>0.032</td>
<td>0.917</td>
<td>2.102</td>
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</tbody>
</table>

5. Discussion

5.1. Main Effect Test Results

The immediate effect of teachers’ mental health literacy intervention was significant, but the tracking effect was only significant with knowledge. The results show that the interventions studied can significantly improve teachers’ mental health literacy in the short term; the intervention effects are different between mental health knowledge, stigma, and seeking help, among which the improvement effect of teachers’ mental health knowledge is the most obvious. The follow-up results showed that teachers’ mental health knowledge weakened over time and failed to significantly improve teachers’ stigmatization of psychological disorders and actual help-seeking behavior, which was similar to the results of the meta-analysis of teachers’ mental health literacy [10].

The aforementioned outcomes could potentially be attributed to the subsequent factors: One, there are few follow-up measurement studies on teachers’ mental health literacy interventions. Of the original studies included in the meta-analysis, only four studies tracked interventions, which could affect our overall understanding of teacher mental health literacy, particularly the tracking effects of stigmatization and help-seeking interventions. Two, the existing tracking measurements are all short-term (within six months). Since actual help-seeking behavior takes time, it may not yield significant results at a short-term follow-up. Three, the length and intensity of interventions were insufficient. Since teachers’ mental health literacy is a dynamic, continuous, and changing process, a brief intervention is insufficient to promote the enduring advancement of their mental health literacy.

5.2. Subgroup Analysis Results

To the best of our knowledge, this is the first meta-analysis to include the level of national economic development and cultural type as moderating variables for teachers’ mental health literacy. However, according to the results of the subgroup moderating variables analysis, the level of economic development of the country does not significantly affect teachers’ mental health knowledge, stigma, and help-seeking (p < 0.001). The analysis of the national cultural type data showed the same results and did not have a significant effect on teachers’ mental health literacy (p < 0.001). It is evident that teachers’ mental health issues have become a worldwide problem. As it has been shown, teachers experience higher levels of psychological distress, burnout, and fatigue compared to other professions. In a comparison of 26 occupations in the UK, teaching is one of the six most physically and psychologically stressful jobs. According to the OECD (Organization for Economic
Cooperation and Development) 2018 International Teaching Survey, nearly a third of teachers question their career choice. According to the Australian Institute for Teaching and School Leadership, 44% of teachers in 2019 said they were unlikely to leave classroom teaching in the foreseeable future, 26% were unsure, and 20% said they would leave the teaching profession within the first five years of teaching. Teachers account for 13.5% of the total number of people with depression by occupation type in mainland China, only with the Internet industry trailing behind [52–55]. There is a global consensus that teachers’ mental health literacy is inadequate, and countries have launched experimental programs to improve teachers’ mental health literacy in order to improve their mental health literacy. Therefore, we believe that the level of national economic development and the type of culture do not significantly influence teachers’ mental health literacy.

6. Conclusions
6.1. Research Conclusions

In summary, mental health literacy is one of the most important indicators of an individual’s mental health. As the “gatekeepers” of students’ mental health literacy, teachers’ mental health literacy plays an important role in the mental health of students [15]. This study focuses on whether a school-based teacher mental health literacy intervention can effectively improve teachers’ mental health literacy, including mental health knowledge, anti-stigma, and help-seeking behavior. Based on a meta-analysis of 20 experiments (totalling 7446 teachers) conducted globally, the results showed that teacher mental health literacy intervention experiments significantly improved teachers’ mental health knowledge, anti-stigma, and help-seeking behaviors. This suggests that training in teacher mental health literacy is necessary and effective. However, teacher mental health literacy decreases over time, and it is evident that interventions for teacher mental health literacy should be conducted on an ongoing basis. In addition, teacher mental health issues as a worldwide problem, the level of national economic development, and the type of culture do not significantly affect the intervention of teacher mental health literacy.

To our knowledge, previous meta-analyses of experiments on teacher mental health literacy interventions only conduct research in English and have not searched and analyzed articles outside of English. The present study section remedies this deficiency by including Chinese language studies in the search and analysis [9,56]. In addition, we examined moderating variables (including national economic development and cultural type) that could potentially affect teachers’ mental health literacy. This is one of the important contributions of this study to the field [57–60].

6.2. Limitations and Future Directions of Research

This study also has the following limitations: (1) This study examined four outcome variables and two subgroup moderating variables, but a more detailed analysis was not possible due to the insufficient number of some studies (e.g.; follow-up studies of help-seeking). This limitation also contributed to our inability to explore the relationship between the three outcome variables of mental health knowledge, stigma, and help-seeking. (2) Some of the original studies included in the meta-analysis were not of high quality. We followed the guidelines for meta-analysis methods (PRISMA) to ensure high-quality meta-analysis results and used whether they were peer-reviewed as one of the criteria to test the quality of the original studies. Although 20 studies eventually met the inclusion criteria, 16 studies were non-randomized controlled trials, which posed some risk to the reliability of the conclusions.

Based on this finding, other researchers can enhance the importance and intensity of the evidence-based intervention of teachers’ mental health literacy. As an important part of their professional development, teachers’ mental health literacy should be carried out throughout their careers. Continuous and normal intervention measures and the development of teachers’ professional emotions, knowledge, and skills should complement each other. There is a need to ascertain an improved definition and structural framework.
of teachers’ mental health literacy and its relationship with students’ mental health literacy. The current definition and structural dimension of teachers’ mental health literacy mainly refer to the conceptual framework of individual mental health literacy, but this framework does not reflect the educational value of teachers’ mental health literacy, such as how teachers improve their own and students’ mental health literacy through classroom teaching and school life. Randomized control group experiments should be used as much as possible to improve the reliability of experimental results. Multiple sources of information collection should be considered, such as self-reports of whether students received help or school records of the number of referrals actually helped, in addition to teacher measurement questionnaires and self-reports.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/su15118981/s1, PRISMA checklist [61].

Author Contributions: Y.L. had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. Concept design and drafting of the manuscript: Y.L. Data search: C.L. Statistical analysis: Y.J., W.L. and Z.A. Acquisition, analysis, or interpretation of data: All authors. Supervision: M.A.A. All authors reviewed the manuscript. All authors have read and agreed to the published version of the manuscript.

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Data Availability Statement: The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request. Correspondence and requests for materials should be addressed to M.A.A.

Conflicts of Interest: The authors declare no competing interest.
## Appendix A

### Table A1. Features of the Original Studies Included in the Meta-Analysis.

<table>
<thead>
<tr>
<th>Study Name</th>
<th>Country</th>
<th>Economic Level</th>
<th>The Experimental Type</th>
<th>N</th>
<th>Measuring Time</th>
<th>Learning Period</th>
<th>Interventions</th>
<th>Duration of Intervention</th>
<th>The Results of Variable</th>
<th>Measuring Tool</th>
<th>Peer-Reviewed Journal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keng-Yen Huang (2017) [51]</td>
<td>Uganda</td>
<td>developing</td>
<td>Non-RCT</td>
<td>42</td>
<td>Pre-test, post-test, follow-up test (4 months)</td>
<td>kindergarten</td>
<td>Education—training, experience, reflection</td>
<td>5 days</td>
<td>Knowledge</td>
<td>Teacher Strategy Questionnaire</td>
<td>✓</td>
</tr>
<tr>
<td>Kok Wai Tay (2019) [52]</td>
<td>Malaysia</td>
<td>developing</td>
<td>Non-RCT</td>
<td>68</td>
<td>Pre-test, post-test</td>
<td>comprehensive</td>
<td>Education—training</td>
<td>1 day</td>
<td>Knowledge</td>
<td>Stigma Help-seeking</td>
<td>✓</td>
</tr>
<tr>
<td>S.A. Hussein (2013) [53]</td>
<td>Pakistan</td>
<td>developing</td>
<td>Non-RCT</td>
<td>114</td>
<td>Pre-test, post-test</td>
<td>primary school</td>
<td>Education—Meetings, Video, Paper</td>
<td>2 days (12 h in 3 sessions)</td>
<td>Knowledge</td>
<td>&quot;Teach's Mental Health Knowledge Questionnaire&quot;</td>
<td>✓</td>
</tr>
<tr>
<td>S.K. Kutcher (2016) [55]</td>
<td>Tanzania</td>
<td>developing</td>
<td>Non-RCT</td>
<td>193</td>
<td>Pre-test, post-test</td>
<td>middle school</td>
<td>Education—training, group discussions</td>
<td>3 days</td>
<td>Knowledge</td>
<td>Teachers' Mental Health Literacy Questionnaire</td>
<td>✓</td>
</tr>
<tr>
<td>Alex Fortier (2017) [56]</td>
<td>Canada</td>
<td>developed</td>
<td>Non-RCT</td>
<td>3985</td>
<td>Pre-test, post-test</td>
<td>comprehensive</td>
<td>Education—training</td>
<td>not mentioned</td>
<td>Knowledge</td>
<td>Teachers' Mental Health Literacy Questionnaire</td>
<td>✓</td>
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<tr>
<td>Yinong Wei (2019) [57]</td>
<td>Canada</td>
<td>developed</td>
<td>Non-RCT</td>
<td>909</td>
<td>Pre-test, post-test</td>
<td>middle school</td>
<td>Education—training</td>
<td>1 day</td>
<td>Knowledge</td>
<td>Teachers' Mental Health Literacy Questionnaire</td>
<td>✓</td>
</tr>
<tr>
<td>Yinong Wei (2021) [58]</td>
<td>Canada</td>
<td>developed</td>
<td>Non-RCT</td>
<td>920</td>
<td>Pre-test, post-test</td>
<td>middle school</td>
<td>Education—training, videos, group discussions, self-study with online materials</td>
<td>2 days</td>
<td>Knowledge</td>
<td>Mental Health Knowledge and Stigma Questionnaire</td>
<td>✓</td>
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<tr>
<td>Li Hui (2021) [59]</td>
<td>China</td>
<td>developing</td>
<td>Non-RCT</td>
<td>34</td>
<td>Pre-test, post-test</td>
<td>primary school</td>
<td>Inspirational lectures, group discussions, role-playing, educational experiences, brainstorming, games, case discussions, practical assignments</td>
<td>12 weeks (1.5 h per week)</td>
<td>Knowledge</td>
<td>&quot;Mental Health Knowledge Questionnaire&quot;</td>
<td>✓</td>
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<tr>
<td>Elia D. (2017) [60]</td>
<td>Haiti</td>
<td>developing</td>
<td>Non-RCT</td>
<td>22</td>
<td>Pre-test, post-test, follow-up test (6 weeks)</td>
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<td>Teaching Demonstrations, Role Plays, Interactive Discussions</td>
<td>two and a half days</td>
<td>Knowledge</td>
<td>Mental Health Knowledge and Attitude Questionnaire</td>
<td>✓</td>
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<tr>
<td>Amanda N. Nguyen (2020) [61]</td>
<td>Vietnam</td>
<td>developing</td>
<td>RCT</td>
<td>55</td>
<td>Pre-test, post-test</td>
<td>middle school</td>
<td>Education—training, classroom operations, lesson planning, discussion of teaching strategies</td>
<td>3 days</td>
<td>Knowledge</td>
<td>Stigma Help-seeking</td>
<td>✓</td>
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<tr>
<td>Cambodia</td>
<td>developing</td>
<td>RCT</td>
<td>36</td>
<td>Pre-test, post-test</td>
<td>middle school</td>
<td>Education—training, classroom operations, lesson planning, discussion of teaching strategies</td>
<td>3 days</td>
<td>Knowledge</td>
<td>&quot;Mental Health Literacy Questionnaire&quot;</td>
<td>✓</td>
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<tr>
<td>Junsy Ueda (2021) [62]</td>
<td>Japan</td>
<td>developed</td>
<td>RCT</td>
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<td>Pre-test, post-test</td>
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<td>Education—Video</td>
<td>50 min</td>
<td>Knowledge</td>
<td>Questionnaire on Mental Health Knowledge, Stigma, and Help</td>
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<tr>
<td>Josie D. Proven (2014) [63]</td>
<td>United States</td>
<td>developed</td>
<td>Non-RCT</td>
<td>50</td>
<td>Pre-test, post-test</td>
<td>primary school</td>
<td>educational seminar</td>
<td>2 h</td>
<td>Knowledge</td>
<td>&quot;Mental Health Knowledge Questionnaire&quot;</td>
<td>✓</td>
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<tr>
<td>Study Name</td>
<td>Country</td>
<td>Economic Level</td>
<td>The Experimental Type</td>
<td>N</td>
<td>Measuring Time</td>
<td>Learning Period</td>
<td>Interventions</td>
<td>Duration of Intervention</td>
<td>The Results of Variable</td>
<td>Measuring Tool</td>
<td>Peer-Reviewed Journal</td>
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<td>Vania Martinez (2015) [57]</td>
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<td>38</td>
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<td>120</td>
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<td>“Mental Health Knowledge and Attitude Questionnaire”</td>
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<td>S.Kutcher (2015) [14]</td>
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<td>Non-RCT</td>
<td>79</td>
<td>Pre-test, post-test</td>
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<td>3 times (1 day each time)</td>
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<td>“Mental Health Knowledge and Attitude Questionnaire”</td>
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<td>Anthony F Jorm (2010) [25]</td>
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<td>RCT</td>
<td>221</td>
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<tr>
<td>Belinda L Parker (2021) [62]</td>
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<td>Non-RCT</td>
<td>70</td>
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<td>6 weeks</td>
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<td>Knowledge</td>
<td>“Mental Health Knowledge Questionnaire”</td>
<td>√</td>
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<td>Help-seeking</td>
<td>“Providing Help to Students Questionnaire”</td>
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References


5. Rusch, N. Public knowledge and attitudes as predictors of help seeking and disclosure in mental illness. Psychiatr. Serv. 2011, 6, 675–678. [CrossRef] [PubMed]


31. Moor, S.; Maguire, A.; McQueen, H.; Wells, E.J.; Elton, R.; Wrate, R.; Blair, C. Improving the recognition of depression in adolescence: Can we teach the teachers? J. Adolesc. 2007, 30, 81–95. [CrossRef][PubMed]
49. Australian Institute for Teaching and School Leadership (AITSL). InSights-Initial Teacher Education: Data Report; Education Services Australia: Melbourne, Australia, 2019.
55. Wei, Y.; Baxter, A.; Kutcher, S. Establishment and validation of a mental health literacy measurement in Canadian educators. Psychiatry Res. 2019, 279, 231–236. [CrossRef]


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