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Effectiveness of family psychosocial intervention on mental health and family function of caregivers of children with cancer: a meta-analysis†

Review

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Abstract: **Objective:** To evaluate the effect of family psychosocial intervention on the mental health and family function of caregivers of children with cancer.

Methods: A comprehensive literature search of CNKI, Wanfang, VIP, CMB, PubMed, Web of Science, MEDLINE, Embase, Cochrane Library, and PsycARTICLES was conducted to retrieve randomized controlled trials of family psychosocial intervention from database inception until 19 September 2021. RevMan (version 5.4.1) was used to analyze the data.

Results: A total of 894 caregivers participated in 11 studies. The analysis showed that anxiety (standardized mean difference [SMD] = −0.22, 95% confidence interval [CI] = −0.37 to −0.07, $P = 0.004$) and depression (SMD = −0.33, 95% CI = −0.57 to −0.08, $P = 0.01$) were significantly reduced, while family function (SMD = −0.86, 95% CI = −1.28 to −0.45, $P < 0.001$) was significantly improved by the family psychosocial intervention compared with the controls. According to subgroup analysis, family psychosocial interventions were found to reduce posttraumatic stress disorder (PTSD) symptoms when the follow-up time was >1 month (SMD = −0.48, 95% CI = 0.68 to −0.27, $P < 0.00001$).

Conclusions: Current evidence supports the use of family psychological intervention to reduce depression and anxiety and improve family function. However, its effect on PTSD symptoms requires further study. Future studies should further identify the role of specific family psychosocial interventions on families and caregivers of children with cancer.

Keywords: *anxiety • cancer • caregivers • depression • family function • family psychosocial intervention • meta-analysis*

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1. Introduction

Childhood cancer has been the major cause of death among children worldwide since 2015.[1] Data analysis performed in 2017 showed that the global incidence rate of childhood cancer was 16.2%,[2] and it is anticipated that there will be 6.7 million instances of childhood cancer worldwide from 2015 to 2030.[3] Family caregivers

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are responsible for managing the different problems that children with cancer face, and their psychological well-being is highly related to the disease progression and rehabilitation of their child.[4] However, the accumulated burdens in long-term care inevitably cause physical and mental problems for caregivers.[5] The literature shows that caregivers of children with cancer commonly report symptoms of anxiety, depression, posttraumatic stress disorder (PTSD), and impaired family function.[6,7]

Family-based psychosocial interventions are proposed to aid families dealing with childhood cancer.[8] Recently, several family-based psychosocial intervention strategies, such as family therapy,[9] cognitive behavioral therapy,[6] and family talk intervention,[10] have been widely used to promote the well-being of family members and the family as a whole. A previous systematic review[11] suggested that family-oriented psychosocial intervention might be effective in reducing emotional distress, anxiety, and depression in caregivers of children with cancer. However, consistent evidence is still lacking on the effect of family-based psychosocial interventions in treating the mental health of caregivers of children with cancer. Additionally, considering the psychological outcomes influenced by family function,[12] it is also necessary to explore the efficacy of family-based psychosocial interventions with regard to family function.

To our knowledge, no meta-analysis exists that specifically examines recently published randomized control trial (RCT) studies to determine the effect of family psychosocial intervention on the mental health of caregivers and family function of children with cancer. Therefore, the purpose of this meta-analysis is to explore RCTs specifically examining the caregivers of children with cancer to investigate the effect of family psychosocial intervention on their mental health and family function.

2. Methods

2.1. Search strategy

A comprehensive search of published articles in international databases (PubMed, Web of Science, MEDLINE, Embase, Cochrane Library, and PsycARTICLES) and Chinese databases (CNKI, VIP, Wanfang, and CBM) was conducted, spanning from database inception until September, 2021. The search terms included the following subject headings and keywords: (family intervention OR family-based intervention OR family-centred intervention OR family psychosocial intervention OR family psychoeducation OR family therapy) AND (adolescent* OR teen* OR youth* OR child* OR infant* OR preschool OR minor*) AND (neoplasm* OR cancer* OR tumour* OR leukaemia). The strategy used to search the Web of Science is presented as an example in Table 1. A manual search of the related references was also performed to identify potentially relevant trials. The meta-analysis was conducted and reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, and the protocol was registered with PROSPERO (CRD42022308181).

2.2. Inclusion and exclusion criteria

Articles that met the following inclusion criteria were selected for the subsequent analysis: (1) focused on caregivers of children with cancer; (2) included randomized participants in a family-based psychosocial intervention condition (interventions aiming to change the thoughts or behaviors of the family as a whole, such as family psychoeducation, family therapy, or family cognitive behavioral therapy) or a control condition (treatment as usual); (3) included both preintervention and postintervention assessments and reported at least 1 of the following outcome indicators: anxiety, depression, PTSD, and family function; and (4) the full-text article was available in English and Chinese. Meanwhile, articles were excluded from the analysis process if they (1) were duplicated studies, research protocols providing only an intervention model without data evaluation, case reports, conference abstracts, and reviews; (2) did not include data for meta-analysis; or (3) were family interventions targeting only disease-specific knowledge.

2.3. Study selection and data extraction

Two reviewers (Ren and Wang) independently reviewed the potential studies according to the inclusion/exclusion criteria. An initial eligibility screening based on the title and abstract was conducted, followed by an assessment of the full text of each study. Disagreements were resolved by consultation with a senior reviewer who approved the final list of included studies. Data were systematically extracted from each included study by the 2 reviewers independently using a standardized form to obtain the study characteristics and intervention characteristics. Any disagreements were resolved through group discussion until an agreement was reached. The following data were retrieved from each publication: name of the first author, year of publication, country, participants' demographic characteristics, number of participants randomized to the intervention or control, intervention methods, duration and frequency of intervention, duration of follow-up, measurement tools, and outcome indicators.

2.4. Quality assessment

Two reviewers independently evaluated the risk of bias in individual studies using the Cochrane risk of bias tool.[13] The source of risk was assessed using the

No.	Search strategy	No. of documents
#1	((TS=("adolescent*" OR "teen*" OR "youth*" OR "child*" OR "infant*" OR "preschool" OR "minor*")) OR TI=("adolescent*" OR "teen*" OR "youth*" OR "child*" OR "infant*" OR "preschool" OR "minor*")) OR AB=("adolescent*" OR "teen*" OR "youth*" OR "child*" OR "infant*" OR "preschool" OR "minor*")	1,778,196
#2	((TS=("neoplasm*" OR "cancer*" OR "tumour*" OR "leukaemia")) OR TI=("neoplasm*" OR "cancer*" OR "tumour*" OR "leukaemia")) OR AB=("neoplasm*" OR "cancer*" OR "tumour*" OR "leukaemia")	3,171,886
#3	((TS=("family intervention" OR "family-based intervention" OR "family-centred intervention" OR "family psychosocial intervention" OR "family psychoeducation" OR "family therapy")) OR TI=("family intervention" OR "family-based intervention" OR "family-centred intervention" OR "family psychosocial intervention" OR "family psychoeducation" OR "family therapy")) OR AB=("family intervention" OR "family-based intervention" OR "family-centred intervention" OR "family psychosocial intervention" OR "family psychoeducation" OR "family therapy")	2363
#4	#1 AND #2 AND #3	39

Table 1. Strategy used to search the Web of Science.

following 6 items: random sequence generation, allocation concealment, blinding, incomplete outcome data, selective reporting, and other biases. Each item was judged to be high risk, low risk, or unclear.

2.5. Statistical analysis

RevMan 5.4.1 (Cochrane Collaboration, Oxford, UK), a program of the Cochrane Library, was used for data analysis. The standardized mean difference (SMD) with 95% confidence interval (CI) was calculated to synthesize the pooled effects of the continuous data. Heterogeneity was tested using the I^2 statistic. A fixed effect model was used when the studies were homogenous ($I^2 \leq 50\%$, $P > 0.1$), and a random effects model was employed when study heterogeneity was found ($I^2 > 50\%$, $P \leq 0.1$). Sensitivity analysis or subgroup analysis was performed when appropriate. To assess publication bias, Egger's and Begg's tests were conducted using Stata 17.0 (Stata-Corp, College Station, TX, USA), and $P < 0.05$ was considered statistically significant.

3. Results

3.1. Literature screening process and results

The literature search identified a total of 1373 studies (14 in CNKI, 9 in Wanfang, 11 in VIP, 219 in CBM, 39 in WOS, 1 in Cochrane, 139 in PubMed, 121 in MEDLINE, 365 in Embase, 418 in PsyARTICLES, and 37 through manual search of the reference list). After duplicates (n = 15) were removed using NoteExpress software, 1358 studies were reviewed. After the titles and abstracts were screened, 1270 irrelevant articles were excluded. The full texts of 88 articles were assessed with the selection criteria, and a total of 11 RCT studies were selected for meta-analytic evaluation. The study selection process is summarized in the PRISMA flow diagram (Figure 1).

3.2. Basic characteristics of included studies

Eleven studies[6,9,14–22] were included, and they were published between 1998 and 2021; of these, 4 were from the United States,[16–18,20] 2 were from China,[9,14] 1 was from the Netherlands,[15] 1 was from Iran,[19] 1 was from Sweden,[6] 1 was from Cyprus,[21] and 1 was from Denmark.[22] A total of 894 subjects were included in this review. Most included studies focused on the following psychosocial outcomes: anxiety ($n = 8$), depression ($n = 5$), and PTSD ($n = 6$). Only 2 studies reported on family function. The interventions ranged from 1 d[16] to 24 weeks[22] in duration. The interventions ranged in frequency from once every 2–3 weeks to twice a week. The detailed characteristics of the included studies are presented in Table 2.

3.3. Risk of bias

Figure 2 summarizes the assessment results of the 7 domains of bias for individual studies. Of the 11 RCT studies included, only 2[16,22] were considered low risk for the generation of random sequences, and 4[6,15,17,18] were considered low risk for allocation concealment. No study was judged as having a low risk of bias for blinding of participants and personnel and blinding of outcome assessment because blinding family psychosocial intervention is difficult. All 11 studies were judged as having a low risk of bias for selective reporting bias and other biases, and only 1 study was judged as unclear for incomplete outcome data.

3.4. Meta-analysis of the effect of family psychosocial intervention

3.4.1. Effect of family psychosocial intervention on the anxiety level of the caregiver

Eight[6,15–18,20–22] studies measuring caregiver anxiety were pooled for meta-analysis. The heterogeneity among the studies was small ($I^2 = 5\%$, $P = 0.39$). The results of the

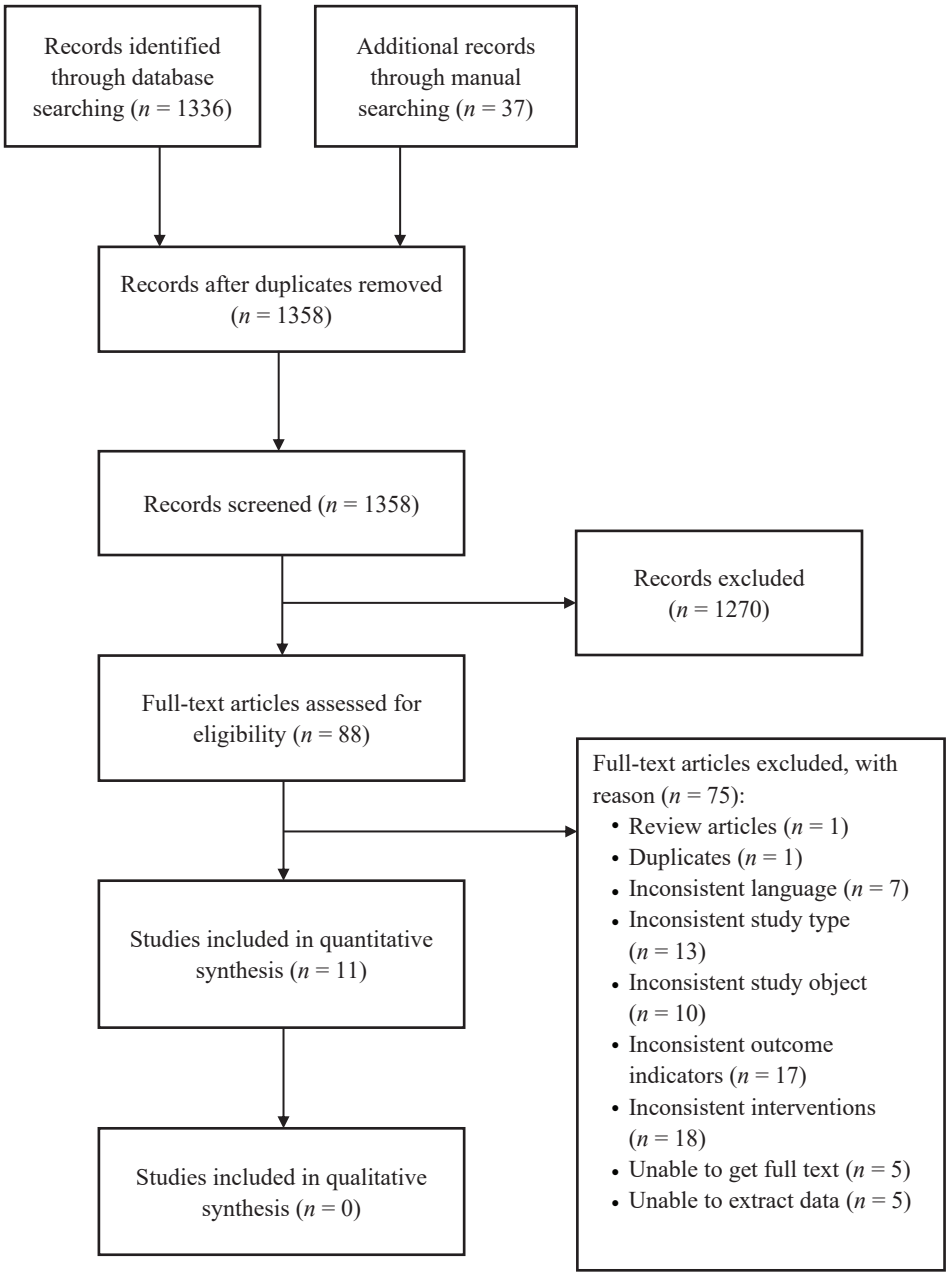


Figure 1. PRISMA flow diagram for the study selection process.

pooled analysis (Figure 3) showed that family psychosocial interventions had significant effects on anxiety levels (SMD = –0.22, 95% CI = –0.37 to –0.07, $P = 0.004$).

3.4.2. Effect of family psychosocial intervention on the depression level of the caregiver

Five[6,19–22] studies assessed the caregiver depression level as an important outcome, and 4 of them reported its mean values (and standard deviations), which could be pooled for meta-analysis.[19–22] There was no heterogeneity among the studies ($I^2 = 0\%$, $P = 0.47$), and the results of the pooled analysis (Figure 4) showed that family psychosocial intervention had a significant effect on the level of depression (SMD = –0.33, 95% CI = –0.57 to –0.08, $P = 0.01$).

3.4.3. Effect of family psychosocial intervention on caregiver PTSD symptoms

Six[6,16–18,20,22] studies measured the impact of family psychosocial intervention on PTSD, but 1 study[17] did not

Study/country	Cancer type	Sample size		Intervention type	Duration of intervention	No. of sections	Section length (min)	Frequency of intervention	Follow-up	Measurement tools	Outcome indicators
		Experimental group	Control group								
Liu et al.[14]/ China	Unlimited	30	28	Family task intervention	4 weeks	8	45	Twice a week	Immediately after intervention	FFFS	①
Fu et al.[9]/ China	Hematological tumors	20	20	Structural family therapy	8 weeks	4	60	Every 2 weeks	1 month after intervention	FAD	①
Hoekstra-Weebers et al.[15]/ Netherlands	Unlimited	20	21	Family cognitive behavior intervention	21 weeks	7	90	Every 3 weeks	6 months after intervention	STAI	②
Kazak et al.[16]/ USA	Unlimited	129	115	Family cognitive behavior intervention	1 d	4	60–90	—	Intervention group: 3–5 months after intervention Control group: 8–10 months after intervention	STAI, PTSD-RI, IES-R	②④
Kazak et al.[17]/ USA	Unlimited	11	18	Family cognitive behavior intervention	3 weeks	3	45	Once a week	2 months after intervention	STAI, ASDS, IES-R	②④
Stehl et al.[18]/ USA	Unlimited	76	76	Family cognitive behavior intervention	6 weeks	6	45	Once a week	1 month after intervention	STAI, ASDS, IES-R	②④
Shekarabi-Ahari et al.[19]/ Iran	Unlimited	10	10	Family cognitive behavior intervention	8 weeks	8	120	Once a week	2 months after intervention	BYI	③
Marsland et al.[20]/ USA	Unlimited	23	14	Family cognitive behavior intervention	12–18 weeks	6	30–60	Every 2–3 weeks	2 weeks after intervention	STAI, BYI, IES	②③④
Cernvall et al.[6]/ Sweden	Unlimited	31	27	Family cognitive behavior intervention	10 weeks	10	240	Once a week	12 months after intervention	BYI, PCL-C	②③④
Tsitsi et al.[21]/ Cyprus	Unlimited	29	25	Family relaxation therapy	3 weeks	3	25	Once a week 25 min each time	3 weeks after intervention	HAM-A POMS	②③
Salem et al.[22]/ Denmark	Unlimited	82	79	Family cognitive behavior intervention	≤24 weeks	7	60–90	Unclear	12 months after intervention	SCL-92-R Harvard Trauma Questionnaire	②③

Note: ASDS, Acute Stress Disorder Scale; BYI, Beck Youth Inventory; FAD, Family Assessment Device; FFFS, Feetham Family Functioning Survey; HAM-A, Hamilton's Anxiety Scale; IES, Impact of Events Scale; IES-R, Impact of Events Scale-Revised; PCL-C, PTSD Checklist-Civilian Version; POMS, Profile of Mood States Brief Scale; PTSD-RI, Post-Traumatic Stress Disorder Reaction Index; RCT, randomized control trial; SCL-92-R, Symptom Checklist-92-Revised; STAI, State-Trait Anxiety Inventory,; ①, family function; ②, anxiety; ③, depression; ④, PTSD.

Table 2. Characteristics of the included RCT studies.

report its mean values (or standard deviations). The remaining 5 studies were pooled for meta-analysis. Due to high heterogeneity among these studies (I^2 = 80%, P = 0.0006), the random effect model was adopted for analysis. Across all included trials, the SMD for PTSD in the family psychosocial intervention compared to the control was –0.18 (95% CI = –0.57 to 0.21), but this was not statistically significant (P = 0.37) (Figure 5). Two studies[6,22] had shorter follow-up periods (≤1 month), and 3 studies[16,18,20] had longer follow-up periods (>1 month). Subgroup analysis showed that there was no significant difference in PTSD in interventions with shorter follow-up times compared to controls (SMD = 0.25, 95% CI = –0.04 to 0.54, P = 0.09, I^2 = 0%) (Figure 5), and interventions with longer follow-up periods produced a significant reduction in PTSD compared to controls (SMD = –0.48, 95% CI = –0.68 to –0.27, P < 0.00001, I^2 = 5%) (Figure 5).

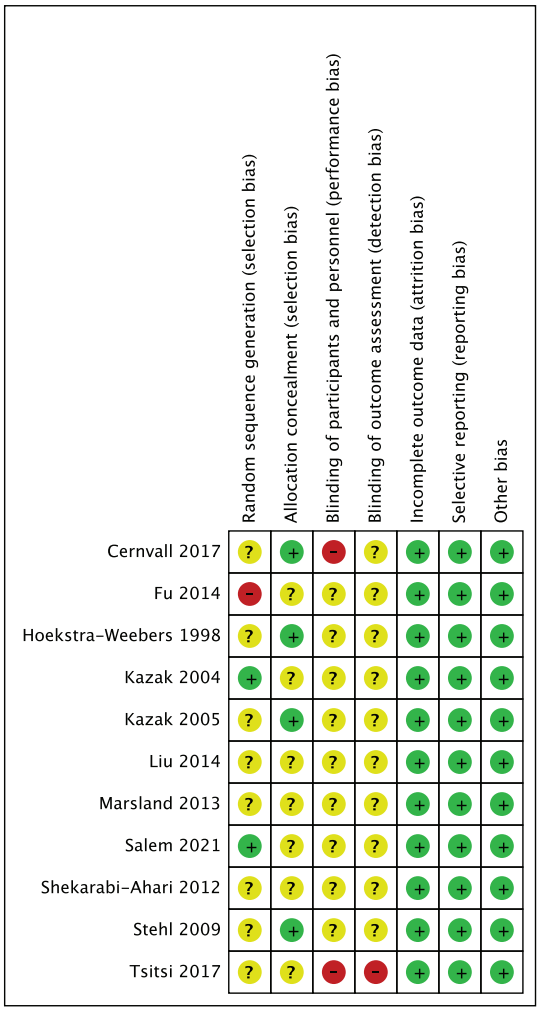


Figure 2. Risk of bias summary: assessment of each risk bias item for the individual studies.

3.4.4. *Effect of family psychosocial intervention on family function of children with cancer*

Two[9,14] studies reported the effect of family psychosocial intervention on family function. There was no heterogeneity between the studies (I^2 = 0%, P = 0.84). The pooled analysis results (Figure 6) showed that family psychosocial intervention had a significant effect on family function (SMD = –0.86, 95% CI = –1.28 to –0.45, P < 0.001).

3.5. Publication bias

Egger's and Begg's tests of anxiety, depression, and PTSD were not statistically significant (all P > 0.05), and Egger's test of family function showed no statistical significance (P > 0.05), indicating that there was no publication bias (Table 3).

4. Discussion

This meta-analysis was intended to produce a pooled estimate of all currently accessible randomized controlled trials regarding the effect of family psychosocial intervention on the mental health of caregivers of children with cancer and their family function. The results from this meta-analysis demonstrate that family

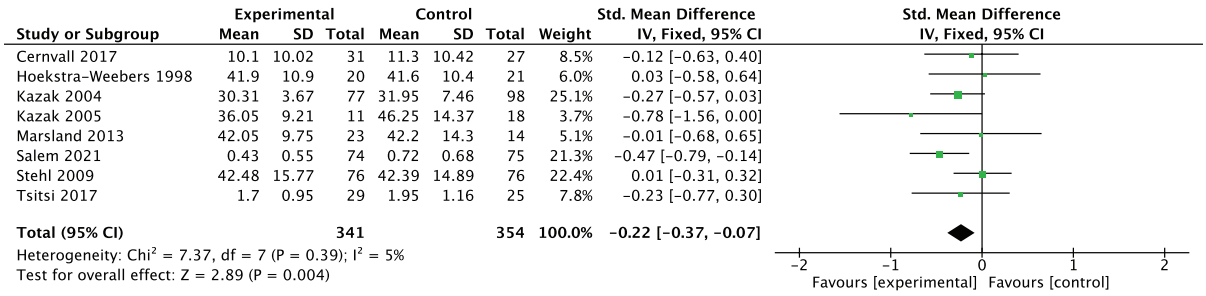


Figure 3. Forest plot: effect of family psychosocial intervention on caregiver anxiety level.

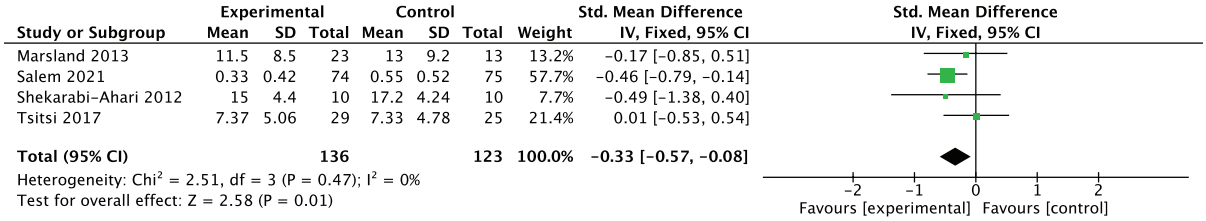


Figure 4. Forest plot: effect of family psychosocial intervention on caregiver depression level.

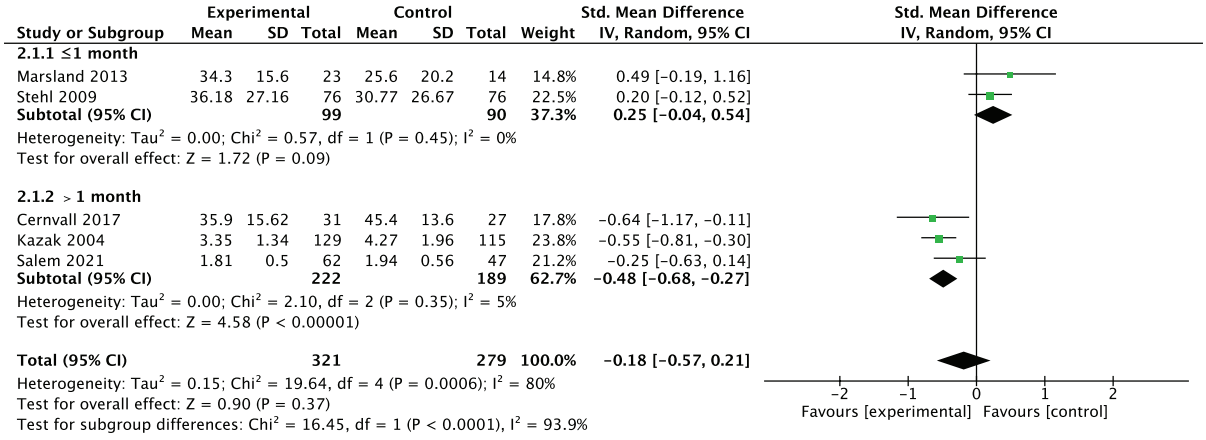


Figure 5. Forest plot: subgroup analysis of the effects of family psychosocial intervention on caregiver PTSD symptoms.

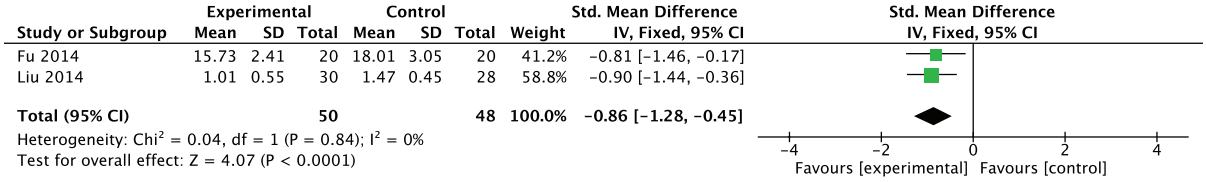


Figure 6. Forest plot: effect of family psychosocial intervention on family function.

Items	Egger's test		Begg's test	
	Z value	*P*	*Z* value	*P*
Anxiety	−0.01	0.9886	−0.12	1.0000
Depression	0.68	0.4973	−0.34	1.0000
PTSD	0.75	0.4539	0.24	0.8065
Family function	0.21	0.8370	—	—

Note: PTSD, posttraumatic stress disorder.

Table 3. Publication bias.

psychosocial intervention has an effect on the anxiety and depression of caregivers of children with cancer, which is inconsistent with the findings of a previous systematic review involving the parents of children with chronic medical conditions.[23] This discrepancy might be because caregivers of children with cancer suffer more severe emotional distress than those of children with other chronic diseases.[24] Family psychosocial intervention provides a platform to change the thoughts or behaviors of the family as a whole and promotes interaction and communication among family members,[25] which in turn alleviates caregivers' symptoms of depression and anxiety. However, more and larger-scale RCT studies are required to further validate this finding. Interestingly, all the studies reporting the outcomes of anxiety and depression in this review were conducted in Western countries; therefore, the effectiveness and reliability of family psychosocial intervention on the Chinese caregivers of children with cancer need to be explored.

The pooled result of 5 studies showed that the interventions had nonsignificant effects on the PTSD

of children with cancer. Although the clinical practice guideline for the treatment of PTSD highlights the importance of family therapy,[26] the complicated inner mechanism between family adjustment and PTSD may affect the effectiveness of family psychosocial intervention on PTSD.[27] The family psychosocial intervention analyzed in the present study included family cognitive behavior intervention, family task intervention, and structural family therapy, and the diverse types of intervention may affect the effect size of the pooled results. Furthermore, the subgroup meta-analysis indicated that interventions with a follow-up period >1 month had a significant effect on PTSD, suggesting that psychosocial intervention may be more effective for longer-term effects.[28] Therefore, RCTs with longer follow-up periods are warranted in future studies.

The pooled results of 2 studies suggest that family psychosocial interventions could significantly improve family function. Interestingly, both studies included in the analysis were from the Chinese culture. The consciousness of the "family root" in Chinese traditional culture may make family psychological intervention more effective for improving family function.[29] However, the pooled analysis result should be used with caution due to the small sample size. Knafl et al.[30] proposed that the intervention component is one of the potential factors that would influence the intervention effect. Arnaud et al.[31] also pointed out that the effect on family function would be greater if the emphasis of the intervention was on improving family strength and family resources rather than on narrowly addressing disease-related issues. This indicates a need for further evidence to differentiate the effect of various types of family psychosocial interventions on the family function of children with cancer.

5. Conclusions

In conclusion, this meta-analysis review supports the notion that family psychosocial intervention can reduce caregivers' symptoms of anxiety and depression, as well as improve the family function of children with cancer. Caregivers can also benefit from interventions with longer follow-up periods in terms of PTSD. Therefore, we suggest that family psychosocial intervention may represent a viable strategy for improving the health of children with cancer and their families. However, the effects of this type of intervention are not conclusive due to the small number of studies with poor methodological quality and the short follow-up period. Future large-scale RCT studies with high-quality study designs and longer follow-up periods are recommended to examine and confirm the effectiveness of family psychosocial intervention for the caregivers and families of children with cancer.

Strength and limitations

The main strength of this study is its exclusive focus on RCTs of family psychosocial interventions involving caregivers of children with cancer. However, several limitations should be noted. First, the differences in measurement tools, timing and duration of the interventions, intervention strategies, and follow-up period in the included literature may have resulted in bias in this analysis. Second, a certain degree of risk of bias was detected in the 11 included studies, possibly affecting the quality of the obtained evidence in this review. For instance, due to the complexity of family psychosocial intervention, blinding the participants and professionals involved in the interventions was difficult, leading to potential detection bias. Third, only published English and Chinese studies were included in this review, causing a potential language bias. Finally, the small number of included studies and small sample sizes of most included studies might limit the precision of evidence acquired via the pooled analysis.

Ethical approval

Ethical issues are not involved in this paper.

Conflicts of interest

All contributing authors declare no conflicts of interest.

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