JKSCI

한국컴퓨터정보학회논문지
Journal of The Korea Society of Computer and Information
Vol. 30 No. 7, pp. 115-128, July 2025
https://doi.org/10.9708/jksci.2025.30.07.115

The Effect of Psychological Interventions on Anxiety and Depression in Parents of Children with Cancer: A Meta-analysis of Randomized Controlled Trials

Young-Ran Yeun*

*Professor, Dept. of Nursing, Kangwon National University, Samcheok, Korea

[Abstract]

This study aimed to evaluate the effectiveness of a psychological intervention in reducing anxiety and depression among parents of children with cancer. A total of 1,323 articles were searched for randomized controlled trials published up to November 2024 in PubMed, CINAHL, Embase, Cochrane Library, RISS, KISS, and ScienceOn, and 20 articles were finally included in the meta-analysis through screening. The results of the analysis showed that psychological intervention had a large effect on anxiety reduction immediately after the intervention (SMD = −1.53) and a medium effect at follow-up (SMD = −0.77), and a large effect on depression reduction immediately after the intervention (SMD = −0.97) and a greater effect at follow-up (SMD = −1.39). In subanalysis, cognitive behavioral therapy was the most effective, and emotional support and peer support programs also showed significant effects. In addition, online and group-based interventions were found to be more effective than offline and individual interventions. This study provides a basis for designing a customized program to alleviate the emotional distress of parents of children with cancer.

▸ **Key words**: Anxiety, Childhood cancer, Depression, Parents, Psychological intervention

[요 약]

본 연구는 소아암 부모를 대상으로 한 심리중재가 부모의 불안과 우울 감소에 미치는 영향을 평가하고자 실시되었다. 2024년 11월까지 출판된 무작위대조연구를 대상으로 PubMed, CINAHL, Embase, Cochrane Library, RISS, KISS, ScienceOn에서 총 1,323편의 문헌을 검색하였고 선별을 통해 최종 20편을 메타분석에 포함하였다. 분석 결과, 심리중재는 불안 감소에 대해 중재 직후 큰 효과(SMD = −1.53), 추적 시점에서 중간 효과(SMD = −0.77), 우울 감소에는 중재 직후 큰 효과(SMD = −0.97), 추적 시점에서 더 큰 효과(SMD = −1.39)를 나타냈다. 하위분석에서는 인지행동치료가 가장 효과적이었으며, 정서적 지원과 동료지원프로그램도 유의미한 효과를 보였다. 또한 온라인·그룹 기반 중재가 오프라인·개별 중재보다 더 효과적인 것으로 확인되었다. 본 연구는 소아암 부모의 정서적 고통 완화를 위한 맞춤형 프로그램 설계에 근거를 제공한다.

▸ **주제어**: 불안, 소아암, 우울, 부모, 심리적 중재

• First Author: Young-Ran Yeun, Corresponding Author: Young-Ran Yeun
*Young-Ran Yeun (yeunyr@kangwon.ac.kr), Dept. of Nursing, Kangwon National University
• Received: 2025. 06. 04, Revised: 2025. 07. 07, Accepted: 2025. 07. 21.

http://www.ksci.re.kr pISSN:1598-849X | eISSN:2383-9945

I. Introduction

Childhood cancer is a serious illness that affects approximately 400,000 children and adolescents globally each year and remains one of the leading causes of death in this population[1]. The severity of the disease can impose psychological and emotional burdens not only on patients but also on their families. In particular, parents of children with cancer often experience prolonged psychological stress beginning at the time of diagnosis and continuing throughout the treatment process. According to the study by Lewandowska et al. [2], the prevalence of anxiety and depression among parents of children with cancer was 48.4% and 45.0%, respectively, which is higher than that observed in parents of healthy children. The major contributing or exacerbating factors of parental anxiety and depression can be categorized into medical, economic, and social domains. Medically, childhood cancer is a life-threatening disease that often requires prolonged hospitalization, involves numerous complications, and is accompanied by fears of relapse or death. Economically, the high cost of treatment and the need for parents to quit their jobs to provide full-time care are common challenges. Socially, insufficient emotional and practical support from family and community, as well as marital strain, are also influential factors[3].

Parents play a central role as primary caregivers throughout the treatment process of children with cancer, and their mental health status can significantly influence the overall course of their child's care. Parents experiencing anxiety or depression may respond passively to medical recommendations and treatment plans, which can negatively affect the child's treatment adherence[4]. Children are highly sensitive to their parents' emotional states; thus, when parents display anxiety in response to the hospital environment or interactions with medical staff, the child may also develop negative emotions toward the treatment process [5]. Furthermore, persistent psychological distress and stress experienced by parents can exacerbate emotional anxiety and worry in the child, potentially hindering their ability to adapt to the illness and recover effectively[6]. Therefore, systematic management of parental mental health should be considered an essential component in promoting both the emotional well-being and treatment outcomes of pediatric cancer patients.

Key strategies to alleviate parental anxiety and depression include psychological interventions, financial support, and enhanced collaboration with medical staff. Among these, psychological interventions have been shown to improve parental coping mechanisms and family stress management, and to promote emotional stability. Such interventions may also alleviate psychological burdens and enhance emotional well-being[7]. Despite increasing attention to psychological support for PCCs, few meta-analyses have comprehensively synthesized existing intervention studies. For example, Koumarianou et al.[8] conducted a systematic review of family-centered interventions; however, their inclusion of not only experimental but also quasi-experimental studies may compromise the reliability of the findings. Luo et al.[9] focused on psychological interventions aimed at enhancing parental resilience, thereby excluding key indicators of emotional distress such as anxiety and depression. Ozturk et al.[10] performed a relatively recent meta-analysis that incorporated multiple domains—stress, depression, and quality of life—yet their integrated analysis makes it difficult to isolate the intervention effects on anxiety and depression specifically. Therefore, the present study aims to conduct a more rigorous analysis by including only randomized controlled trials that explicitly measure anxiety and depression among parents of children with cancer. This approach is expected to enhance the internal validity of the findings and increase the clinical applicability of the results to specific dimensions of emotional distress. Furthermore, by incorporating recent studies that were not covered in prior

meta-analyses, this study seeks to provide more comprehensive and up-to-date evidence.

II. Preliminaries

Psychosocial interventions for PCC not only provide emotional support but also include structured strategies for managing stress, regulating emotions, and enhancing coping skills. These interventions play a critical role in protecting parental mental health and strengthening their capacity to effectively fulfill caregiving responsibilities throughout the child's treatment process. Major psychological intervention approaches for this population include Cognitive Behavioral Therapy (CBT), Emotional Support and Counseling (ESC), Peer Support Programs (PSP), and Family-Centered Therapy (FCT).

CBT is one of the most extensively studied psychological intervention. Its theoretical foundation is based on the premise that maladaptive emotional responses are triggered by distorted or negative patterns of thinking. CBT helps individuals recognize and modify these irrational cognitions through cognitive restructuring and promotes adaptive coping through behavioral strategies such as relaxation training and activity scheduling[11]. In the context of pediatric cancer, CBT supports parents in modifying illness-related cognitive distortions and developing more constructive coping mechanisms. Empirical evidence has demonstrated that CBT is particularly effective in reducing anxiety during the initial stages of treatment and following cancer recurrence[12].

ESC primarily facilitates emotional expression and prevents caregiver burnout. By helping parents articulate and regulate their emotions through structured therapeutic support, ESC promotes healthier coping, enhances family communication, and reduces emotional exhaustion, thereby enabling parents to engage more effectively in their child's care process[13].

PSP is a structured intervention in which individuals with shared experiences—such as parents of children with cancer—engage in mutual support and information exchange. This program has been shown to be effective in alleviating symptoms of anxiety and depression by fostering a sense of understanding, empathy, and emotional solidarity among participants. Through both online and offline platforms, PSP facilitates sustained peer networks that provide ongoing psychological and emotional support. Participants often report reduced feelings of social isolation and enhanced emotional stability as a result of their involvement in this program[14].

FCT is a comprehensive psychological approach targeting the entire family unit, including siblings. FCT aims to enhance intra-family emotional bonds and improve communication patterns among family members. It has been shown to be effective in strengthening spousal relationships and improving emotional well-being among siblings[15]. Following FCT interventions, improvements in parental stress regulation and intra-family support systems have been observed, along with enhanced psychological adaptation in the child, contributing to emotional stability throughout the treatment process[16].

Psychological interventions aimed at reducing anxiety and depression in parents of pediatric cancer patients are instrumental in protecting parental mental health and fostering a more supportive treatment environment for the child. Future research should focus on evaluating the long-term effectiveness of these interventions and developing individualized psychological support strategies. Such efforts are essential to systematically address the mental health needs of families and establish optimal conditions for pediatric cancer care. Moreover, most existing studies have focused on short-term outcomes, highlighting the need for follow-up research to evaluate the sustainability and clinical applicability of these interventions. It is particularly important

to develop more comprehensive and practical psychosocial support models by incorporating and comparing interventions across diverse cultural and socioeconomic backgrounds.

III. Research Methods

1. Eligibility criteria

This systematic review and meta-analysis were conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Eligibility criteria were established based on the Participants, Intervention, Comparisons, Outcomes, Study Design(PICO-SD) framework. Participants included parents of children and adolescents aged 18 or younger who had been diagnosed with cancer. The intervention of interest was non-pharmacological psychological interventions. Control groups were either wait-listed, received no intervention, or were exposed to alternative types of psychological treatment. Outcomes were quantitatively measured changes in anxiety and depression levels. Only randomized controlled trials (RCTs) were included. Studies were restricted to those published in English or Korean. Exclusion criteria were as follows: (1) non-quantitative designs such as qualitative studies, descriptive research, and single-case reports; (2) non-original sources including previous meta-analyses and conference abstracts; (3) studies without accessible full texts; and (4) studies lacking sufficient statistical data to calculate effect sizes.

2. Literature search and data extraction

A comprehensive search was conducted between December 2024 and January 2025 for studies published up to November 2024, with no limitations on publication year. Databases searched included PubMed, CINAHL, Embase, Cochrane Library, Research Information Service System (RISS), Korean Information Service System (KISS), and ScienceOn. To optimize sensitivity and specificity, Medical Subject Headings (MeSH) and Emtree terms were pre-identified and applied, and additional keywords not included in these thesauri were searched in titles, abstracts, and keyword fields. The search strategy combined terms related to pediatric cancer, parents or caregivers, psychological outcomes such as anxiety and depression, and intervention-related keywords including therapy, program, and clinical trials.

For data extraction and coding, standardized forms were developed after a preliminary review of the included studies to ensure consistency and accuracy. Extracted data included author and publication year, country of study, study design, participant characteristics, intervention characteristics, outcome variables, and measurement tools.

3. Data analysis

Effect size and heterogeneity were analyzed using RevMan 5.3 (Cochrane Collaboration). Standardized mean differences (SMD) with 95% confidence intervals (CI) were calculated to compare the effects of interventions on anxiety and depression across studies, taking into account sample sizes and variances. Heterogeneity was assessed using Higgins' I^2 statistic, interpreted as low ($\leq$25%), moderate (~50%), or high ($\geq$75%) heterogeneity[17]. To account for between-study variability, both fixed-effect and random-effects models were applied in the analysis. When homogeneity was confirmed, the fixed-effect model was used to estimate the pooled effect size. In contrast, when substantial heterogeneity was detected, a random-effects model was employed. This approach is justified by the fact that the random-effects model estimates the mean of a distribution of effects and accommodates between-study variance, offering a more appropriate synthesis under heterogeneous conditions[18]. In addition, subgroup analyses were conducted to explore potential sources of

heterogeneity and to identify moderators of intervention effects. Subgroups were predefined based on intervention type, delivery format and mode of delivery. Separate pooled effect sizes were calculated within each subgroup for comparison. Statistical significance was determined using overall effect tests with a significance level of $p < 0.05$. Interpretation of effect size followed Cohen's guidelines[19]: 0.20–0.49 (small), 0.50–0.80 (moderate), and >0.80 (large). Publication bias was assessed visually using a funnel plot.

4. Risk of bias assessment

To systematically evaluate the potential for bias in study design and implementation, the Cochrane Risk of Bias Tool (RoB 1.0) was used [20]. This tool assesses seven domains: sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data, selective reporting, and other sources of bias. Each domain was rated as having a "Low," "High," or "Unclear" risk of bias.

IV. Results

1. Literature selection

The study selection process is illustrated in Figure 1. A total of 1,323 records were identified through database searches. After removing 652 duplicates, 671 records remained for initial screening. Based on title and abstract review, 133 studies were selected for full-text assessment. Following the inclusion and exclusion criteria, 20 studies were ultimately included in the meta-analysis.

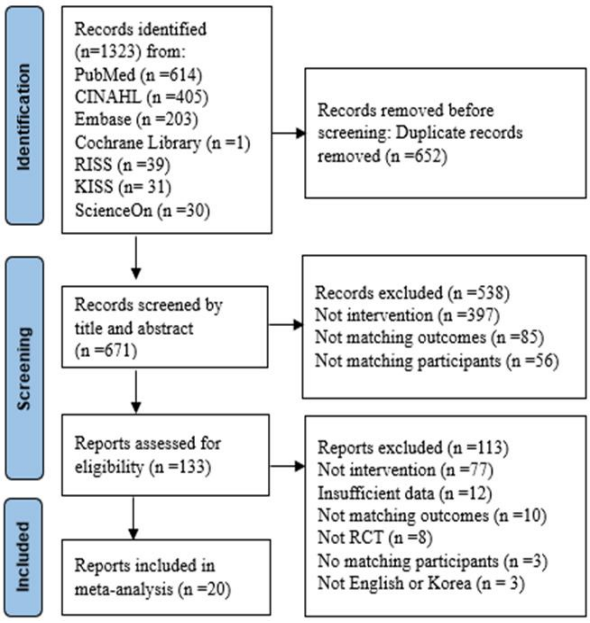


Fig. 1. Flow Diagram of Study Selection

2. Characteristics of the included studies

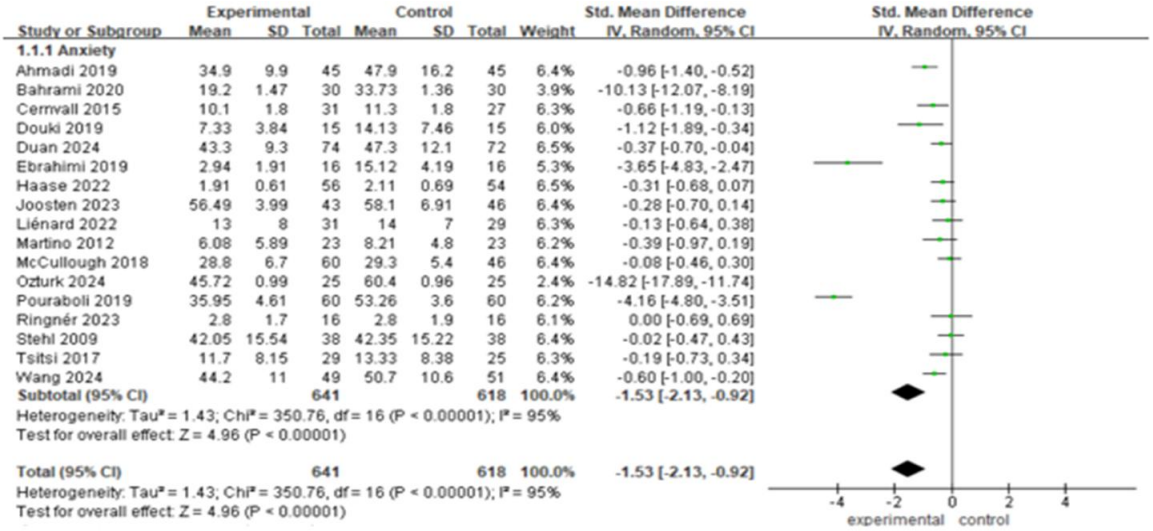
The characteristics of the 20 studies conducted across 11 countries are presented in Table 1. The largest number of studies (n = 5, 25.0%) were conducted in Iran, and the majority of studies (n = 17, 85.0%) were published after 2015. The mean age of children with cancer was 8.3 ± 1.3 years, while the mean age of parents was 37.0 ± 1.3 years. A total of 1,607 participants were included, comprising 809 in the intervention groups and 798 in the control groups. In terms of intervention type, ESC was the most common (n = 9, 45.0%), followed by CBT (n = 6, 30.0%), FCT (n = 3, 15.0%), and PSP (n = 1, 5.0%). Most interventions were delivered individually (n = 13, 65.0%), and 6 studies (30.0%) were conducted online.

The duration of individual sessions ranged from 20 to 240 minutes, with the number of sessions varying between 3 and 24. The total duration of interventions ranged from 3 days to 6 months. The most commonly used tool for measuring anxiety was the Spielberger State-Trait Anxiety Inventory (STAI), which was used in four studies. For depression, the most frequently used instrument was the Beck Depression Inventory (BDI), reported in three studies.

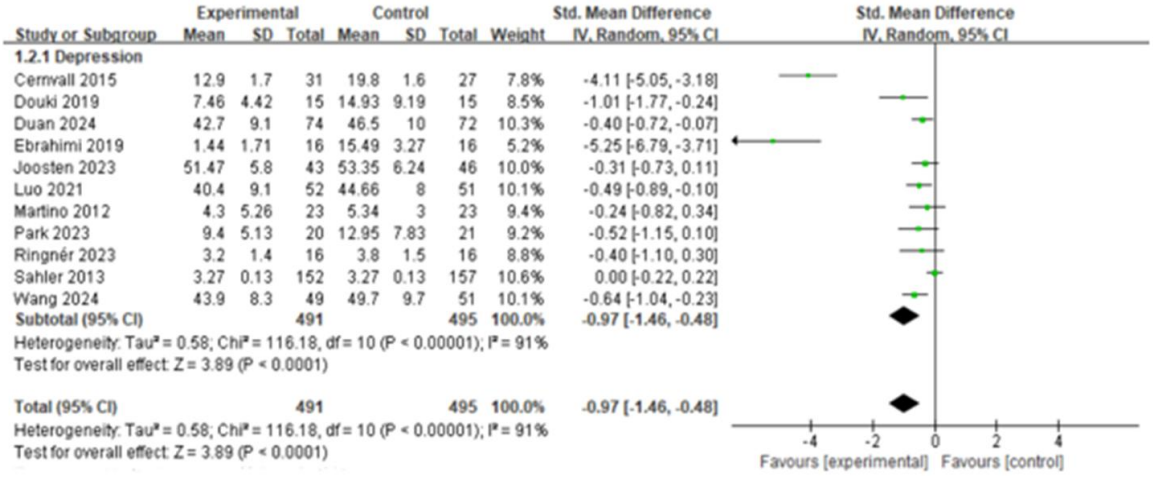
Table 1. Characteristics of Included Studies

First author and year	Country	Participants				Intervention				Outcomes	Measure	Follow-up
		Pt's age	Mean age	Female (%)	No. (eN, cN)	Type	Format	Online	Total duration, session, Fre, Min,			
Ahmadi 2019[21]	Iran	8.5	34.7	100.0	90(45, 45)	ESC	Group	-	3D, 1/D, 20	Anxiety	SSTAI	5wk
Bahrami 2020[22]	Iran	9.2	36.2	86.7	60(30, 30)	CBT	Group	-	8wk, 8S, 1/wk, 90	Anxiety	BAI	3M
Cernvall 2015[23]	Sweden	6.5	38.1	67.2	58(31, 27)	CBT	Individual	Online	10wk	Anxiety, depression	BAI, BDI-II	-
Douki 2019[24]	Iran	10.1	35.8	100.0	30(15, 15)	ESC	Group	-	8S, 1/wk, 60	Anxiety, depression	DASS-21	-
Duan 2024[7]	China	7.8	37.4	50.0	146(74, 72)	PSP	Individual	Online	6M, 24S, 1/wk	Anxiety, depression	SAS, SDS	-
Ebrahimi 2019[25]	Iran	6.9	39.5	100.0	32(16,16)	FCT	Group	-	10wk, 30	Anxiety, depression	DASS-21	-
Haase 2022[26]	USA	8.3	36.9	87.0	110(56, 54)	ESC	Individual	-	6~8wk, 3/wk, 60	Anxiety	SSTAI	90D
Joosten 2023[27]	Netherland	9.0	34.1	86.0	89(43, 46)	CBT	Group	Online	6wk, 6S, 1/wk, 90	Anxiety, depression	HADS	6M
Liénard 2022[28]	Belgium	7.2	35.2	88.3	60(31, 29)	ESC	Individual	-	7wk, 4S, 1/wk, 120	Anxiety	HADS	-
Luo 2021[29]	China	8.1	37.8	69.9	103(52, 51)	CBT	Individual	Online	8wk, 1/wk	Depression	SRDS	6M
Martino 2012[30]	Italy	6.4	38.5	56.5	46(23, 23)	ESC	Individual	-	3S	Anxiety, depression	SQ	4wk
McCullough 2018[31]	USA	10.0	36.0	97.2	106(60, 46)	ESC	Individual	-	4wk, 1/wk, 15	Anxiety	STAI	-
Ozturk 2024[32]	Turkey	11.7	37.6	100.0	50(25, 25)	ESC	Individual	Online	8wk, 2/wk, 30~45	Anxiety	SSTAI	-
Park 2023[33]	Korea	7.9	37.2	100.0	150(75, 75)	FCT	Individual	Online	4wk, 1/wk, 70	Depression	BDI	4M
Pouraboli 2019[34]	Iran	8.3	38.0	77.5	120(60, 60)	ESC	Individual	-	8S, 1/wk, 4hr	Anxiety	SSTAI	-
Ringnér 2023[35]	Sweden	9.1	36.5	65.6	32(16, 16)	ESC	Individual	-	4S	Anxiety, depression	VDS	-
Sahler 2013[36]	USA	7.5	37.9	100.0	309(152, 157)	CBT	Individual	-	8wk, 1/wk, 60	Depression	BDI	3M
Stehl 2009[37]	USA	8.2	37.0	75.0	76(38, 38)	FCT	Group	-	6S, 45	Anxiety	STAI	-
Tsitsi 2017[38]	Cyprus, Greece	8.5	38.2	74.1	54(29, 25)	ESC	Individual	-	3wk, 1/wk, 25	Anxiety	HAM-A	-
Wang 2024[39]	China	7.6	37.3	53.0	100(49, 51)	CBT	Group	-	10wk, 1/wk	Anxiety, depression	SAS, SDS	6M

BADS = Behavioral activation for depression scale, BAI = Beck anxiety inventory, BDI = Beck depression inventory, CBT = Cognitive behavioral therapy, DASS = Depression, anxiety and stress scale, ESC = Emotional support & counseling, FCT = Family-centered therapy, Fre = frequency, GAD-7 = Generalized anxiety disorder 7-item scale, HADS = Hospital anxiety and depression scale, HAM-A = Hamilton anxiety rating scale, S-R = Impact of event scale-revised, PCL-5 = Post-traumatic stress disorder checklist for DSM-5, PCL-C = PTSD checklist civilian version, PSP = Peer support program, PTSD = Posttraumatic stress disorder, PTSS = Post-traumatic stress symptoms, SAS = Self-rating anxiety scale, SC = standard care, SDS = self-rating depression scale, SQ = Self-report questionnaire, SRDS= Self-Rating depression scale, SSTAI = Spielberger state-trait anxiety inventory, STAI = State-trait anxiety inventory



A. Anxiety

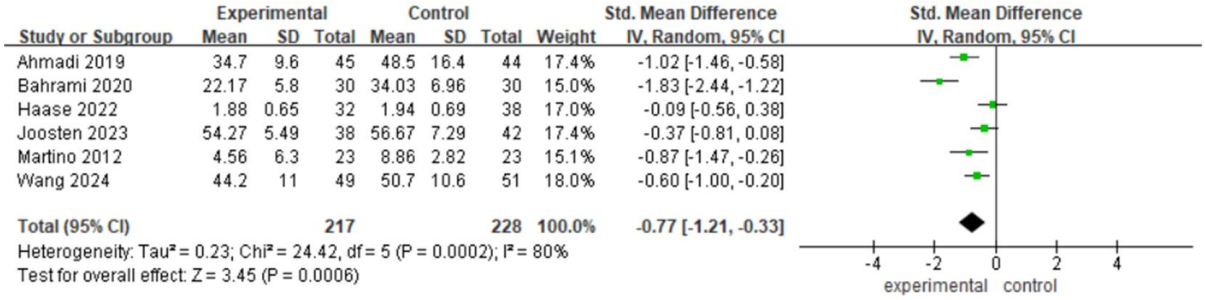


B. Depression

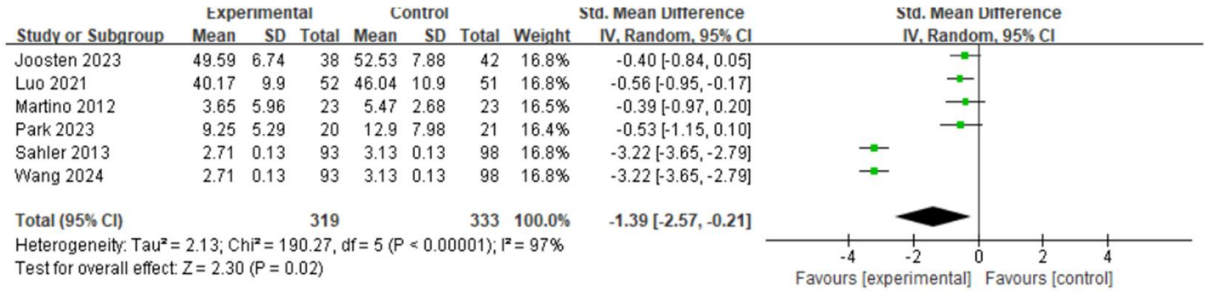
Fig. 2. Forest Plot of the Effects of Psychological Interention

Table 2. Subgroup Meta-analysis of Anxiety and Depression

Categories		Anxiety				Depression			
		ES	95% CI	N	I^2 (%)	ES	95% CI	N	I^2 (%)
Type	CBT	-2.36	-3.92, -0.81	3	97	-0.98	-1.74, -0.21	5	95
	ESC	-1.46	-2.34, -0.59	9	96	-0.50	-0.94, -0.06	3	21
	FCT	-1.79	-5.34, 1.76	2	97	-2.83	-7.46, 1.80	2	97
	PSP	-0.37	-0.70, -0.04	1	-	-0.40	-0.72, -0.07	1	-
Mode	Online	-2.27	-3.72, -0.82	3	96	-1.06	-1.87, -0.25	5	93
	Offline	-1.40	-2.10, -0.69	12	95	-0.93	-1.63, -0.23	6	91
Format	Individual	-1.29	-2.10, -0.48	9	96	-0.78	-1.36, -0.19	7	92
	Group	-1.95	-2.95, -0.94	6	95	-1.48	-2.56, -0.41	4	92

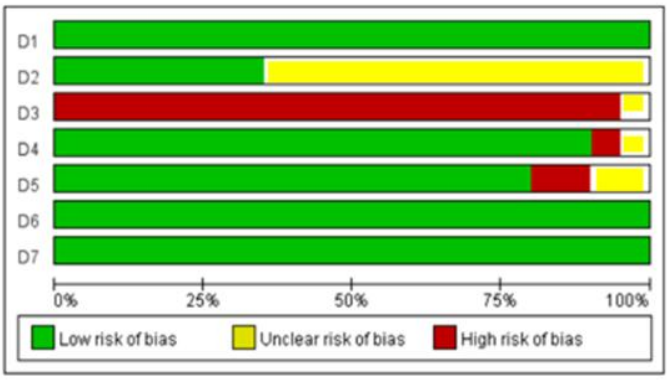


A. Anxiety



B. Depression

Fig. 3. Forest Plots of Follow-up Effects



D1= Random sequence generation; D2= Allocation concealment; D3= Blinding of participants and personnel; D4= Blinding of outcome assessment; D5= Incomplete outcome data; D6= Selective reporting; D7= Other bias

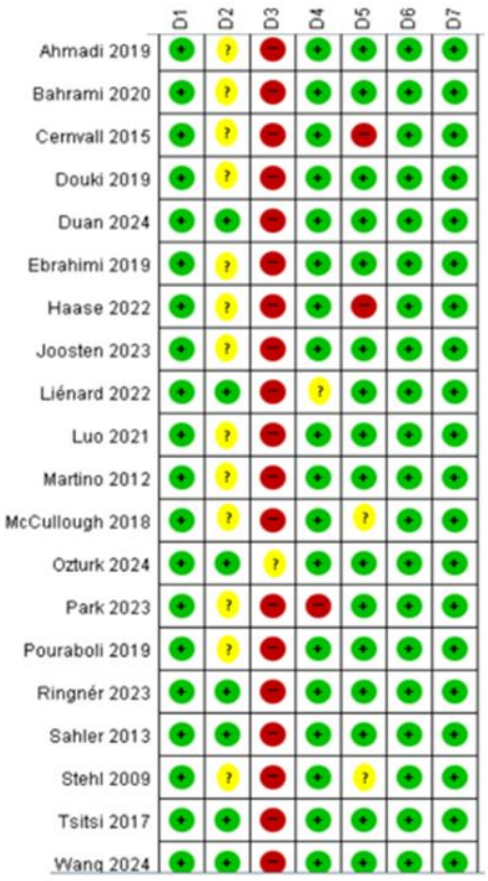


Fig. 4. Assessment of Risk of Bias

3. Effects of psychological intervention

Effect size estimates for the interventions are presented in Figure 2, and subgroup analysis results are shown in Table 2. The overall pooled effect size was SMD = −1.53 (95% CI: −2.13 to −0.92, $p < .001$), which, according to Cohen's criteria[19], represents a large effect (≥ 0.8). This indicates that psychosocial interventions had a clinically significant impact on reducing anxiety among PCCs. However, heterogeneity across studies was high (I^2 = 95%), warranting subgroup analyses to explore potential moderators. By program type, CBT showed a statistically significant large effect (ES = −2.36, 95% CI: −3.92 to −0.81), followed by ESC with a large effect (ES = −1.46, 95% CI: −2.34 to −0.59), and PSP, which demonstrated a small but significant effect (ES = −0.37, 95% CI: −0.70 to −0.04). In terms of delivery mode, both online (ES = −2.27, 95% CI: −3.72 to −0.82) and offline (ES = −1.40, 95% CI: −2.10 to −0.69) interventions significantly reduced anxiety. Regarding format, both individually delivered interventions (ES = −1.29, 95% CI: −2.10 to −0.48) and group-based interventions (ES = −1.95, 95% CI: −2.95 to −0.94) were found to be highly effective. A slight indication of publication bias was detected through visual inspection of the funnel plot.

For depression, 11 studies were included in the analysis. The pooled effect size was SMD = −0.97 (95% CI: −1.46 to −0.48, $p < .001$), also indicating a large effect according to Cohen's rule. Between-study heterogeneity was substantial (I^2 = 91%), prompting additional subgroup analyses. Subgroup analysis by program type showed that CBT yielded a large effect (ES = −0.98, 95% CI: −1.74 to −0.21), ESC showed a moderate effect (ES = −0.50, 95% CI: −0.94 to −0.06), and PSP showed a small effect (ES = −0.40, 95% CI: −0.72 to −0.07). In the delivery mode subgroup, both online (ES = −1.06, 95% CI: −1.87 to −0.25) and offline (ES = −0.93, 95% CI: −1.63 to −0.23) interventions demonstrated large effects in reducing depression. Analysis by intervention format revealed a moderate effect in individually delivered interventions (ES = −0.78, 95% CI: −1.36 to −0.19) and a large effect in group-based interventions (ES = −1.48, 95% CI: −2.56 to −0.41). Visual examination of the funnel plot suggested a slight publication bias.

4. Effects of Follow-Up

Follow-up effect size estimates are presented in Figure 3. A total of six studies each assessed the follow-up effects of interventions on anxiety and depression, with follow-up periods ranging from 4 weeks to 6 months. The pooled follow-up effect size for anxiety was −0.77 (95% CI: −1.21 to −0.33, $p < 0.001$), indicating a moderate effect, with substantial heterogeneity (I^2 = 80%). For depression, the follow-up effect size was −1.39 (95% CI: −2.57 to −0.21, $p = 0.02$), indicating a large effect, although heterogeneity was high (I^2 = 97%).

5. Risk of Bias Assessment

The result of the risk of bias assessment are presented in Figure 4. Thirteen studies (65.0%) were rated as "unclear" for allocation concealment due to lack of specific information. Nineteen studies (95.0%) did not implement blinding of participants and personnel. For incomplete outcome data, two studies (10.0%) had a substantial amount of missing data, and two additional studies (10.0%) did not report attrition details, resulting in an "unclear" rating. In the remaining domains, the risk of bias was generally low. To assess the robustness of the findings, a sensitivity analysis was conducted by excluding studies that were rated as having a high risk of bias in two or more domains [34, 37, 44]. The results showed that the overall effect size remained similar to the original analysis, with no substantial changes in the direction or statistical significance of the effects.

V. Discussion

Parents of children and adolescents with cancer experience considerable psychosocial burdens throughout the diagnostic and treatment process. Given that the psychological and emotional well-being of parents can significantly affect their child's treatment adherence and recovery, establishing psychosocial support services tailored to this population is of critical clinical importance. This study aimed to systematically synthesize the effects of psychological interventions applied to parents of pediatric cancer patients and to provide insights for future clinical application and research directions.

The results of this meta-analysis demonstrated that psychological interventions had a large immediate effect on reducing parental anxiety (SMD = -1.53, 95% CI: -2.13 to -0.92), and a moderate effect at follow-up periods ranging from 4 weeks to 6 months (SMD = -0.77, 95% CI: -1.21 to -0.33). For depression, a large post-intervention effect was observed (SMD = -0.97, 95% CI: -1.46 to -0.48), with an even larger effect size at follow-up (SMD = -1.39, 95% CI: -2.57 to -0.21). These findings indicate that psychological interventions produce not only immediate but also sustained improvements in parents' emotional well-being, suggesting valuable implications for structuring intervention timelines.

This aligns with previous findings. Law et al.[40] reported that these interventions were effective in reducing anxiety and depression in parents of children with chronic illnesses, including cancer and chronic pain. Park et al. [41] found that resilience-enhancing programs had positive effects on anxiety, depression, and post-traumatic stress symptoms in PCCs. Similarly, Sánchez-Egea et al.[42] demonstrated significant improvements in anxiety through psychological interventions targeted at families of pediatric cancer patients.

Among intervention types, CBT showed the largest effect in reducing both anxiety and depression. they often suppress or avoid their own emotions due to pressure to provide psychological support to their child. CBT, grounded in cognitive theory and behavioral psychology, modifies maladaptive thoughts and behaviors, thereby alleviating emotional distress. Wakefield et al.[43] confirmed that CBT-based psychosocial programs reduced anxiety and depression in parents by promoting cognitive reappraisal and emotional regulation. Similarly, Vrijmoet-Wiersma et al.[44] emphasized CBT's appropriateness for correcting distorted thinking patterns such as overgeneralization and black-and-white thinking in this population.

PSP have also garnered attention as effective interventions for mitigating the emotional, psychological, and social burdens experienced by parents. In this study, PSPs significantly reduced anxiety and depression. The observed benefits may result from enhanced social support networks and reduced isolation. Peer support allows parents to share emotions, information, and coping strategies based on shared experiences. Kim et al. [45] conducted in-depth interviews with 40 they and identified a strong need for peer support throughout the treatment process. Ghaljaei et al.[46] found that peer-based interventions improved quality of life in mothers of children with acute lymphoblastic leukemia. Reeves et al.[47] reported that peer support was highly valued by parents of children with mental health challenges, and that participation in peer programs was associated with reduced need for antipsychotic medications among the children. The differences in effect sizes among intervention subtypes appear to be attributable to their underlying theoretical frameworks and structural characteristics. CBT, which demonstrated the largest effect sizes, is grounded in cognitive theory and employs highly structured techniques such as cognitive restructuring, behavioral activation, and relaxation training. These elements offer a direct and systematic approach to modifying maladaptive thoughts and behaviors, thereby enhancing

emotional regulation and symptom reduction. In contrast, ESC interventions typically focus on emotional expression and relational support provided by counselors. While beneficial for psychological relief, ESC may vary in structure and intensity depending on the counselor's approach, potentially resulting in more moderate effects. PSPs rely primarily on peer empathy and shared experiences rather than professional guidance or structured techniques. While effective in reducing social isolation and fostering emotional support, their impact on clinical symptoms like anxiety and depression may be limited, as reflected by the smaller effect sizes observed in this analysis. These findings suggest that interventions grounded in established theoretical models and delivered through structured protocols may be more effective in alleviating psychological distress in parents of children with cancer.

Subgroup analyses revealed that online interventions were more effective than offline formats in reducing both anxiety and depression. Online delivery offers flexibility in time and location, which likely increases adherence and minimizes session dropout. Moreover, the anonymity provided by online settings can facilitate more open expression of sensitive emotions, particularly for parents sensitive to stigma. Digital self-help programs with modular structures and automated feedback further enhance emotional regulation[48].

With respect to intervention format, group-based interventions were more effective than individual approaches. Group settings promote a sense of connection and empathy among parents in similar situations, reducing social isolation—a major contributor to depressive symptoms. Exposure to others' coping strategies and emotional expression may also enhance participants' own emotional regulation skills[49].

This study has several limitations. First, high heterogeneity was observed, which limits the generalizability of the pooled effect sizes and necessitates cautious interpretation. Second, funnel plot asymmetry indicated potential publication bias, suggesting that effect sizes may have been overestimated. Third, the risk of bias assessment revealed a high proportion of studies with unclear allocation concealment and lack of participant and personnel blinding, introducing potential selection and performance biases.

Despite these limitations, the present study provides strong evidence by synthesizing only RCTs, thereby offering high methodological rigor. Importantly, by analyzing both immediate and follow-up effects, this study contributes meaningful evidence regarding the sustained efficacy of psychological interventions. Furthermore, subgroup analyses elucidated the differential impact of various psychosocial interventions on anxiety and depression in parents, offering practical and clinically relevant implications for intervention selection in real-world settings. These findings serve as a foundation for developing more targeted and effective support programs for PCCs.

VI. Conclusion

This study systematically reviewed 20 RCTs published up to November 2024 that examined psychological interventions for PCCs, and quantitatively evaluated their effects on anxiety and depression through meta-analysis. The results revealed that psychological interventions had a large immediate effect on reducing parental anxiety (SMD = −1.53, 95% CI: −2.13 to −0.92), and a moderate effect maintained at follow-up between 4 weeks and 6 months post-intervention (SMD = −0.77, 95% CI: −1.21 to −0.33). Regarding depression, a large effect was also observed immediately after the intervention (SMD = −0.97, 95% CI: −1.46 to −0.48), with an even larger effect at follow-up (SMD = −1.39, 95% CI: −2.57 to −0.21).

Subgroup analyses showed that all intervention types—CBT, ESC, and PSP—had significant effects

on reducing anxiety and depression, with CBT yielding the largest effect size. Furthermore, online interventions were more effective than offline interventions, and group-based formats were more effective than individual-based interventions.

These findings provide robust evidence supporting the development and implementation of evidence-based psychological interventions to alleviate the emotional distress of parents of pediatric cancer patients. They also offer important theoretical and practical foundations for the design of more personalized intervention programs in the future.

REFERENCES

[1] R. L. Siegel, K. D. Miller, N. S. Wagle, and A. Jemal, “Cancer statistics, 2023”, CA: A Cancer Journal for Clinicians, Vol. 73, No. 1, pp. 17-48, Jan 2023. DOI: 10.3322/caac.21763.

[2] A. Lewandowska, K. Zielińska, M. Domańska, M. Nowak, D. Kowalska, and P. Wojciechowski, “Prevalence of anxiety and depression among parents of children with cancer: A preliminary study”, Children, Vol. 11, No. 10, pp. 1227, Oct 2024. DOI: 10.3390/children11101227.

[3] M. Atout, I. Alrimawi, M. A. Daibes, and E. Abusalameh, “The lived experience of family members who care for children with cancer: An interpretative phenomenological approach”, European Journal of Oncology Nursing, Vol. 52, pp. 101978, May 2021. DOI: 10.1016/j.ejon.2021.101978.

[4] A. E. Kazak, B. W. DeRosa, L. A. Schwartz, W. Hobbie, C. Carlson, R. F. Ittenbach, et al., “Psychological outcomes and health beliefs in adolescent and young adult survivors of childhood cancer and controls”, Journal of Clinical Oncology, Vol. 28, No. 12, pp. 2002-2007, Apr 2010. DOI: 10.1200/JCO.2009.25.9564.

[5] K. A. P. Schultz, K. K. Ness, J. Whitton, C. J. Recklitis, L. K. Zeltzer, and L. L. Robison, “Behavioral and social outcomes in adolescent survivors of childhood cancer: A report from the Childhood Cancer Survivor Study”, Pediatrics, Vol. 144, No. 3, pp. e20183258, Sep 2019. DOI: 10.1542/peds.2018-3258.

[6] K. E. Robinson, C. A. Gerhardt, K. Vannatta, and R. B. Noll, “Parent and family factors associated with child adjustment to pediatric cancer”, Journal of Pediatric Psychology, Vol. 32, No. 4, pp. 400-410, May 2007. DOI: 10.1093/jpepsy/jsl038.

[7] H. Duan, L. Wang, H. Li, Z. Wang, S. Jiao, Y. Liu, et al., “The influence of WeChat education and care program on anxiety, depression, insomnia, and general state of health in parents of pediatric acute lymphoblastic leukemia patients”, Journal of Cancer Research and Clinical Oncology, Vol. 150, No. 3, pp. 138, Mar 2024. DOI: 10.1007/s00432-024-05646-0.

[8] A. Koumarianou, A. E. Symeonidi, A. Kattamis, K. Linardatou, G. P. Chrousos and C. Darviri, “A review of psychosocial interventions targeting families of children with cancer”, Palliatric Support Care, Vol. 19, No. 1, pp. 103-118, Feb 2021. DOI: 10.1017/s1478951520000449

[9] Y. Q. G. Ong, L. Juejin, J. Y. A. Tan and H. G. He, “Effectiveness of psychosocial interventions for parents of children with cancer receiving active treatment: A systematic review and meta-analysis”, Journal of Clinical Nursing, Vol. 0, pp. 1-13, Feb 2025, DOI:10.1111/jocn.17699.

[10] C.S. Ozturk, E.G. San, and S. Yildiz, “Effectiveness of psychosocial interventions on stress, anxiety, depression, and quality of life in parents of children, adolescents, and young adults with cancer: A meta-analysis of RCTs”, Nursing Health Science, Vol. 27, No. 2, pp. e70156, Jun 2025. DOI: 10.1111/nhs.70156

[11] Dobson, K.S. and D.J.A. Dozois, “Handbook of cognitive-behavioral therapies (4th ed.)”, Guilford Press, 2019.

[12] J. Woodford, P. Farrand, J. Hagström, L. Hedenmalm, and L. von Essen, “Internet-administered cognitive behavioral therapy for common mental health difficulties in parents of children treated for cancer: Intervention development and description study”, JMIR Formative Research, Vol. 5, No. 7, pp. e22709, Jul 2021. DOI: 10.2196/22709.

[13] A. Lewandowska, “The needs of parents of children suffering from cancer—continuation of research”, Children, Vol. 9, No. 2, pp. 144, Feb 2022. DOI: 10.3390/children9020144.

[14] G. A. McDonnell, A. W. Pope, and J. S. Ford, “Associations among perceived parent and peer support, self-esteem, and cancer-related worry in adolescent and young adult cancer survivors”, Journal of Adolescent and Young Adult Oncology, Vol. 10, No. 2, pp. 209-216, Apr. 2021. DOI: 10.1089/jayao.2020.0111.

[15] K. E. Holm, J. M. Patterson, and J. G. Gurney, “Parental involvement and family-centered care in the diagnostic and treatment phases of childhood cancer: Results from a qualitative study,” Journal of Pediatric Oncology Nursing, Vol. 20, No. 6, pp. 301-313, Nov-Dec 2003. DOI: 10.1177/1043454203254984.

[16] L. Deribe, E. Girma, N. Lindström, A. Gidey, S. Teferra, and A. Addissie, “Parent education and counseling (PairEd-C) intervention to improve family-centered care: protocol for a prospective acceptability study using the theoretical framework of acceptability”, JMIR Research Protocols, Vol. 13, pp. e54914, Oct 2024. DOI: 10.2196/54914.

[17] J. P. T. Higgins and S. Green, “Cochrane Handbook for Systematic Reviews of Interventions Version 5.0.1”, The Cochrane Collaboration, 2008.

[18] M. Borenstein, L. V. Hedges, J. P. Higgins and H. R. Rothstein, "A basic introduction to fixed-effect and random-effects models for meta-analysis", Research Synthesis Methods, Vol. 1, No. 2, pp. 97-111, Apr 2010. DOI: 10.1002/jrsm.12

[19] Cohen, J., "Statistical power analysis for the behavioral sciences (2nd ed.)", Lawrence Erlbaum. 1988.

[20] A. S. A. Ashour, M. M. Elsharkawy, and M. A. Al-Dubai, "Is music intervention effective in reducing anxiety and pain during breast biopsy procedure? A systematic review and meta-analysis of randomized controlled trials", Supportive Care in Cancer, Vol. 30, No. 12, pp. 10379-10389, Dec 2022. DOI: 10.1007/s00520-022-07341-4.

[21] M. Ahmadi, A. R. Hasanzadeh, and F. Esmaeili, "Efficacy of a written prayer technique on the anxiety of mothers of children with cancer", Palliative & Supportive Care, Vol. 17, No. 1, pp. 54-59, Feb 2019. DOI: 10.1017/S1478951518000141.

[22] S. Bahrami, M. S. Moradi Baglooi, and M. Mafi, "Effect of emotion regulation training based on the Gross model on anxiety among parents of children with cancer", Evidence Based Care Journal, Vol. 9, No. 4, pp. 40-47, Jan 2020. DOI: 10.22038/ebcj.2020.42462.2138.

[23] M. Cernvall, L. Carlbring, L. Ljungman, M. Ljungman, and L. von Essen, "Internet-based guided self-help for parents of children on cancer treatment: a randomized controlled trial", Psycho-Oncology, Vol. 24, No. 9, pp. 1152-1158, Sep 2015. DOI: 10.1002/pon.3788.

[24] H. E. Douki, F. Esmaeili, and R. Hasanzadeh, "Effectiveness of positive thinking training on anxiety", Journal of Nursing and Midwifery Sciences, Vol. 6, No. 3, pp. 130-135, Jul 2019. DOI: 10.4103/JNMS.JNMS_43_18.

[25] E. Ebrahimi, H. Mirzaie, M. Saeidi Borujeni, G. Zahed, A. Akbarzadeh Baghban, and N. Mirzakhani, "The effect of filial therapy on depressive symptoms of children with cancer and their mother's depression, anxiety, and stress: A randomized controlled trial", Asian Pacific Journal of Cancer Prevention, Vol. 20, No. 10, pp. 2935-2941, Oct 2019. DOI: 10.31557/APJCP.2019.20.10.2935.

[26] J. E. Haase, K. Stegenga, S. L. Robb, M. C. Hooke, D. S. Burns, P. O. Monahan, et al., "Randomized clinical trial of a self-care and communication intervention for parents of adolescent/young adults undergoing high-risk cancer treatment: A report from the Children's Oncology Group", Cancer Nursing, Vol. 45, No. 4, pp. 316-331, Nov 2022. DOI: 10.1097/NCC.0000000000000974.

[27] M. M. H. Joosten, H. Maurice-Stam, M. van Gorp, L. R. Beek, D. Stremler-van Holten, L. Scholten, et al., "Efficacy of Op Koers Online, an online group intervention for parents of children with cancer: Results of a randomized controlled trial", Psycho-Oncology, Vol. 33, No. 1, pp. e6284, Jan 2024. DOI: 10.1002/pon.6284.

[28] A. Liénard, S. Lamal, I. Merckaert, and D. Razavi, "Efficacy of a support intervention designed to improve parents' communication with children dealing with parental cancer: A randomized pilot trial", Supportive Care in Cancer, Vol. 30, No. 12, pp. 9823-9832, Dec 2022. DOI: 10.1007/s00520-022-07380-0.

[29] Y. Luo, W. Xia, A. T. Cheung, L. L. K. Ho, J. Zhang, J. Xie, et al., "Effectiveness of a mobile device-based resilience training program in reducing depressive symptoms and enhancing resilience and quality of life in parents of children with cancer: Randomized controlled trial", Journal of Medical Internet Research, Vol. 23, No. 11, pp. e27639, Nov 2021. DOI: 10.2196/27639.

[30] M. L. Martino, M. F. Freda, and F. Camera, "Effects of guided written disclosure protocol on mood states and psychological symptoms among parents of off-therapy acute lymphoblastic leukemia children", Journal of Health Psychology, Vol. 18, No. 6, pp. 727-736, Jun 2013. DOI: 10.1177/1359105312462434.

[31] A. McCullough, A. Ruehrdanz, M. A. Jenkins, M. J. Gilmer, J. Olson, A. Pawar, et al., "Measuring the effects of an animal-assisted intervention for pediatric oncology patients and their parents: A multisite randomized controlled trial", Journal of Pediatric Oncology Nursing, Vol. 35, No. 3, pp. 159-177, May 2018. DOI: 10.1177/1043454217748586.

[32] C. S. Ozturk and E. Katikol, "Effect of mHealth-based relaxation program on stress coping and anxiety levels in mothers of children with cancer: A randomized controlled study", Patient Education and Counseling, Vol. 123, pp. 108247, Jun 2024. DOI: 10.1016/j.pec.2024.108247.

[33] M. Park, S. Kim, H. Lee, Y. J. Shin, C. J. Lyu, and E. K. Choi, "Development and effects of an internet-based family resilience-promoting program for parents of children with cancer: A randomized controlled trial", European Journal of Oncology Nursing, Vol. 64, pp. 102332, Jun 2023. DOI: 10.1016/j.ejon.2023.102332.

[34] B. Pouraboli, Z. Poodineh, and Y. Jahani, "The effect of relaxation techniques on anxiety, fatigue, and sleep quality of parents of children with leukemia under chemotherapy in South East Iran", Asian Pacific Journal of Cancer Prevention, Vol. 20, No. 10, pp. 2903-2908, Oct 2019. DOI: 10.31557/APJCP.2019.20.10.2903.

[35] Ringnér, A., M. Björk, and C. Olsson, "Effects of person-centered information for parents of children with cancer (the pifbo study): A randomized controlled trial", Journal of Pediatric Hematology/Oncology Nursing, Vol. 40, Np. 6, pp. 400-410. Nov-Dec 2023. DOI: 10.1177/27527530221115860

[36] O. J. Sahler, M. J. Dolgin, S. Phipps, D. L. Fairclough, M. A. Askins, and E. R. Katz, "Specificity of problem-solving skills training in mothers of children newly diagnosed with cancer: Results of a multisite randomized clinical trial", Journal of Clinical Oncology, Vol. 31, No. 10, pp. 1329-1335, Apr 2013.

DOI: 10.1200/JCO.2011.39.1870.

[37] M. L. Stehl, A. E. Kazak, M. A. Alderfer, A. Rodriguez, W. T. Hwang, and A. L. H. Pai, "Conducting a randomized clinical trial of a psychological intervention for parents/caregivers of children with cancer shortly after diagnosis", Journal of Pediatric Psychology, Vol. 34, No. 8, pp. 803-816, Sep 2009. DOI: 10.1093/jpepsy/jsn130.

[38] T. Tsitsi, A. Charalambous, E. Papastavrou, and V. Raftopoulos, "Effectiveness of a relaxation intervention (progressive muscle relaxation and guided imagery techniques) to reduce anxiety and improve mood of parents of hospitalized children with malignancies: A randomized controlled trial in Republic of Cyprus and Greece", European Journal of Oncology Nursing, Vol. 26, pp. 9-18, Feb 2017. DOI: 10.1016/j.ejon.2016.10.007.

[39] L. Wang, H. Duan, H. Zuo, Z. Wang, S. Jiao, and Y. Liu, "Cognitive-behavioral stress management relieves anxiety, depression, and post-traumatic stress disorder in parents of pediatric acute myeloid leukemia patients: A randomized, controlled study", Hematology, Vol. 29, No. 1, pp. 2293498, Jan 2024. DOI: 10.1080/16078454.2023.2293498.

[40] E. Law, E. Fisher, C. Eccleston, and T. M. Palermo, "Psychological interventions for parents of children and adolescents with chronic illness", Cochrane Database of Systematic Reviews, Vol. 2019, No. 3, pp. CD009660, Mar 2019. DOI: 10.1002/14651858.CD009660.pub4.

[41] M. Park, S. Y. Kim, H. J. Lee, E. J. Choi, J. H. Kim, and Y. S. Lee, "Resilience-promoting programs in families of children with cancer: A systematic review", Journal of Pediatric Hematology/Oncology Nursing, Vol. 39, No. 3, pp. 185-201, May 2022. DOI: 10.1177/27527530211055997.

[42] R. Sánchez-Egea, M. Rubio-Aparicio, J. Sánchez-Meca, and A. I. Rosa-Alcázar, "Psychological treatment for family members of children with cancer: A systematic review and meta-analysis", Psycho-Oncology, Vol. 28, No. 5, pp. 960-969, May 2019. DOI: 10.1002/pon.5052.

[43] C. E. Wakefield, J. K. McLoone, P. Butow, K. Lenthen, and R. J. Cohn, "Development and evaluation of an information booklet for grandparents of children with cancer", Journal of Pediatric Oncology Nursing, Vol. 33, No. 5, pp. 361-369, Sep 2016. DOI: 10.1177/1043454215616605.

[44] C. M. Vrijmoet-Wiersma, J. M. M. van Klink, A. M. Kolk, H. M. Koopman, L. M. Ball, and R. M. Egeler, "Assessment of parental psychological stress in pediatric cancer: A review", Journal of Pediatric Psychology, Vol. 33, No. 7, pp. 694-706, Aug 2008. DOI: 10.1093/jpepsy/jsn007.

[45] M. A. Kim and J. H. Yi, "Service needs for parenting a child with cancer: Perspectives of the parents", Health and Social Welfare Review, Vol. 36, No. 2, pp. 544-580, Jun 2016.

[46] F. Ghaljaei, S. Fooladi, A. Jamali, N. Mahmoodi, and B. Zarei, "The effect of peer support of mothers of children with acute lymphoblastic leukemia on quality of life of patients", Avicenna Journal of Nursing and Midwifery Care, Vol. 28, No. 3, pp. 171-180, Sep 2020. DOI: 10.30699/ajnmc.28.3.171.

[47] G. M. Reeves, H. J. Wehring, K. Bussell, D. R. Medoff, T. Tsuji, R. C. Love, et al., "Does a parent peer support program help parents of children who need mental health services support their child's care? - The Family VOICE Study", Patient-Centered Outcomes Research Institute (PCORI) Final Research Reports, 2019.

[48] M. Cernvall, P. Carlbring, A. Wikman, L. Ljungman, G. Ljungman, and L. von Essen, "Twelve-month follow-up of a randomized controlled trial of internet-based guided self-help for parents of children on cancer treatment", Journal of Medical Internet Research, Vol. 19, No. 7, pp. e273, Jul 2017. DOI: 10.2196/jmir.6852.

[49] K. Nieuwenhuijsen, B. Faber, J. H. Verbeek, and A. Neumeyer-Gromen, "Interventions to improve return to work in depressed people", Cochrane Database of Systematic Reviews, Vol. 12, pp. CD006237, Dec 2014. DOI: 10.1002/14651858.CD006237.pub4.

Authors

Young-Ran Yeun received the B.S. degree in Nursing from Sahmyook University in 1993, the M.S. degree in public health form AIIAS in 2008, and the Ph.D. degree in Nursing from the Catholic University, Korea, in 2012. Dr. Yeun joined the faculty of the Department of Nursing at Kangwon National University, Samcheok, Korea, in 2014. She is currently a Professor in the Department of Nursing, Kangwon National University. She is interested in health promotion, psychiatric mental health, and research methods.