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The effectiveness of art-based interventions for cancer patients: A systematic review and meta-analysis

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ABSTRACT

Purpose: This study aimed to examine the effectiveness of art-based interventions on anxiety, depression, fatigue, and overall quality of life (QoL), including its physical, psychological, and social dimensions in cancer patients.

Methods: The literature search included all studies published up to March 2024. Searches were conducted in the MEDLINE, Web of Science, EBSCO, and PubMed databases considering the updated Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) guidelines. The quality of the studies was assessed using the Revised Cochrane Risk of Bias Tool (RoB 2) and the Risk of Bias in Nonrandomized Studies of Interventions (ROBINS-I) developed by the Cochrane Collaboration. Data were analysed using the MAJOR package in JAMOVI 2.3.28.

Results: Fifteen studies conducted with 1113 cancer patients were identified and included in this study. Ten of the studies included women with breast cancer. The remaining studies involved chemotherapy patients with various cancers (n = 3), cancer patients in a blood and marrow transplantation unit (n = 1), and nasopharyngeal cancer patients (n = 1). Meta-analysis indicated that art-based interventions had a significant effect on anxiety, depression and physical aspects of QoL but no significant impact on fatigue, overall QoL, or the psychological and social dimensions of QoL.

Conclusions: This study provided clinical support for pursuing art-based research on anxiety, depression, and the physical QoL in cancer patients. However, the effect of art-based interventions on cancer patients' fatigue and their overall QoL, including its social and psychological dimensions, was insignificant.

Registration: The study protocol was registered in advance in the PROSPERO (CRD42024531397/April 13, 2024).

1. Introduction

Cancer is one of the world's leading causes of death and a significant barrier to extending life expectancy (Sung et al., 2021). It is a severe condition that can be life-threatening (Elimimian et al., 2020). In 2020, an estimated 20 million people received a cancer diagnosis, and about 10 million died from the illness (Sung et al., 2021). Cancer is increasingly prevalent around the world, severely affecting people, families, communities, and healthcare systems on financial, emotional and physical levels (World Health Organization, 2024). Being diagnosed with cancer is a highly stressful, painful and traumatic experience (Elimimian et al., 2020; Zhou et al., 2023). Because they may have a wide range of psychological and physical symptoms, including depression, anxiety, hopelessness, pain, fatigue, nausea, vomiting, hair loss and

sleep disturbances (Bosman et al., 2021; Izgu et al., 2024), the symptoms could disrupt treatment procedures, impair quality of life (QoL) and interfere with clinical results (Lin et al., 2024). In order to treat these symptoms, pharmacotherapy and non-pharmacological techniques are the current approaches used (Jiang et al., 2020).

There can be wide variations in the types, amounts, and quality of non-pharmacological techniques provided to cancer patients (Kaimal et al., 2020). Art therapy, one of the current non-pharmacological techniques, has been gaining popularity (Jiang et al., 2020). Several definitions of art therapy are available (Bosman et al., 2021). The American Art Therapy Association defined art therapy as "a mental health profession that enriches the lives of individuals, families and communities through active art-making, creative process, applied psychological theory, and human experience within a psychotherapeutic

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relationship.” (American Art Therapy Association, 2024). According to The British Association of Art Therapists, art therapy “is an established form of psychotherapy, delivered by trained art therapists.” (British Association of Art Therapists, 2024). Art therapy includes the patients’ characteristics and the psychological and physical effects of their suffering (Mittal et al., 2023). Through the arts, patients can express experiences that are too difficult to express verbally, feel good, and unwind through a supported form of creative self-expression (Radl et al., 2018). Unlike traditional talk-oriented psychotherapies, art therapy offers a safe space that allows patients to express their concerns, thoughts, and worries through visual means before sharing them with the therapist (Kim et al., 2018). This makes art therapy interventions potentially beneficial in meeting psychosocial needs.

Arts-based interventions are among the significant public health strategies to support healthy lifestyle habits, control physical health problems, and improve mental health problems like anxiety and depression (Fancourt and Finn, 2019). However, there is no definitive conclusion about the effectiveness of arts-based interventions for cancer patients. While some studies have shown positive effects (Jang et al., 2016; Lawson et al., 2012; Lone et al., 2021; Öster et al., 2006; Yang et al., 2010), others have not found similar results (Ando et al., 2013; Bar-Sela et al., 2007; Geue et al., 2013; Wiswell et al., 2019). The diversity in content, duration, and participant characteristics of arts-based interventions creates uncertainty about how these interventions can effectively reduce cancer patients’ psychological and physical symptoms (Jiang et al., 2020). Therefore, art-based interventions for cancer patients should be addressed with a holistic approach, and the effects of these interventions on health should be examined in more depth. In addition, it is important that nurses caring for cancer patients are informed about research on the possible benefits of these interventions in cancer treatment.

Current systematic reviews and meta-analyses provide essential information about art-based interventions in the field of oncology (Jiang et al., 2020; Lin et al., 2024; Abu-Odah et al., 2024). For example, a study by Jiang et al. (2020) evaluated twelve studies and found that art therapy significantly reduced depression, anxiety, and fatigue while also improving the QoL in cancer patients. However, the database search for this study ended in August 2019, and more recent studies may have been published after this date. Lin et al. (2024) carried out a meta-analysis of twenty-three studies, finding that art-based interventions can alleviate physical symptoms, increase psychological well-being, and improve the QoL of cancer patients. Nevertheless, this study included heterogeneous studies involving different therapeutic interventions, such as dance movement therapy, music therapy, and art-based approaches. Abu-Odah et al. (2024) reviewed twenty-five studies, finding significant improvements in QoL and its social dimension in cancer patients but no notable effects on depressive symptoms or coping strategies with Creative Arts Therapy (CAT). However, it is worth noting that the study includes CAT, which combines different art-based therapies (music, drama, and dance/movement) either multimodally or as a single therapy. These variations hinder the ability to draw definitive conclusions about the effectiveness of art-based interventions for cancer patients. Consequently, these inconsistencies underscore the need for a systematic review and meta-analysis focusing on art-based interventions in this patient population. Therefore, this research is expected to contribute to a more robust and consistent understanding of the potential benefits of art-based interventions for cancer patients, offering a holistic perspective.

1.1. Aim and research questions

This meta-analysis aimed to (i) review the existing evidence on art-based interventions for cancer patients; (ii) compare the effectiveness of these interventions with control groups in terms of anxiety, depression, overall QoL, as well as physical, psychological, and social dimensions of QoL, and fatigue; and (iii) provide recommendations for the

future development and application of art-based interventions. The following research question was formulated: “Are arts-based interventions effective as part of clinical care to manage anxiety, depression, and fatigue and to improve QoL in cancer patients?”

2. Methods

2.1. Design

The design of this study was a systematic review and meta-analysis. The updated Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) guidelines were used to report this study (Page et al., 2021). The research questions were formulated using the “Population, Intervention, Comparison, and Outcome” (PICO) strategy (Thomas et al., 2023). The participants (P) of this study were adult cancer patients. The intervention (I) included art-based interventions. The comparison (C) involved other interventions, no intervention, or standard treatment methods. The outcome variables (O) were anxiety, depression, quality of life, and fatigue. The study protocol was registered in advance in the International Prospective Register of Systematic Reviews (PROSPERO) under the registration number CRD42024531397.

2.2. Data sources and search strategy

The literature search included all studies published up to March 2024. Searches were conducted in the MEDLINE, Web of Science, EBSCO, and PubMed databases. The searches were performed using the following keywords and Medical Subject Headings (MeSH) combinations: “Art” OR “Art Therapy”, OR “Art-based”, OR “Art Making” OR “Mandala” OR “Painting” OR “Handcrafting” OR “Calligraphy” OR “Drawing” AND “Cancer” OR “Carcinoma” OR “Cancer Patients” OR “Oncology Patients”. No filters or restrictions (e.g., year, language, publication status) were applied to the search. No outcomes in search strategies were included as they could limit the search results. Reference list review and hand searching were also performed.

2.3. Data extraction

All studies from the databases were imported into the Mendeley® software (Elsevier, Amsterdam). The researchers systematically and independently reviewed the studies. First, duplicate studies were removed. Then, the remaining studies’ titles and abstracts were assessed according to the inclusion and exclusion criteria. Researchers used a standardised form to summarise the characteristics of the included studies and the outcomes to be analysed. This form included the authors, publication year, country, sample, sample size, participants’ age, sex (%), intervention duration, intervention strategy, control strategy, assessment time, and evaluation instruments. Any inconsistencies in the selected studies and extracted data were discussed and resolved collaboratively by the researchers.

2.4. Inclusion and exclusion criteria

This meta-analysis included studies that (1) involved adult cancer patients, (2) had a randomised or non-randomised controlled design, and (3) were published in English. There were no restrictions on sample size. Studies were excluded if they: (1) were published as abstracts, (2) did not report the mean (M) and standard deviation (SD) values required to calculate effect sizes, (3) were secondary analyses, systematic reviews and meta-analyses, theses, letters, opinions, expert opinions, committee reports, government reports, brief reports or conference proceedings, (4) were unpublished, or (5) were written in languages other than English.

2.5. Quality assessment

The Revised Cochrane Risk of Bias Tool (RoB 2) and the Risk of Bias

in Nonrandomized Studies of Interventions (ROBINS-I) developed by the Cochrane Collaboration were used to assess the studies' quality. The researchers independently performed the risk assessment of the included studies. Any discrepancies were discussed and resolved.

RoB 2 includes five domains: bias arising from the randomisation process, bias due to deviations from intended interventions, bias due to missing outcome data, bias in the measurement of the outcome, and bias in the selection of the reported result. Each domain is categorised as 'low risk', 'some concerns' or 'high risk'. Overall, a study is categorised as 'low risk' if all domains are low risk, 'some concerns' if there are concerns in at least one domain, and 'high risk' if there is high risk in at least one domain or some concerns in multiple domains (Sterne et al., 2019).

ROBINS-I includes seven domains: bias due to confounding factors, selection of participants, classification of interventions, deviations from the initially intended intervention, missing data, measurement of outcomes, and selection of the reported result. Each domain is rated as low risk, moderate risk, serious risk, critical risk, or no information. Overall, a study is categorised as 'low risk' if all domains are low risk, 'moderate risk' if there is moderate risk in at least one domain, and 'high risk' if there is high risk in at least one domain. However, no serious risk, 'serious risk' if there is serious risk in at least one domain, and 'no information' if there is no clear indication of severe or critical risk and if there is a lack of information in one or more key domains (Sterne et al., 2016).

2.6. Data synthesis

Since different measurement tools were used in the studies included in the meta-analysis, the effect size was calculated by considering the

standardised mean difference (SMD) and 95% confidence interval (CI). Forest plots were created to visually represent the SMD and 95% CI, and the overall effect size was determined. The z-value represented statistical significance. The Q and I^2 statistics were used to evaluate the heterogeneity of the studies. The Q statistic tests the null hypothesis of homogeneity, assuming a chi-square distribution with (k - 1) degrees of freedom for k studies. A significant Q statistic ($p < 0.05$) indicates the presence of heterogeneity among the studies. If the I^2 statistic is below 50%, it indicates that the heterogeneity is insignificant; if it is above 50%, it indicates that heterogeneity is significant. Since the Q statistic and I^2 values indicated high heterogeneity among the studies included in this meta-analysis, a Random-Effects Model was used with the Restricted Maximum Likelihood (REML) approach (Higgins et al., 2023). Publication bias was assessed using funnel plots, Rosenthal's fail-safe N value, Egger's regression, and the Begg and Mazumdar rank correlation tests (Egger et al., 1997; Begg and Mazumdar, 1994). Data were analysed using the MAJOR package in JAMOMI 2.3.28 (Jamovi project, 2022). A significance level of $p < 0.05$ was considered for all statistical evaluations.

3. Results

3.1. Search outcomes

The PRISMA flow used in this study details the exclusion process of articles identified through the literature search (Fig. 1). A total of 2311 articles were retrieved from the databases: MEDLINE (n = 629), Web of Science (n = 362), EBSCO (n = 821), and PubMed (n = 499). Out of these, 1302 were removed due to being duplicate records. The

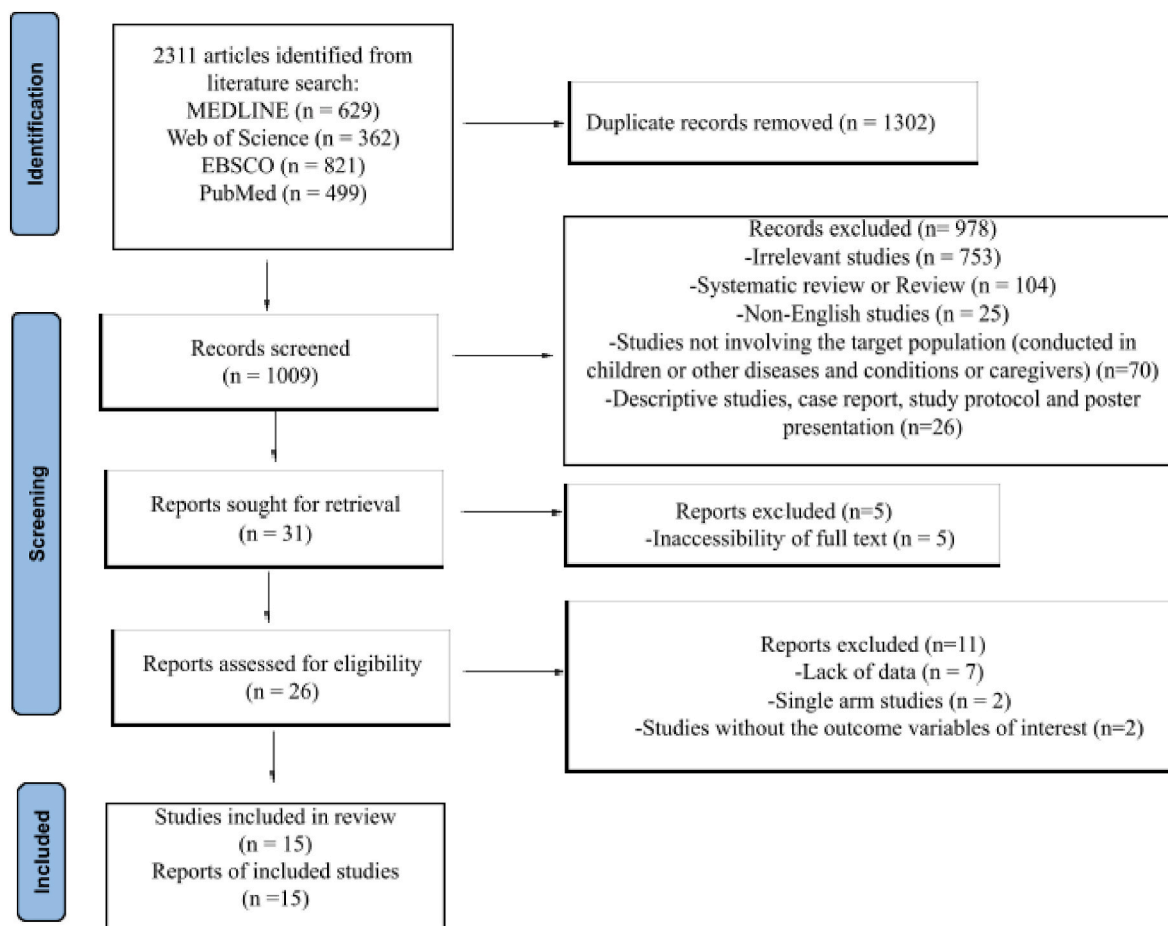


Fig. 1. PRISMA Flow diagram.

remaining 1009 articles were screened, and 978 were excluded. The reasons for exclusion included irrelevant studies ($n = 753$), systematic reviews or review articles ($n = 104$), non-English studies ($n = 25$), studies not involving the target population ($n = 70$), and descriptive studies, case reports, study protocols, and poster presentations ($n = 26$). Of the screened articles, 31 were sought for full-text access, but five were excluded due to the inaccessibility of the full text. The remaining 26 reports were assessed in detail, and 11 were excluded due to lack of data ($n = 7$), single-arm studies ($n = 2$), and studies without the outcome variables of interest ($n = 2$). Ultimately, 15 studies were identified and included in this meta-analysis for further analysis.

3.2. Characteristics of the included studies

The studies were conducted between 2006 and 2024. The included studies were carried out in the following countries: USA ($n = 3$), Sweden ($n = 2$), Iran ($n = 2$), Turkey ($n = 2$), China ($n = 1$), Italy ($n = 1$), France ($n = 1$), Israel ($n = 1$), Germany ($n = 1$), and South Korea ($n = 1$). Ten of the studies included women with breast cancer. The remaining studies involved chemotherapy patients with various cancers ($n = 3$), cancer patients in a blood and marrow transplantation unit ($n = 1$), and nasopharyngeal cancer patients ($n = 1$). The total number of study participants was 1.113, with sample sizes ranging from 9 to 252. Eleven studies had samples of only women, while the remaining included both genders. The average age of participants ranged from 45 to 60 years. Most interventions lasted between 4 and 12 weeks, although there were also studies with a single session ($n = 4$) and one study with a duration of 22 weeks (Table 1).

3.3. Risk of bias

The risk of bias in the studies is shown in Fig. 2. Although randomisation was reported in all 12 studies assessed by RoB 2, details regarding the randomisation process were provided in only two studies (16.7%). All studies had some concerns about the risk of bias due to deviations from intended interventions (100%). The risk of bias due to missing outcome data was low in 11 studies (91.7%), while one study had some concerns (8.3%). In eight studies, the risk of bias in measuring the outcome was low (66.7%), while four had some concerns (33.3%). The risk of bias in selecting the reported result was low in nine studies (75.0%), while three studies had a high risk (25%). Overall, 11 studies were found to have a high risk of bias (91.7%) (Fig. 2).

According to the ROBINS-I assessment, one study had a low risk (33.3%) of bias due to confounding, while one had a moderate risk (33.3%) and another had a serious risk (33.3%). Bias in selecting participants for the study was found to be low in one study (33.3%) and moderate in another (33.3%). In comparison, one study needed to provide more information (33.3%) on this matter. The risk of bias in classifying interventions was low in all three studies (100%). Bias due to deviations from intended interventions was moderate in two studies (66.7%). The risk of bias due to missing data was low in two studies (66.7%). The risk of bias in measuring outcomes was moderate across all three studies (100%). One study determined that the reported result's selection bias was serious (33.3%). The overall risk of bias was moderate in two studies (66.7%) and serious in one study (33.3%) (Fig. 2).

3.4. Effects of art-based interventions on outcomes

Ten studies involving 694 participants were included in the analysis to examine the effectiveness of art-based interventions on anxiety in cancer patients. The four studies involving single-session interventions comprised 149 intervention and 148 control participants. The I^2 value for the subgroup showed significant heterogeneity ($Q(3) = 6.44$, $p = 0.092$, $I^2 = 54.99\%$). According to the random effects model estimate, SMD was found to be -0.40 (95% CI $[-0.76, -0.04]$), and the result was significant for the subgroup ($z = -2.19$, $p = 0.028$). The six studies

involving multiple-session intervention comprised 160 intervention and 237 control participants. The Q test and I^2 value for heterogeneity were significant ($Q(5) = 43.46$, $p < 0.001$, $I^2 = 90.08\%$). According to the random effects model estimate, SMD was calculated as -0.75 (95% CI $[-1.48, -0.02]$), and the result was significant for the subgroup ($z = -2.00$, $p = 0.045$). In the overall analysis, including all studies, the Q test and I^2 value indicated significant heterogeneity ($Q(9) = 50.00$, $p < 0.001$, $I^2 = 84.68\%$). Based on the random effects model estimate, SMD was -0.58 [95% CI: 1.00, -0.16]. The mean effect differed significantly from zero ($z = -2.70$, $p = 0.007$). The rank correlation test was not significant ($p = 0.216$), while Egger's Test revealed publication bias ($p = 0.004$) (Fig. 3).

Seven studies with 462 participants were included in the analysis to examine the effectiveness of art-based interventions on depression in cancer patients. A total of 59 intervention and 56 control participants were included in a study that included single-session interventions. The SMD was 0.14 (95% CI $[-0.23, 0.50]$), and the result was insignificant. The six studies, including multiple session interventions, included 134 intervention and 213 control participants. The Q test and I^2 value for this subgroup showed significant heterogeneity ($Q(5) = 30.53$, $p < 0.001$, $I^2 = 84.32\%$). According to the random effects model estimate, the SMD was -0.72 (95% CI $[-1.38, -0.06]$), and this result was significant ($z = -2.14$, $p = 0.032$). Heterogeneity was also high in the overall analysis ($Q(6) = 34.22$, $p < 0.001$, $I^2 = 86.96\%$). According to the random effects model estimate, SMD was calculated as -0.58 (95% CI $[-1.17, 0.02]$) and no significant difference was observed between the groups ($z = -1.90$, $p = 0.058$). The findings showed that the effect of multi-session art-based interventions on the depression level of cancer patients was significant. The rank correlation test was not significant ($p = 0.136$), and Egger's Test showed publication bias ($p < 0.001$) (Fig. 4).

Five studies involving 404 participants were included in the analysis to examine the effectiveness of art-based interventions on the overall QoL of cancer patients. Q test for heterogeneity and I^2 value was significant ($Q(4) = 113.76$, $p < 0.001$, $I^2 = 98.91\%$). SMD was found to be 2.10 [95% CI: 0.56, 4.77] according to the estimate based on a random effects model. The mean result was not significantly different from zero ($z = 1.55$, $p = 0.122$). Both rank correlation ($p = 0.017$) and the Egger's Test ($p < 0.001$) indicated publication bias (Fig. 5).

Five studies involving 455 participants were included in the analysis to examine the effectiveness of art-based interventions on the physical QoL of cancer patients. Q test for heterogeneity and I^2 value was significant ($Q(4) = 41.63$, $p < 0.001$, $I^2 = 87.49\%$). SMD was found to be 0.71 [95% CI: 0.08, 1.35] according to the estimate based on a random effects model. The mean result differed significantly from zero ($z = 2.19$, $p = 0.028$). Neither rank correlation nor Egger's Test showed publication bias ($p > 0.05$) (Fig. 6).

Five studies involving 444 participants were included in the analysis to examine the effectiveness of art-based interventions on the psychological QoL of cancer patients. Q test for heterogeneity and I^2 value was significant ($Q(4) = 21.39$, $p < 0.001$, $I^2 = 90.84\%$). SMD was found to be 0.41 [95% CI: 0.31, 1.13] according to the estimate based on a random effects model. The mean result was not significantly different from zero ($z = 1.11$, $p = 0.266$). While the rank correlation test was not significant ($p = 0.233$), Egger's Test indicated publication bias ($p = 0.006$) (Fig. 7).

Five studies involving 455 participants were included in the analysis to examine the effectiveness of art-based interventions on the social QoL of cancer patients. Q test for heterogeneity and I^2 value was significant ($Q(4) = 24.58$, $p < 0.001$, $I^2 = 84.74\%$). SMD was found to be 0.03 [95% CI: 0.53, 0.58] according to the estimate based on a random effects model. The mean result was not significantly different from zero ($z = 0.09$, $p = 0.928$). Neither rank correlation nor Egger's Test showed publication bias ($p > 0.05$) (Fig. 8).

Five studies involving 483 participants were included in the analysis to examine the effectiveness of arts-based interventions on fatigue in cancer patients. One study included a single-session intervention, with

Table 1
Characteristics of reviewed studies.

| First Author, Year/ Country | Type of participants | Sample | Age (Mean ± SD) | Sex (%) | Duration of intervention | Intervention strategies | Scales | Study outcomes |
|-------------------------------------------|----------------------------------------------------------------------------|--------------------------|---------------------------------------------------|--------------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Akbulak and Can, 2023/Türkiye | Early-stage breast cancer patients receiving chemotherapy | IG = 41 CG = 43 | IG: 46.1 ± 7.7 CG: 50.8 ± 9.2 | Female: 100% | A single 30- min session | Participants in the intervention group received a mandala painting intervention during premedication, while the control group received standard care. Both groups were assessed using a pretest before and posttest after the intervention to evaluate changes over time. | DT STAI | Average distress levels were low in both the intervention and control groups before premedication, and state anxiety scores did not differ statistically between the groups before or after premedication. However, patients in the intervention group who had high distress levels before premedication showed a significant decrease in state anxiety scores after premedication. At the same time, patients in the control group showed no decrease. |
| Cheraghi et al., 2024/Iran | Breast cancer patients receiving outpatient chemotherapy | IG = 35 ACG = 35 | IG: 45.51 ± 9.32 ACG: 44.94 ± 9.98 | Female: 100% | A single 2-h session | Participants in the experimental group coloured a simple Mandala pattern during their chemotherapy. Participants in the control group solved a sudoku puzzle during their chemotherapy. Both groups were assessed using a pretest before and posttest after the intervention to evaluate changes over time. | STAI | The results indicated a significant difference between the pretest and posttest anxiety scores in both Sudoku and Mandala painting groups ($P = 0.0001$). The difference between the pretest and posttest mean anxiety scores was 6.09 ± 4.02 in the Sudoku group and 48.93 ± 13.8 in the Mandala painting group. The results of the inter-group comparison also showed a significant difference between the two groups in posttest mean anxiety score ($P = 0.0001$), proving that Mandala painting was more effective in reducing patients' anxiety. |
| Czamanski-Cohen et al., 2019/Israel | Breast cancer patients who have completed their primary treatment | IG = 4 Sham IG = 5 | NI | Female: 100% | Eight weeks | The IG participated in a 90-min art therapy session once a week. Each session began with a 10-min relationship-building discussion and a 50- min art-making process. Participants were encouraged to explore materials and use them for personal expression. Each session featured a different theme to increase emotional engagement and exploration gradually. Participants focused on introspective experiences, while instrumental music supported this process. Sessions concluded with a 30-min processing and discussion period | LEAS AE CES-D BCPT | After the intervention, statistically significant differences in emotional awareness and acceptance of emotion were found. Large effect sizes were found between groups and over time in acceptance of emotion, emotional awareness, and depressive symptoms. |

(continued on next page)

Table 1 (continued)

| First Author, Year/ Country | Type of participants | Sample | Age (Mean ± SD) | Sex (%) | Duration of intervention | Intervention strategies | Scales | Study outcomes |
|---------------------------------|-----------------------------------------------------|------------------------|----------------------------------------------------------|------------------------------------------|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| De Feudis et al., 2021/Italy | Cancer patients before receiving chemotherapy | IG = 59 CG = 56 | NI | IG Female:79.6% CG Female:73.2% | An average single 90- min session | where participants shared their work and received responses or support from the group. The sham IG sessions did not focus on emotional processing. Participants spent 45 min colouring pre- prepared Mandalas in a calm environment, followed by a 15-min self-care lesson from the art therapist, an oncology nurse. There was no relationship- building component, and instrumental music was used to compare with the art therapy intervention. Both groups were assessed using a pretest before and posttest after the intervention to evaluate changes over time. The art therapy intervention consisted of 90-min sessions. Each participant attended a single session, which included spontaneous artwork creation, individual self- reflection, and shared meaning-making. The control group received standard care. Both groups were assessed using a pretest before and posttest after the intervention to evaluate changes over time. | STAI-Y ESAS-R | The intervention group participants demonstrated a decrease in symptoms of anxiety, drowsiness and tiredness. |
| Geue et al., 2013/Germany | Cancer patients in ambulant aftercare | IG = 54 CG = 129 | IG: 51.50 ± 12.13 CG: 53.45 ± 13.58 | IG Female:74% CG Female: 42% | 22 weeks | The IG participated in a 90-min art therapy session once a week. In the first stage, the IG worked with structured materials and created experimental drawings with the artist's guidance. Starting from the eighth week, participants began making more decisions about what and how to paint. From the fourteenth session, the focus shifted to creating an individual book, with participants making all decisions regarding the content and style of their books. The books allowed participants to express their feelings about themselves and their illness. The control group received | HADS FCQI PACIS | Analyses of variance included group membership (IG vs. CG) and the following factors: gender, other psychosocial help and significant life events. None of these variables was a predictor for changes in depression, anxiety and coping. Therefore, we could not prove the effects of intervention over time. |

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Table 1 (continued)

| First Author, Year/ Country | Type of participants | Sample | Age (Mean ± SD) | Sex (%) | Duration of intervention | Intervention strategies | Scales | Study outcomes |
|-------------------------------------|---------------------------------------------|-----------------------|--------------------------------------------------|--------------|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Jalambadani and Borji, 2019/Iran | Women with any stage of breast cancer | IG = 50 CG = 50 | IG: 55.75 ± 3.53 CG: 55.35 ± 3.35 | Female: 100% | 12 weeks | standard care. Both groups were assessed at pretest, posttest, and 6-month follow-up to track changes over time. The intervention consisted of 12 weekly sessions, each lasting 90 min. The first session included an introduction to art making and a self-portrait assessment. In the second session, art materials were explored with mindfulness. The third session focused on the mind-body relationship, and the fourth session addressed creative problem-solving and self-care. The fifth session involved meditation and mindfulness practice. The sixth session covered stress physiology and communication skills. The seventh session provided an open studio for free art making. The eighth session included guided imagery of a healing place. The ninth session offered the opportunity to create a healthy self-portrait based on health visualization. The tenth session involved another self-portrait assessment. The eleventh and twelfth sessions concluded with group discussions and summaries of the sessions. The control group received standard care. Both groups were assessed using a pretest before and posttest after the intervention to evaluate changes over time. | WHOQOL-BREF | Compared to the control group, the MBAT group demonstrated a significant decrease in symptoms of distress and significant improvements in key aspects of health-related quality of life. |
| Jang et al., 2016/South Korea | Breast cancer patients | IG = 12 CG = 12 | IG: 51.75 ± 5.32 CG: 51.42 ± 6.33 | Female: 100% | 12 weeks | The intervention consisted of weekly 90-min sessions. The sessions began with participants drawing a complete picture of themselves. This was followed by activities to gain self-awareness through sensory stimulation and working with art materials. The mind- | PAI EORTC-QLQ- C30 | The results showed that depression and anxiety decreased significantly, and health-related quality of life improved significantly in the MBAT group. In the control group, however, there was no significant change. |

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Table 1 (continued)

| First Author, Year/ Country | Type of participants | Sample | Age (Mean ± SD) | Sex (%) | Duration of intervention | Intervention strategies | Scales | Study outcomes |
|-----------------------------------|---------------------------------------------------------|----------------------|--------------------------|--------------|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | | | | body relationship was assessed through hatha yoga, and physical sensations were observed through mandala drawing. Participants were encouraged to express a loving attitude towards themselves and others through drawing. Activities included observing tension and relaxation through breathing exercises, expressing thoughts and feelings through collages, and representing stressful and happy events through drawing. The sessions concluded with a walk using colourful paint to focus on the present moment, ending with drawing a complete painting of oneself. The control group received standard care. Both groups were assessed using a pretest before and posttest after the intervention to evaluate changes over time. | | |
| Joly et al., 2022/France | Localized breast cancer patients receiving radiotherapy | IG = 125 CG = 127 | IG: 55 ± 8 CG: 55 ± 9 | Female: 100% | Eight weeks | The intervention consisted of weekly 60-min group sessions. Four additional optional sessions were offered within 4 months after the end of radiotherapy. Creative art therapy interventions included techniques such as painting, drawing, and sculpture. The intervention involved an initial individual session to detail the personal artistic project and a final individual session for evaluation. The control group received standard care. Both groups were assessed at the pretest, posttest, and six and 12-month follow-ups. | FACT-F FACT-G HADS | AT did not significantly improve global severe fatigue among all cancer participants one month after radiation therapy; however, it had a positive impact on social well-being and may improve MFF and motivation. |
| Mollaoglu et al., 2024/Türkiye | Breast cancer patients undergoing chemotherapy | IG = 30 CG = 30 | NI | Female: 100% | 10 weeks | The intervention group participated in five sessions of marbling art accompanied by Ney music, held every two weeks. The sessions were conducted for half an hour in the art room before the chemotherapy sessions. The control group received | VAS RINVR BAI FACT-G | The decrease in the pain, nausea-vomiting, and anxiety levels of the patients in IG and the increase in their quality of life after the art therapy accompanied by ney music were statistically significant compared with the first follow-up ($p < 0.05$). There was no statistically |

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Table 1 (continued)

| First Author, Year/ Country | Type of participants | Sample | Age (Mean ± SD) | Sex (%) | Duration of intervention | Intervention strategies | Scales | Study outcomes |
|-----------------------------------|----------------------------------------------------------------------|-------------------------------------|----------------------------------------------------------|--------------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | | | | standard care. Both groups were assessed at baseline, the third session, and the fifth session. | | significant change in the quality of life of the patients in the CG, whereas their pain, nausea-vomiting, and anxiety scores increased. According to the comparison between IG and CG, there was a significant difference in favour of IG in terms of pain severity, quality of life, emesis, and anxiety levels ($p < 0.05$). |
| Mische Lawson et al., 2016/USA | Patients receiving blood and marrow transplantations | IG = 14 MG = 11 CG = 14 | 49.54 ± 14.42 | Female:51.3% | A single 1-h session | The intervention group painted 4-inch ceramic tiles freely for 60 min. The control group received standard care. The music group listened to music for 60 min. The control group received standard care. Groups were assessed using a pretest before and posttest after the intervention to evaluate changes over time. | TRSC STAI | No significant differences in age, gender, ethnicity, or diagnosis existed between groups, and no statistical differences were found on all measures following the intervention. |
| Puig et al., 2006/USA | Newly diagnosed Stage I and Stage II breast cancer patients | IG = 20 CG = 19 | 51.4 ± 11.9 | Female:100% | Four weeks | The intervention group received individual therapy sessions to support emotional expression, spirituality, and psychological well-being. These sessions were conducted once a week for four weeks, each lasting 60 min. The sessions consisted of guided and semi-structured creative art therapy exercises, allowing participants to explore their breast cancer experiences, enhance body awareness, and examine spiritual themes. The control group received standard care. Both groups were assessed using a pretest before and posttest after the intervention to evaluate changes over time. | EACS ESI-R POMS | The intervention was not effective in enhancing the emotional approach, coping style, emotional expression, or level of spirituality of subjects in this sample. However, participation in the creative arts therapy intervention enhanced psychological well-being by decreasing negative emotional states and enhancing positive ones of experimental group subjects. |
| Radl et al., 2018/USA | Female oncology patients during active treatment | IG = 20 CG = 20 | IG: 51.95 ± 10.59 CG: 52.30 ± 12.42 | Female:100% | Six weeks | The Self-Book© intervention process took place in a supportive environment with an art therapist and consisted of six sessions, each lasting 50 min. During these sessions, participants received art therapy directives based on the therapist's five themes and magazine collages were used to create | DT PEDI FACIT-Sp Patient-Reported Outcomes Measurement Information System Brief Psychological Well-being test | No significant differences between groups were found for the primary outcome measures: emotional distress and psychological well-being. Self-book art therapy participants' spiritual well-being improved compared to standard care control participants. |

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Table 1 (continued)

| First Author, Year/ Country | Type of participants | Sample | Age (Mean ± SD) | Sex (%) | Duration of intervention | Intervention strategies | Scales | Study outcomes |
|--------------------------------|---------------------------------------------------------------------------|-----------------------|--------------------------|-------------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Svensk et al., 2009/Sweden | Non-metastatic breast cancer patients undergoing radiotherapy | IG = 20 CG = 21 | IG: 59.5 CG: 55 | Female:100% | Five weeks | each section of their book. In the sixth session, participants prepared and decorated the cover of their book. This process helped participants visually express their experiences and emotions and create a self-reflective book. The control group received standard care. Both groups were assessed at baseline, week three, week six, and one to two months post-intervention. In the intervention group, five individual art therapy sessions of 1 h each were conducted once a week. The first session focused on visualizing feelings through analogue drawings; the participant drew lines on paper in response to heard words and named them. In the second session, she expressed her emotions using colours and shapes on a body outline. During the third and fourth sessions, the participants created several free-form paintings. All the artworks were reviewed in the final session, and the participant created a final painting summarizing her experiences. The control group received standard care. Both groups were assessed at baseline, two months later, and six months later. | WHOQOL-BREF EORTC QLQ-BR23 | The results indicate an overall improvement in QoL aspects among women in the intervention group. The art therapy group observed a significant increase in total health, total QoL, physical health and psychological health. |
| Thyme et al., 2009/Sweden | Non-metastatic breast cancer patients undergoing radiotherapy | IG = 20 CG = 21 | IG: 59.5 CG: 55 | Female:100% | Five weeks | In the intervention group, five individual art therapy sessions of 1 h each were conducted once a week. The first session focused on visualizing feelings through analogue drawings; the participant drew lines on paper in response to heard words and named them. In the second session, she expressed her emotions using colours and shapes on a body outline. During the third and fourth sessions, the | SASB SCL-90 | Significant lower ratings of depression, anxiety, and somatic symptoms and less general symptoms were reported for the art therapy group compared to the control group. The regression analysis showed that art therapy relates to lower ratings of depression, anxiety, and general symptoms; chemotherapeutic treatment predicts lower depressive symptoms, in contrast to axillary surgery and hormonal treatment, as well as being a parent, predicts |

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Table 1 (continued)

| First Author, Year/ Country | Type of participants | Sample | Age (Mean ± SD) | Sex (%) | Duration of intervention | Intervention strategies | Scales | Study outcomes |
|--------------------------------|----------------------------------------------------------|-------------------------------------|-----------------------|--------------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Yang et al., 2010/China | Nasopharyngeal carcinoma patients in the inpatient | IG = 24 RG = 26 CG = 29 | 49.63 ± 10.81 | Female:31.1% | Four Weeks | participants created several free-form paintings. All the artworks were reviewed in the final session, and the participant created a final painting summarizing her experiences. The control group received standard care. Both groups were assessed at baseline, two months later, and six months later. Participants in the intervention group practiced Chinese calligraphy for 30 min each day over four weeks. The control group received standard care. The relaxation group received 30 min of relaxation daily over four weeks. The control group received standard care. Groups were assessed at baseline, week two, week four, and two weeks post- intervention. | SDS POMS-SF KPS | higher ratings of anxiety and general symptoms. Both calligraphy and relaxation training had specific effects on symptom relief and mood improvement in NPC patients. Relaxation was effective in relieving insomnia symptoms ($p =$ 0.042) and improving mood disturbance, calligraphy elevated concentration ($p = 0.032$) and improved mood disturbance. |

Abbreviations: ACG, Active Control Group; AE, Acceptance of Emotions Scale; BAI, Beck Anxiety Inventory; BCPT, Breast Cancer Prevention Trial Symptom Scale; CES-D, Center for Epidemiologic Studies-Depression Scale; CG, Control Group; DT, Distress Thermometer; EACS, Emotional Approach Coping Scale; EORTC QLQ-BR23, European Organization for Research and Treatment of Cancer Quality of Life Questionnaire Breast Cancer Module; EORTC-QLQ-C30, European Organization for Research and Treatment of Cancer Quality of Life Questionnaire; ESAS-R, Edmonton Symptom Assessment Scale-Revised; ESI-R, Expressions of Spirituality Inventory-Revised; FACIT-F, Functional Assessment of Chronic Therapy Fatigue; FACIT-Sp, Functional Assessment of Chronic Illness Therapy Spiritual Well-being; FACT-G, General Functional Assessment of Cancer Therapy Scale-General; FCQI, Freiburg Questionnaire on Coping with Illness; HADS, Hospital Anxiety and Depression Scale; IG, Intervention Group; KPS, Karnofsky Performance Status; LEAS, -Levels of Emotional Awareness Scale; MG, Music Group; PACIS, Perceived Adjustment to Chronic Illness Scale; PAI, Personality Assessment Inventory; PEDI, Perceived Emotional Distress Inventory; POMS, Profile of Mood States; POMS-SF, Profile of Mood State-Short Form; RG, Relaxation Group; RINVR, Rhodes Index of Nausea, Vomiting, and Retching; SASB, Structural Analysis of Social Behaviour; SCL-90, Symptom Check List-90; SDS, Symptom Distress Scale; STAI, Spielberger State-Trait Anxiety Inventory; STAI-Y, The State-Trait Anxiety Inventory-Form Y; TRSC, Therapy-Related Symptoms Checklist; VAS, Pain Intensity Measurement-Visual Analog Scale; WHOQOL-BREF, World Health Organization Quality-of-Life Brief Questionnaire.

59 intervention and 56 control participants. The SMD was -0.46 (95% CI $[-0.83, -0.09]$). Four studies included multiple-session interventions, with 181 intervention and 187 control participants. Heterogeneity was found to be relatively high for this subgroup ($Q(3) = 40.93$, $p < 0.001$, $I^2 = 94.97\%$). The random-effects model estimate calculated the SMD as -1.00 (95% CI $[-2.25, 0.25]$). However, no significant difference was observed in this group ($z = -1.57$, $p = 0.116$). In the general analysis, the Q test and I^2 value showed significant heterogeneity ($Q(4) = 42.52$, $p < 0.001$, $I^2 = 94.98\%$). According to the estimation based on the random effects model, SMD was calculated as -0.87 (95% CI $[-1.81, 0.08]$) and was not significant ($z = -1.79$, $p = 0.074$). While the rank correlation test was not significant ($p = 0.233$), the Egger's Test showed publication bias ($p < 0.001$) (Fig. 9).

4. Discussion

This systematic review and meta-analysis aimed to thoroughly examine the effectiveness of art-based interventions on anxiety, depression, fatigue, and overall QoL, including its physical, psychological, and social dimensions in cancer patients, and to offer

recommendations for the future development and application of these interventions. The findings from the current meta-analysis indicated statistically significant improvements in the physical aspects of QoL and notable reductions in anxiety and depression. However, no significant effects were observed on fatigue, overall QoL, or the psychological and social dimensions of QoL. These findings demonstrate the potential of arts-based interventions as an effective and supportive approach to enhance cancer patients' well-being.

This study examined the potential of art-based interventions to reduce anxiety and depression in cancer patients and found them to be effective in alleviating these symptoms. The results are consistent with the therapeutic principles of art therapy, which strongly emphasise emotional release and self-expression (Haeyen and Hinz, 2020), providing cancer patients a nonverbal way to express their feelings and process their experiences. Additionally, art therapy can activate body and mind processes, which help activate, reorganise, grow, and reintegrate these processes (Czamanski-Cohen and Weihs, 2016). Art-based interventions may contribute to the alleviation of psychological symptoms (Nainis et al., 2006; Bosman et al., 2021) and promote emotional regulation (Gruber and Oepen, 2018; Haeyen and Hinz, 2020), which is

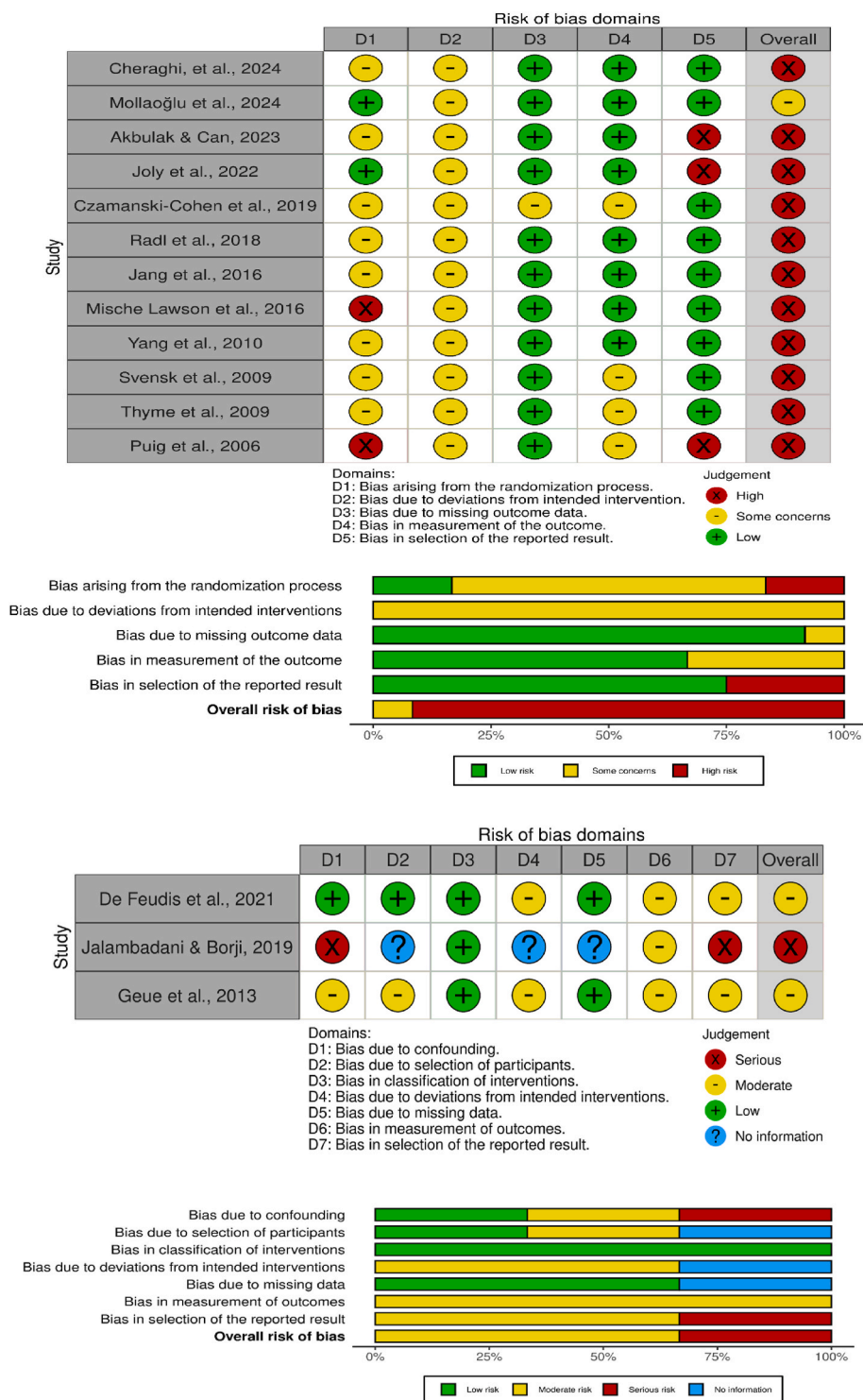


Fig. 2. Risk of bias assessment for included studies.

consistent with the findings of this study. A previous systematic review and meta-analysis support these findings (Jiang et al., 2020; Zhou et al., 2023). A systematic review and meta-analysis carried out by Jiang et al. (2020) and Zhou et al. (2023) reported that art therapy significantly reduced anxiety and depression levels in cancer patients. Contrary to our study, this study included literature written in both Chinese and English. Furthermore, a recent meta-analysis conducted by Abu-Odah et al. (2024) highlighted that Creative Arts Therapy (CAT) reduced anxiety and depression in cancer patients. In contrast to our meta-analysis, this study examined CAT, which combines various art-based therapeutic

approaches, such as dance/movement, music, and drama/theatre therapy.

In terms of QoL, this study found that art-based interventions did not significantly improve overall QoL and the psychological and social dimensions of QoL in cancer patients, and these findings contradict previous reviews (Jiang et al., 2020; Lin et al., 2024; Zhou et al., 2023). However, significant improvements in the physical dimensions of QoL observed in cancer patients participating in art-based interventions suggest that these therapies may positively affect physical well-being. According to these results, being creative can be a therapeutic

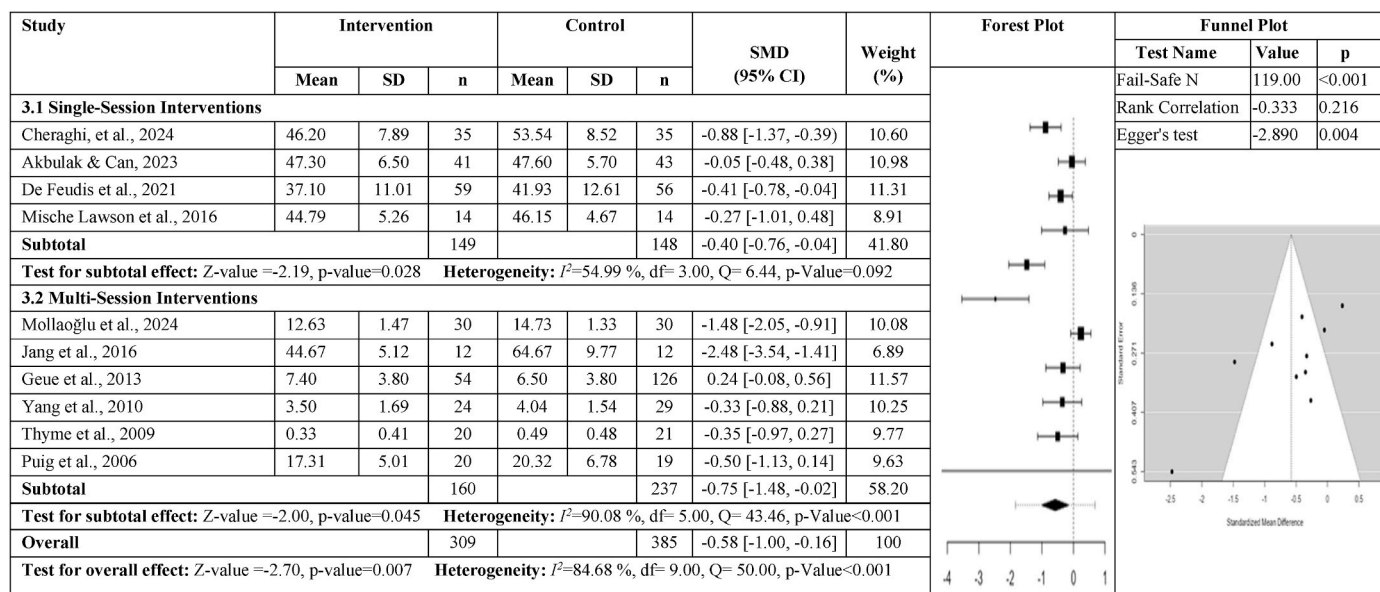


Fig. 3. Forest plot and funnel plot for the anxiety of the intervention and control group.

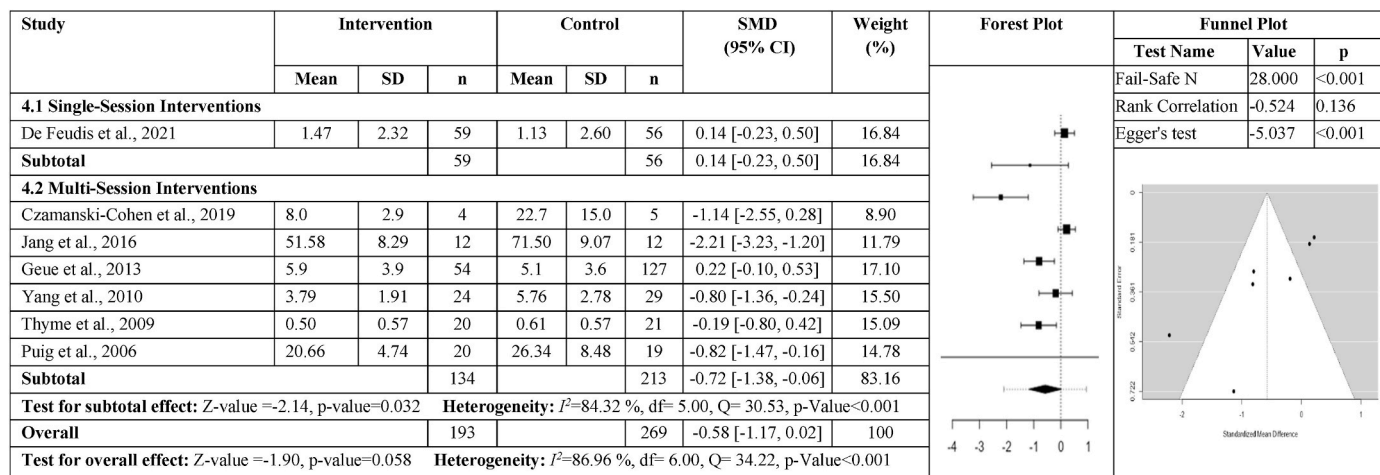


Fig. 4. Forest plot and funnel plot for the depression of the intervention and control group.

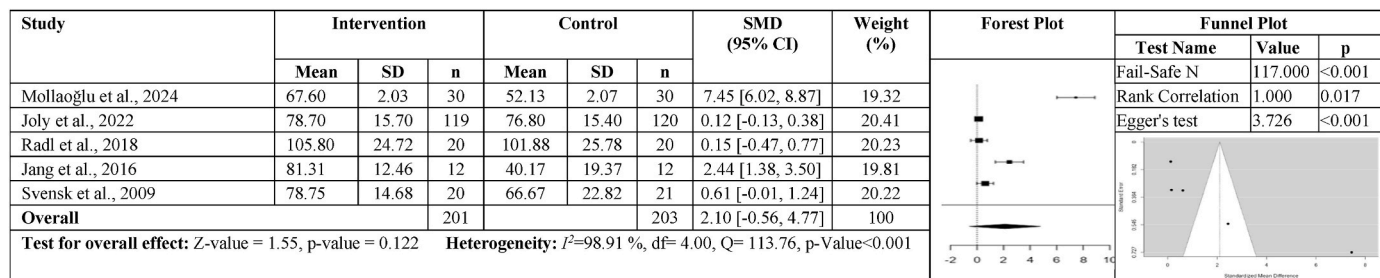


Fig. 5. Forest plot and funnel plot for the overall QoL of the intervention and control group.

approach that improves physical health by reducing stress, promoting relaxation, and alleviating some of the physical side effects of cancer and its treatment. One possible reason for these improvements is that art therapy promotes a healthier connection between body and mind (Czamanski-Cohen and Weihs, 2016). Furthermore, art-making often involves rhythmic and repetitive movements that may reduce physical tension (Zimmermann and Mangelsdorf, 2020). In addition, the act of

creating art has the power to deflect attention from discomfort and allow individuals to focus on fulfilling creative endeavours rather than their physical conditions.

However, improving the psychological and social dimensions of QoL may require more targeted or intensive interventions than those presented in the studies included in this analysis. Art-based interventions may not offer the depth or duration necessary to address complex

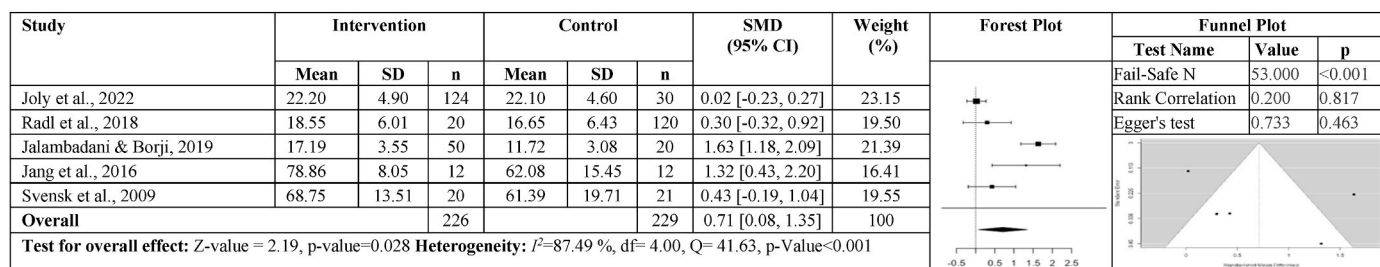


Fig. 6. Forest plot and funnel plot for the physical QoL of the intervention and control group.

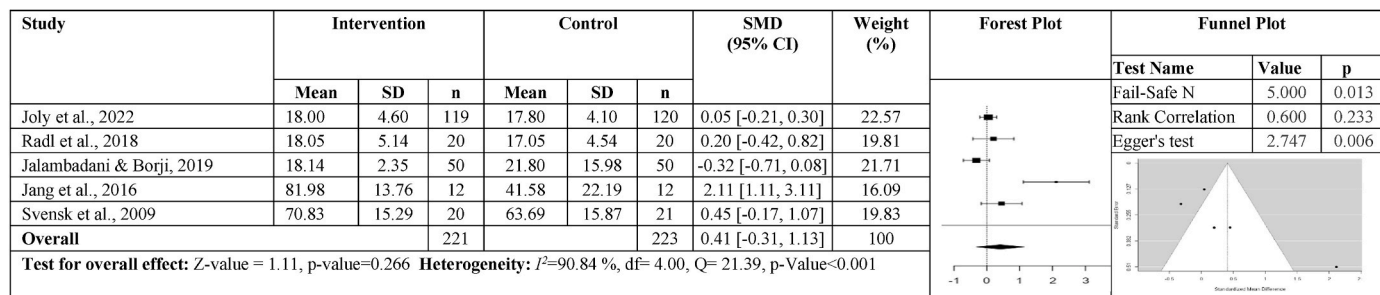


Fig. 7. Forest plot and funnel plot for the psychological QoL of the intervention and control group.

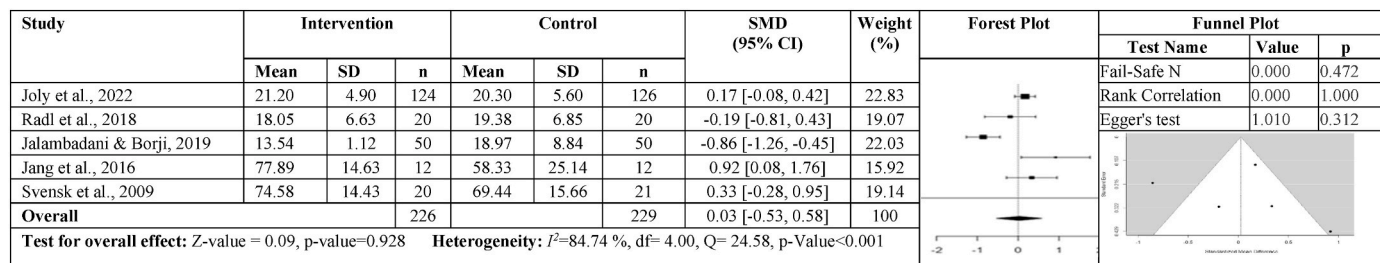


Fig. 8. Forest plot and funnel plot for the social QoL of the intervention and control group.

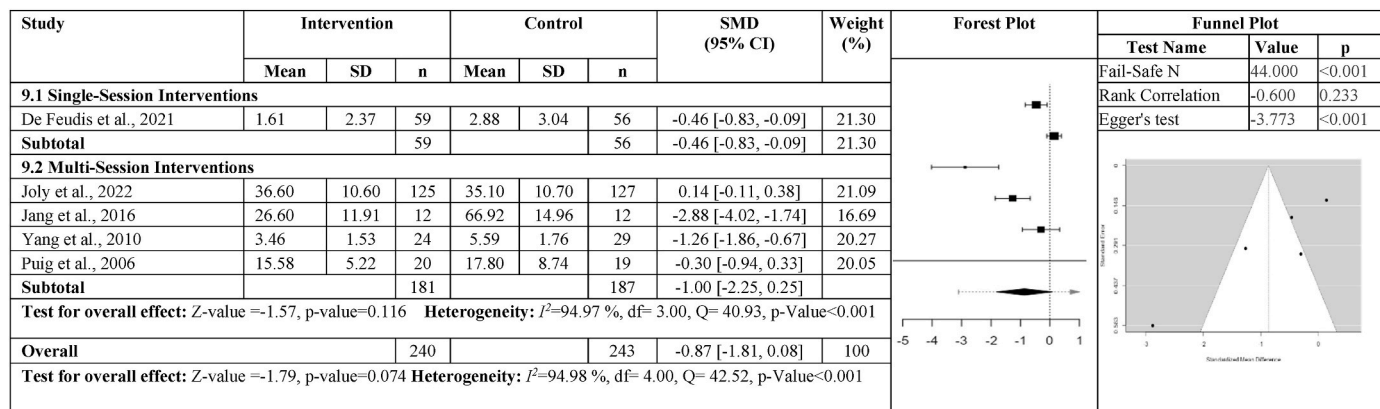


Fig. 9. Forest plot and funnel plot for the fatigue of the intervention and control group.

psychological issues such as posttraumatic stress symptoms, fear of relapse, or existential distress, which are common among cancer patients and often require specialised support like counselling or cognitive-behavioural therapy (Burbuck et al., 2024; Havsteen-Franklin et al., 2020; Yao et al., 2024). Furthermore, social problems such as stigma and isolation may limit the effectiveness of art-based interventions in improving interpersonal relationships and reintegrating individuals into society (Yao et al., 2024). While the benefits of physical QoL seen in this

analysis are consistent with previous research, which has shown that art-based interventions can enhance physical relaxation (Bosman et al., 2021; Lin et al., 2024), the psychological and social dimensions of QoL may require more targeted or intensive interventions than those provided in the studies included in this analysis.

In this study, although the effect of arts-based interventions on fatigue was not statistically significant (p = 0.074), a trend towards improvement was observed. This result may be due to the limited

sample sizes in the included studies, which may have reduced the power to detect significant effects. The meta-analysis of Jiang et al. (2020) determined that art therapy positively impacted fatigue (Jiang et al., 2020). This difference might be attributed to fatigue being a complicated symptom with several underlying causes, and it can linger as a disruptive issue for months or even years post-treatment, indicating that patients may experience fatigue for an extended period. (Lin et al., 2024).

Moreover, the heterogeneity of the included studies, particularly variations in intervention types, durations, and patient samples, may have contributed to these results. Moreover, the art-based interventions reviewed may have needed to be sufficiently intensive or specifically targeted to address the underlying causes of fatigue. This often requires more comprehensive management techniques like exercise or cognitive-behavioural therapy. Therefore, the lack of significant improvements in overall QoL, as well as its psychological and social dimensions and fatigue, indicates that although art-based interventions are beneficial, they may need to be combined with other therapeutic approaches to address the broader range of needs in cancer care comprehensively.

4.1. Implications

Even though this study does not reveal a statistically significant impact of art-based interventions on cancer patients' fatigue or their overall QoL, including its social and psychological dimensions, it does provide clinical support for pursuing art-based research on anxiety, depression, and the physical QoL in cancer patients. The implications of these findings for clinical practice and policy formation are significant. It has been demonstrated that art-based interventions, which are well-known for being non-pharmacological, widely accepted and low-risk, are a successful technique for this population. These results suggest that cancer nurses should consider incorporating art-based interventions into cancer care by collaborating with art therapists, especially for their benefits to mental health. This study could create a multi-component, interdisciplinary, and multidisciplinary approach to integrating arts-based interventions into clinical practice.

Additionally, by incorporating cultural sensitivity in adapting the therapy, patients can be assisted in integrating art into their daily lives after a supervised practice period. Forming art interest groups supported by art therapists could improve the accessibility and availability of this intervention in cancer care environments. Researchers and clinical staff should recognise the gender gap when using art-based interventions. Since this study's findings were derived mainly from female cancer patients, it is appropriate to conclude that the effectiveness of art-based interventions was confirmed in female patients. However, additional evidence is necessary to reach the same conclusion for male patients.

4.2. Limitations

This study has some limitations that should be taken into account. First, all included RCTs, except for one, were assessed at high risk of bias due to deviations from the intended intervention. In contrast, non-randomised controlled trials were assessed at high and moderate risk of bias. It is possible that this had an impact on the study's findings, but it also emphasised the importance of having high-quality studies in the literature. Moreover, the heterogeneity was high in the included studies, and the data were insufficient for subgroup analysis. Second, no national studies in other languages were discovered because all searches were performed in English. Due to a need for more sufficient data (mean and SD values), efforts were made to reach the authors of seven English articles. However, the corresponding authors of these articles could not be contacted, resulting in the inability to obtain the necessary data from the publications. Third, small sample sizes were used in most of the included studies. Moreover, because ten out of the fifteen studies included female patients, the results may not be fully generalisable to male cancer patients. Thus, it is necessary to confirm whether art-based

interventions are adequate for the general population of cancer patients.

5. Conclusion

This systematic review and meta-analysis present an overview of the effectiveness of art-based interventions for cancer patients. Notably, this study's findings demonstrated that these interventions led to significant reductions in depression and anxiety, as well as improvements in the physical QoL for cancer patients. However, the limited effect on other QoL dimensions indicates that art-based interventions should be combined with other therapeutic approaches to thoroughly meet cancer patients' needs. Although the use of art-based interventions for breast cancer patients has been extensively studied in the included studies, there has not been much research done on other cancer populations. Thus, future studies should expand their scope to encompass various cancer groups. Furthermore, high-quality randomised controlled trials with larger sample sizes, including both male and female cancer patients, are advised to explore further the effects of these interventions on the physical and psychological outcomes of cancer patients. In addition, cancer nurses involved in cancer treatment should know the potential benefits of art-based interventions for cancer patient care.

CRediT authorship contribution statement

Eda Ünal: Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Gülyeter Erdoğan Yüce:** Writing – review & editing, Writing – original draft, Supervision, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

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Declaration of competing interest

The authors declare no conflicts of interest.

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