Research Article

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# Impact Of Psychological Nurse On Anxiety And Depression In Thyroid Cancer Patient Treated With Iodine-131 Isolation: A Systematic Review And Meta-Analysis.

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## ABSTRACT

**Background:** Systematic evaluation of the effects of psychological nursing on alleviating anxiety and depression in patients undergoing iodine-131 isolation therapy following thyroid cancer surgery.

**Methods:** A meta-analysis was conducted to investigate the impact of psychological nursing on anxiety and depression in patients undergoing postoperative iodine-131 isolation therapy for thyroid cancer. Literature searches were performed across eight databases for peer-reviewed articles published between 2010 and 2023 that discussed the impact of psychological care on anxiety and depression in patients. Data extraction focused on mean differences (MD), standard deviations (SD), and 95% confidence intervals (95% CI) of anxiety scores (SAS) and depression scores (SDS) between the experimental group receiving psychological nursing and the control group without it. Study quality was appraised using the Cochrane Risk of Bias Assessment Tool in Rev Man 5.4 software, which also supported statistical analyses. Sensitivity analysis was performed with STATA 14.0 software. Additionally, publication bias was evaluated using Begg's test and Egger's test within the same software.

**Results:** Twelve studies involving 1004 patients undergoing iodine-131 treatment for thyroid cancer were included, with 502 patients in the experimental group and 502 patients in the control group. The results showed that compared to the control group, the experimental group had a significant decrease in SAS scores (MD=-8.18, 95% CI [-9.54, -6.838], P<0.05) and SDS scores (MD=-8.49, 95% CI [-9.93, -7.04], P<0.05), indicating a statistically significant difference.

**Conclusion:** Psychological care has been shown to be effective in alleviating anxiety and depression in patients undergoing postoperative iodine-131 isolation therapy for thyroid cancer, warranting its clinical promotion and application.

**KeyWords :** *Psychological nursing, I-131 therapy, anxiety, depression, meta-analysis.*

## INTRODUCTION

Differentiated thyroid cancer (DTC) is the most common

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form of thyroid cancer that originates mainly from follicular epithelial cells, and boasts a high 10-year survival rate[1-3]. Surgery is the primary treatment for DTC, and postoperative iodine-131 therapy is a common adjuvant treatment that can effectively eliminate residual thyroid tissue[4]. The treatment process for differentiated thyroid carcinoma (DTC) involves not only physiological challenges but also imposes psychological burdens on patients. Psychological issues such as anxiety and depression often accompany the progression of the disease and the treatment process. Due to the lack of understanding regarding the iodine-131 treatment among the majority of patients, negative emotions such as anxiety and depression frequently arise during the isolation period, adversely affecting patient prognosis. Psychological care aims to better understand patients' psychological issues through interventions such as psychological counseling and to provide targeted solutions to alleviate negative emotions, including tension, worry, anxiety, and depression. For patients with differentiated thyroid cancer (DTC), the treatment process encompasses not only postoperative recovery and physical rehabilitation but also necessitates attention to the patients' mental health. Through a comprehensive treatment regimen that includes surgery, postoperative iodine-131 therapy, levothyroxine therapy, isolation treatment, bedside care, and psychological intervention, patients can be better supported in coping with the progression of their illness, thereby enhancing their prognosis and quality of life. Psychological intervention is a crucial aspect of DTC treatment; through psychological support and care, it can assist patients in managing the psychological distress associated with the treatment process, ultimately improving their quality of life. Previous studies have extensively explored the impact of psychological care on preoperative or postoperative anxiety and depression in patients with differentiated thyroid cancer. However, there is a relative scarcity of evidence-based research regarding the effects of psychological care on anxiety and depression in DTC patients undergoing postoperative iodine-131 isolation treatment [5-7].

Meta-analysis is a crucial method in evidence-based medicine that involves the systematic integration and quantitative analysis of multiple independent studies with similar objectives, utilizing the best available research evidence judiciously, accurately, and wisely. This approach combines the clinical expertise and extensive experience of healthcare professionals with considerations of patients' rights, values, and expectations, thereby achieving a harmonious synthesis of these elements to formulate appropriate treatment strategies for patients. The outcomes of this process are both objective and reliable. This study employs an evidence-based medicine approach to conduct a meta-analysis on the effects of psychological nursing in alleviating anxiety and depression among patients undergoing iodine-131 isolation therapy following thyroid cancer surgery, with the aim of providing additional psychological care information for clinical practice.

## THE REVIEW

### Objective

This paper aims to explore the effectiveness of psychological nursing on alleviating anxiety and depression among differentiated thyroid cancer (DTC) patients undergoing postoperative iodine-131 isolation therapy through a systematic review and meta-analysis. The goal is to provide a comprehensive overview of psychological nursing practices, thereby enriching clinical knowledge and improving patient management strategies. By integrating these findings, the study seeks to enhance the quality of life and treatment outcomes for DTC patients. The review was guided by the directed by the subsequent research questions: How does psychological nursing affect the psychological well-being of DTC patients during isolation therapy? What are the implications of these effects for clinical practice in managing DTC?

### Design

We carried out a systematic review to aggregate and assess the results from prior peer-reviewed studies. This review adhered to the guidelines laid out in the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) framework (Page et al.2021). Additionally, we followed methodologies for umbrella reviews (Aromataris et al.2015) and the processes for reviewing systematic reviews (Smith et al., 2011). The registration number for this review protocol is #CRD42024531631.

### Search methods

Databases in English (PubMed, Embase, Web of Science, Cochrane Library) and Chinese (CNKI, CBM, Wanfang, VIP) were searched electronically. The Chinese key words included psychological care, thyroid cancer, 131I treatment, etc., and the English key words were "Psychosocial Interventions, Thyroid Neoplasm,131 iodine therapy". Searches combined controlled vocabulary terms with free-text terms; the search period spanned from January 1, 2010, to December 31, 2023. The search strategy for Chinese papers was similar to that for English papers, with the publication language limited to English or Chinese, and the search strategy was as follows, Step 1: Neoplasm, Thyroid subject terms + free words are concatenated with OR, search formula I (Neoplasm, Thyroid OR Thyroid Neoplasm OR Neoplasms, Thyroid OR Thyroid Carcinoma OR Carcinoma, Thyroid).Step 2: Psychological Care subject words + free words are joined by OR, search formula II (Psychological Care OR Psychological nursing OR Intervention, Psychosocial OR Psychosocial Interventions OR

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Psychological Intervention).Step 3: 131 iodine therapy subject words + free words are joined by OR, search formula III (131 iodine therapy OR 131 therapy OR Iodine therapy OR Iodine isolation therapy OR Iodine nuclide therapy).Step 4: The above three search formulas were searched by connecting them with AND, search formula one AND search formula two AND search formula three. A comprehensive search was conducted for grey literature, and no documents meeting the inclusion/exclusion criteria were found.

This study adheres to the PICOS principles: P(Population): Patients with thyroid cancer undergoing postoperative iodine-131 isolation therapy. I(Intervention): Psychological Care. C(Comparison): No psychological care was provided. O(Outcome): Research Utilizing Anxiety Scores (SAS) and Depression Scores (SDS) as Outcome Indicators. S(Study design): Randomized Controlled Trial (RCT).

### Eligibility criteria

Literature management and screening were conducted using EndNote software. Inclusion criteria are as follows: (1) Research type: Randomized controlled trial (RCT); (2) Study subjects: Patients with thyroid cancer undergoing postoperative iodine-131 isolation therapy. The experimental group comprises patients undergoing psychological care during iodine-131 isolation therapy following thyroid cancer surgery, while the control group consists of patients receiving iodine-131 isolation therapy post-thyroid cancer surgery without any psychological care. (3) The study aims to investigate the effects of psychological care on anxiety and depression in patients undergoing iodine-131 isolation therapy after thyroid cancer surgery; (4) The study uses anxiety scores (SAS) and depression scores (SDS) as outcome measures; (5) Provided the mean difference (MD) and standard deviation (SD) for the SAS and SDS, along with the 95% confidence intervals (CIs) for both the experimental and control groups; (6) The anxiety and depression scales used in the experimental group and control group are the Zung Self-Rating Anxiety Scale (SAS) and Zung Self-Rating Depression Scale (SDS) developed by W.K. Zung in 1971.

Exclusion criteria are as follows::(1) Non-randomized controlled trials (non-RCT experiments); (2) Reviews, animal experiments, systematic reviews, and duplicate literature; (3) The language of the literature is non-Chinese or English; (4) Studies that did not provide the mean difference (MD) and standard deviation (SD) of the experimental and control groups, as well as the 95% confidence interval (95% CI); (5) Studies where the outcome measures are not anxiety scores (SAS) or depression scores (SDS); (6) Other scales for assessing anxiety and depression.

### Study selection

Two researchers independently assessed the compliance of studies with inclusion and exclusion criteria using EndNote software. Extracted information includes: first author's name, year of publication, time frame of study inclusion, age range of experimental and control groups, psychological nursing intervention measures, number of male/female patients, and the number of participants in the experimental and control groups. Extracted research data include mean differences (MD) of anxiety scores (SAS), depression scores (SDS), standard deviation (SD), and 95% confidence intervals (CI).

### Quality appraisal

Two researchers independently evaluated the quality of the studies using the Cochrane Risk of Bias tool in RevMan 5.4 software. In cases of disagreement, a third researcher was consulted. The evaluation of six major principles includes: (1) randomization principle; (2) allocation concealment principle; (3) adherence to blinding principle; (4) completeness of outcome data; (5) selective reporting of results; (6) presence of other biases. For each study result, the above 6 criteria were evaluated as "high risk," "unclear," or "low risk."

### Statistical analysis

A comprehensive meta-analysis of the 12 included studies was performed using RevMan5.4 software. Continuous variable analysis was used to combine data including mean difference (MD), standard deviation (SD), and 95% confidence interval (CI) for anxiety score (SAS) and depression score (SDS). Heterogeneity test was performed using RevMan5.4 software. If the result of heterogeneity test was $I2<50\%$ or $P>0.1$, fixed-effect model was used for analysis. If $I2>50\%$ or $P<0.1$, a random effects model is used. The sensitivity analysis was performed using STATA14.0 software. If no individual study significantly affected the results of the meta-analysis, it indicated that the results of the study had good stability. If any one original study has a significant effect on the results, it indicates that the results are unstable. The Begg test and Egger test were carried out by STATA14.0 software. A $P>0.05$ indicates no publication bias in the study. If $P<0.05$, there is publication bias.

## RESULTS

### Literature search results

The literature search strictly adhered to the PICOS search principles and retrieved 12 randomized controlled trials (RCTs) that satisfied the inclusion and exclusion criteria. These trials comprised a total of 1,004 patients, with 502 patients in the experimental group and 502 in the control group. **Table 1** displays the basic characteristics and main outcome measures of the included studies, while **Figure 1** illustrates the study selection process.

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**Table 1.** Characteristics of the studies included in this meta-analysis.

| Author | Year of publication | Investigation of patient time | Male/ Female | Experimental group age | Control group age | Experimental group/ Control group(n) | Psychological Intervention Approaches | Evaluation indicators |
|---|---|---|---|---|---|---|---|---|
| Fuhong Zhao8 | 2015 | 2012-10 to 2014-10 | 28/112 | unclear | unclear | 70/70 | Emotional support, preoperative education, relaxation, sleep assurance, family support. | SAS SDS |
| Xun Zheng9 | 2017 | 2015-07 to 2016-10 | 37/33 | 56.2±6.4 | 56,2±5.4 | 35/35 | Preoperative education, patient communication, emotional support, family assistance, interest guidance. | SAS SDS |
| Tingting Xu10 | 2018 | 2016-08 to 2018-03 | 15/25 | 48.58±4.87 | 47.93±5.09 | 20/20 | Health education, building confidence, psychological counseling, family support, and boosting self-confidence. | SAS SDS |
| Jing Li11 | 2019 | 2016-01 to 2018-10 | unclear | unclear | unclear | 40/40 | Psychological counseling, pre-treatment education, and timely communication. | SAS SDS |
| Fengfen Jing12 | 2019 | 2018-01 to 2018-12 | 15/65 | unclear | unclear | 40/40 | Hierarchical care, emotional management, knowledge dissemination, emotional counseling. | SAS SDS |
| Peifen Zhao13 | 2020 | 2019-01 to 2019-12 | 25/59 | 47.11±2.58 | 47.94±2.67 | 42/42 | Pre-treatment education, encouragement, and support. | SAS SDS |
| Qiu Wang14 | 2021 | 2016-02 to 2017-02 | 47/39 | 49.6±3.3 | 43.8±4.9 | 46/46 | Health education, safety protection,psychological counseling. | SAS SDS |
| Lei Long15 | 2021 | 2018-06 to 2020-12 | 15/53 | 42.41±8.77 | 42.37±8.58 | 43/43 | Psychological communication, psychological counseling, emotional support, and a supportive environment. | SAS SDS |
| Zhihai Li16 | 2021 | 2020-03 to 2021-03 | 35/25 | 40.28±2.15 | 40.15±2.14 | 34/34 | Promote cognitive, health education, psychological counseling, and provide support and encouragement. | SAS SDS |
| Xiaojuan Li17 | 2021 | 2020-08 to 2021-08 | 68/38 | 43.59±2.67 | 43.58±2.48 | 30/30 | Preoperative education, catharsis guidance, supportive encouragement, confidence building, and relaxation of body and mind. | SAS SDS |
| Wei Sun18 | 2022 | 2019-12 to 2021-02 | 23/57 | 41.31±3.61 | 41.24±3.58 | 53/53 | Pre-treatment education, psychological counseling, guided emotional release, supportive encouragement, family care. | SAS SDS |
| Yuru Ma19 | 2022 | 2018-06 to 2020-09 | 41/69 | 43.31±8.26 | 43.85±6.07 | 40/40 | Pre-therapy psychoeducation, personalized music to soothe emotions. | SAS SDS |

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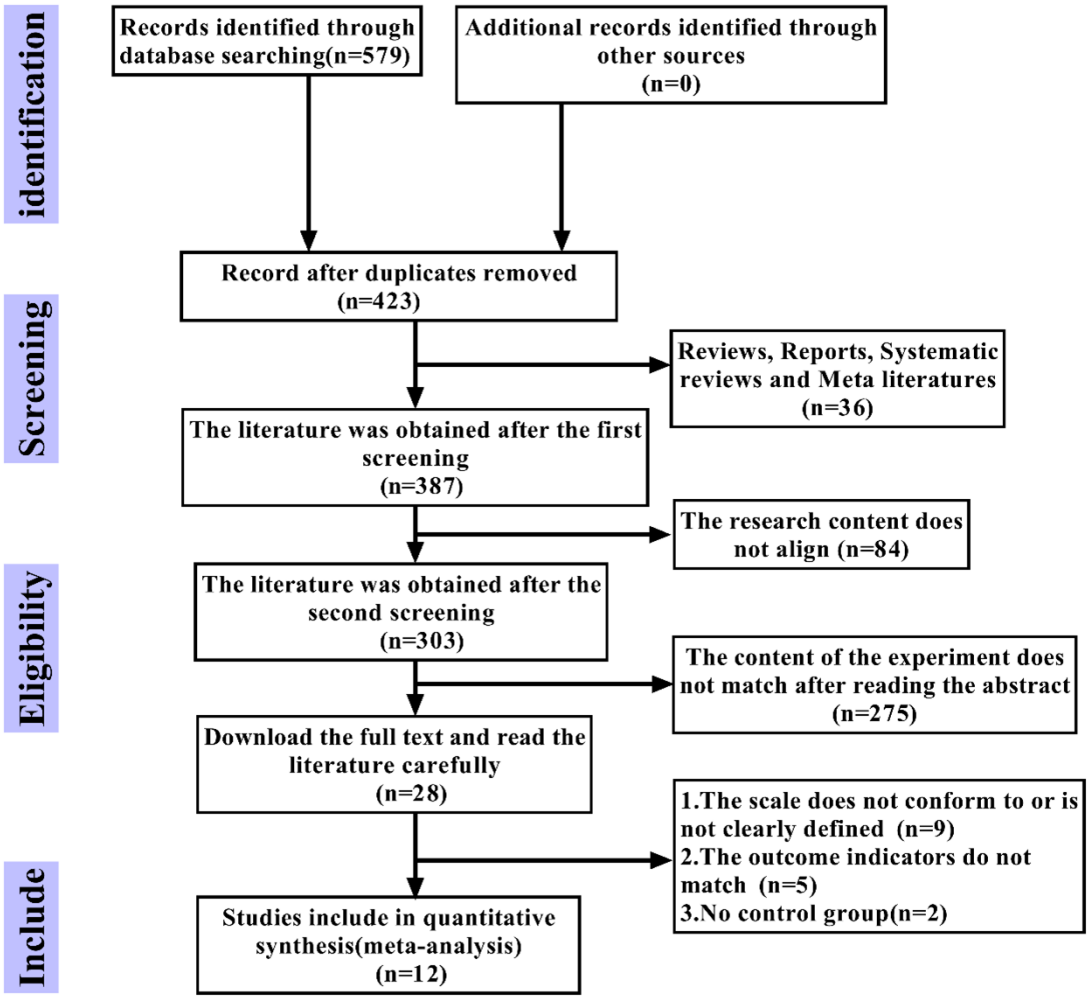
**Figure1.** Presents a four-phase PRISMA flow diagram that illustrates the number of studies identified, screened, determined eligible, and ultimately included in the meta-analysis.




**Risk of bias assessment**

In this study, the Cochrane Risk of Bias tool in RevMan 5.4 software was employed to assess the quality of the 12 included randomized controlled trials (RCTs). The findings, depicted in **Figure 2A and 2B**, The study by Yuru Ma[19] revealed ambiguities regarding the principle of random allocation. It was found that among the 12 selected studies, the risk of bias was low in terms of data completeness, selective reporting, and the presence of other biases. However, uncertainties were noted concerning the principles of allocation concealment, the blinding methods applied to participants and personnel, and the assessment of outcomes under blinding, as these aspects were not addressed in the original studies. Consequently, only one of the included studies was classified as low quality, while the remaining eleven were deemed high quality, indicating an overall good quality of the literature.

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**Figure 2A.** Methodological quality summary.

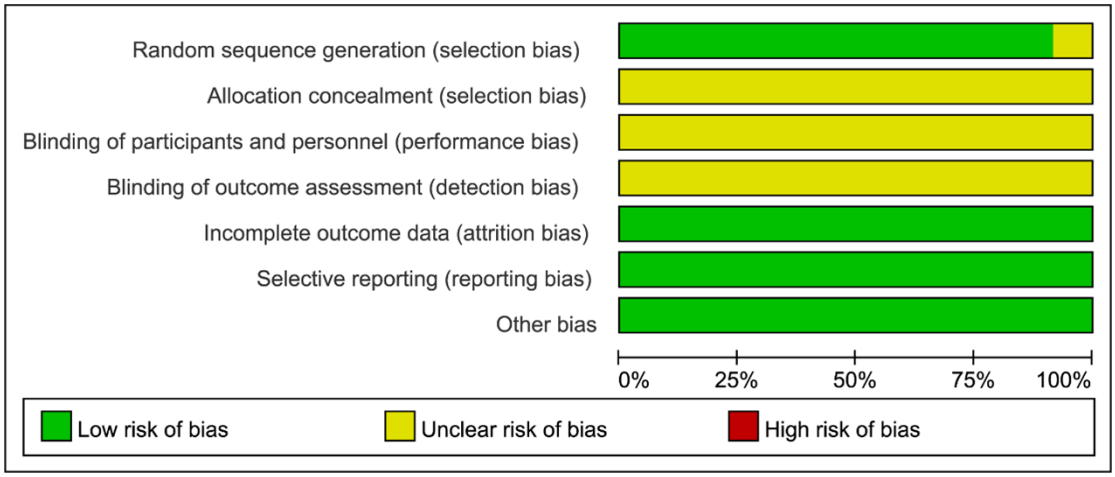
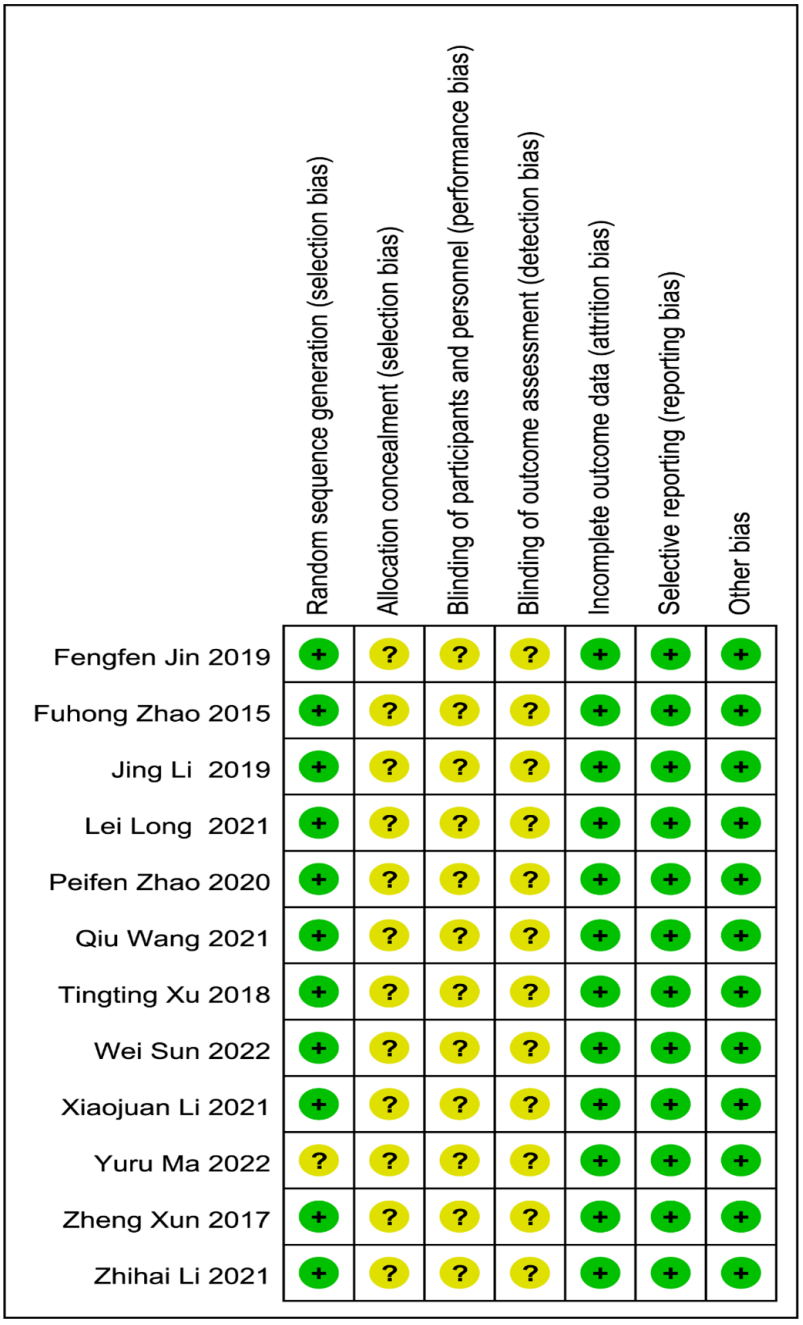



**Figure 2B.** Methodological quality graph.



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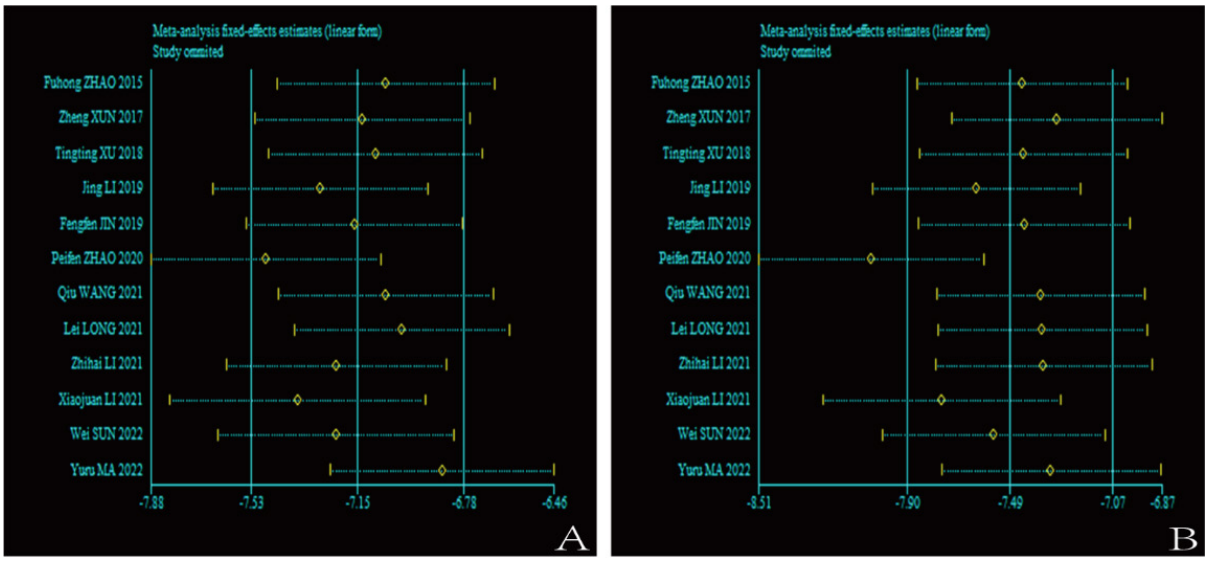
### Heterogeneity Test

The 12 studies included in this research, in terms of anxiety scores (SAS): after heterogeneity testing, $I^2$=91%>50%, and the P value of Q test<0.1; in terms of depression scores (SDS): after heterogeneity testing, $I^2$=90%>50%, and the P value of Q test<0.1, indicating strong heterogeneity among the selected literature in this study, so a random effects model was chosen for the Meta-analysis.

### Sensitivity Analysis

To ensure the accuracy and stability of the findings, a sensitivity analysis was performed using STATA 14.0 software. The analysis of SAS and SDS scores from the 12 studies indicated no significant outliers, all points are concentrated around the 95% confidence interval-confirming the robustness of the meta-analysis. The results are illustrated in **Figure 3A and 3B**.

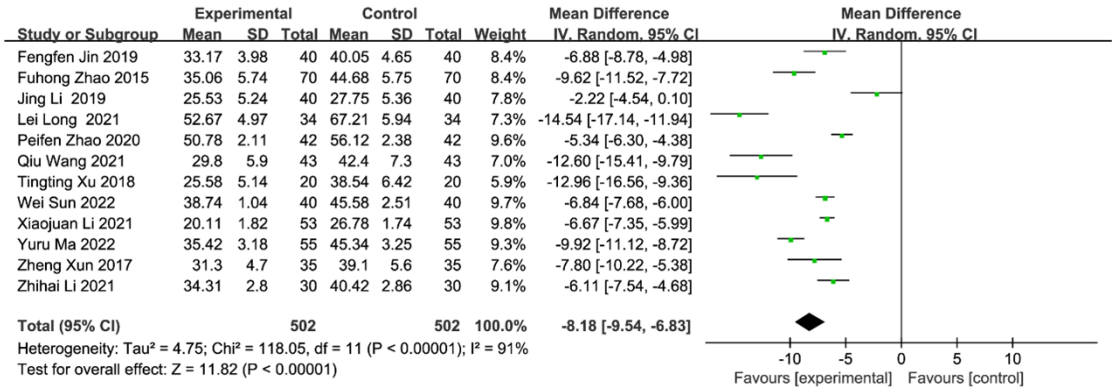
**Figure 3.** SAS sensitivity analysis diagram(A) ; SDS sensitivity analysis diagram(B).




### SAS-Meta analysis results

The meta-analysis of anxiety scores (SAS) across 12 studies demonstrated a significant mean difference (MD) of -8.18 (95% CI: -9.54 to -6.83). The random effects model showed that the experimental group exhibited a reduction in anxiety scores by 8.18 points compared to the control group, with a statistically significant difference ($p < 0.05$). This finding supports the effectiveness of psychological care in reducing anxiety among these patients. For further details, see the forest plot in **Figure 4**.

**Figure 4.** Forest plot showing the MD of SAS for the 12 studies included in the meta-analysis.



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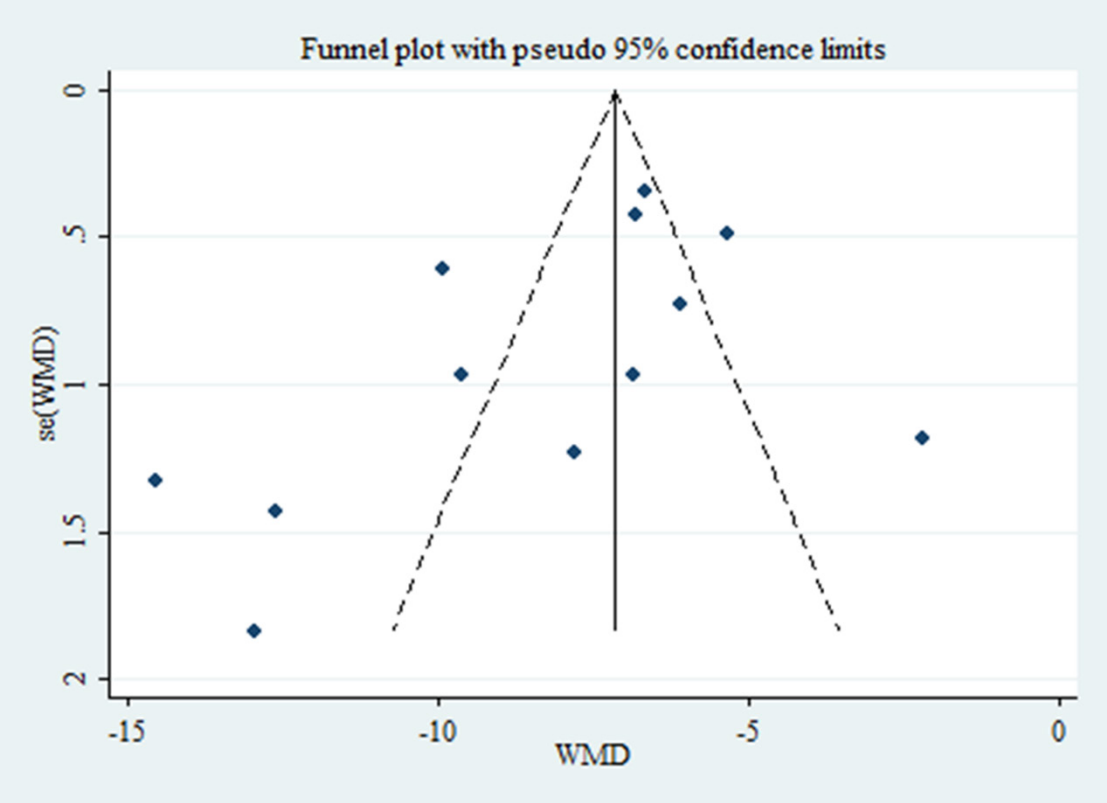
Regarding publication bias, analysis using the funnel plot in RevMan 5.4 indicated symmetry, suggesting no publication bias in the studies analyzed. This was further supported by non-significant results from Begg's test (p = 0.086) and Egger's test (p = 0.118) conducted in STATA 14, indicating an absence of publication bias. See **Figure 5** for the funnel plot.

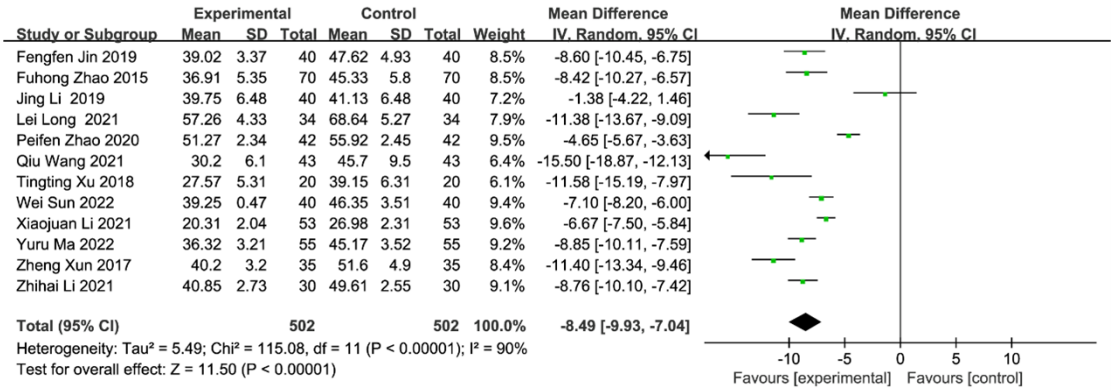
**Figure 5.** Funnel plot to detect publication bias-based anxiety.




**SDS--Meta analysis results**

Comparison of depression scores (SDS): A meta-analysis of 12 studies revealed a mean difference (MD) of -8.49 in SDS, with a 95% confidence interval (CI) ranging from -9.93 to -7.04. Using a random effects model, it was found that the experimental group exhibited significantly lower depression scores than the control group, by an average of 8.49 points ($P < 0.05$). This significant reduction suggests that psychological interventions are more effective in the experimental group compared to the control group. For additional details, please see the forest plot in **Figure 6**.

**Figure 6.** Forest plot showing the MD of SDS for the 12 studies included in the meta-analysis.




Publication bias test of depression score (SDS): To assess potential publication bias, a funnel chart was generated using RevMan 5.4 software. The chart's symmetry suggests an absence of publication bias in the included studies, as illustrated in

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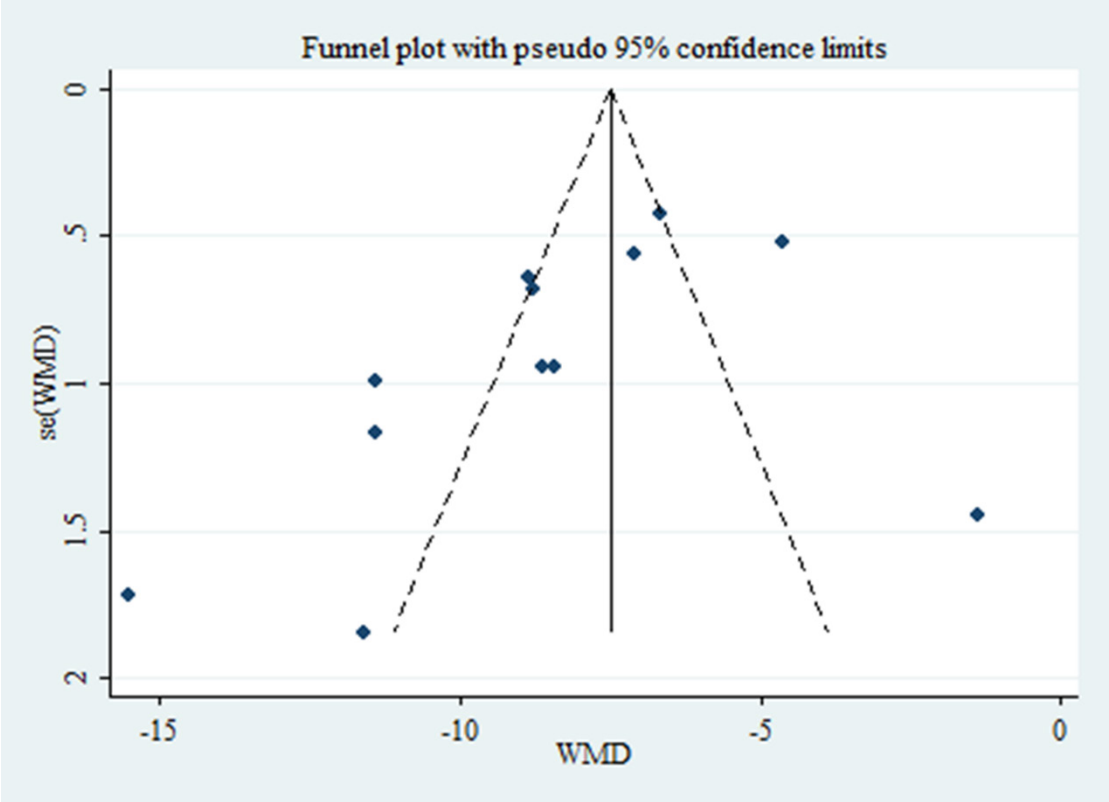
**Figure 7**. Furthermore, Begg's and Egger's tests were conducted using STATA 14 software, yielding P-values of 0.064 and 0.074, respectively, both above the threshold of 0.05, thus indicating no significant publication bias.

**Figure 7.** Funnel plot to detect publication bias-based depression.




**Meta-analysis Summary Data Results**

**Table 2** presents the summary data results for the SAS and SDS outcome measures.

**Table 2.** Meta-analysis results of two outcome measures

| Outcome indicators | Inclusion of research variables | Experimental group/Control group(n) | Effect size of merger | | | | Heterogeneity test | | | Publication bias(Begger's test) | Publication bias(Eegger's test) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mean Difference | 95% CI | Z | P value | Chi2 | P value | I2(%) | P value | P value |
| SAS | 12 | 502/502 | -8.18 | -9.54 to -6.83 | 11.82 | <0.05 | 118.05 | <0.05 | 91 | 0.086 | 0.118 |
| SDS | 12 | 502/502 | -8.49 | -9.93 to -7.06 | 11.50 | <0.05 | 115.08 | <0.05 | 90 | 0.064 | 0.074 |

## DISCUSSION

Clinical thyroid cancer predominantly affects females, with incidence rates approximately 2-4 times higher than in males, it is more common in young adults, and early symptoms are often subtle and typically detected during routine physical examinations [20]. The typical clinical manifestation involves a hard mass in the thyroid gland, that exhibits minimal vertical movement during swallowing. This mass may grow rapidly or be associated with invasive growth into surrounding tissues, dysphagia, dyspnea, hoarseness and other symptoms may occur in the late stage [21-23].

The disease is mainly treated by surgery and other comprehensive treatments. Patients with distant metastasis or multiple cancers should be treated with iodine-131 after operation, and the treatment safety is high. Most patients can be cured in a single treatment, and the recurrence rate is low, so it is widely used in the clinic. However, if radiation protection is not implemented properly during the treatment process, it will affect the surrounding environment and others [24, 25]. Isolation during

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iodine-131 treatment often leads to negative emotional states in patients; thus, psychological and supportive nursing care is critical components of treatment.

This study included the results of 12 clinical trials, which demonstrated that the mean difference (MD) in anxiety scores, as measured by the Self-Rating Anxiety Scale (SAS), was -8.18, with a 95% confidence interval of (-9.54, -6.83), and a p-value of <0.05, indicating that the differences were statistically significant. The experimental group exhibited a reduction of 8.18 points in anxiety scores compared to the control group. Similarly, the MD for the Self-Rating Depression Scale (SDS) was -8.49, with a 95% confidence interval of (-9.93, -7.04), and a p-value of <0.05, reflecting statistically significant differences. These findings indicate that the experimental group experienced alleviation of anxiety and depression symptoms following psychological nursing interventions, with notable efficacy compared to the control group. By strengthening psychological nursing, patients can have a correct understanding of their condition, eliminate bad emotions, encourage patients to actively cooperate with treatment, and significantly improve their prognosis and quality of life[26]. Strengthening health education can also make patients fully understand and master disease-related knowledge, clearly recognize the sense of self-responsibility, and gradually enhance the ability of self-care [27-28].

Cancer patients are prone to negative emotions such as anxiety and depression, which have a negative impact on follow-up treatment and rehabilitation, resulting in deterioration or recurrence of the disease [29-31]. Prior to initiating iodine-131 treatment, nurses should educate patients about the therapy to alleviate anxiety and depression. In the process of treatment, nurses should center on patients, timely understand patients' negative emotions, communicate more with patients, guide patients to correctly express negative emotions, calm their state of mind, and alleviate psychological pressure [32,33] Nurses can also use some successful cases to increase patients' confidence, urge family members to cooperate, make patients feel respect and support all the time, improve patients' compliance with treatment and promote their recovery[34] .

In the holistic nursing model based on psychological care, radiation protection prevention measures are also very important and cannot be ignored, Protective measures include wearing radiation shielding apparel and installing lead barriers to minimize exposure to others. It is safe for healthcare personnel to maintain a distance of one meter or more from patients with differentiated thyroid cancer on the third day following their administration of iodine-131 treatment[35-36]. Typically, the residual radioactivity in the body at the time of discharge is low; however, due to the substantial total dosage administered, it is advisable to minimize close contact with family members post-discharge. Special precautions should be taken if there are pregnant women or infants in the household. In addition, the patient's excreta, such as urine, feces, sweat and so on, may have radiation, so there should be a toilet with a special discharge system in the ward and a decay tank should be set up to deal with the patient's excreta. Postoperative patients with thyroid cancer should pay attention to eating high nutritional value, light and easy to absorb food, supplement a variety of vitamins, high-quality protein, trace elements, avoid greasy and spicy food, avoid strong tea tobacco and alcohol[37-38]. Enhanced psychological nursing has been shown to help patients understand their conditions better, mitigate adverse emotions, foster active treatment participation, and significantly improve prognoses and quality.

The strength of this study lies in its focus on the anxiety and depression experienced by patients undergoing iodine-131 isolation therapy following thyroid cancer surgery, a topic previously overlooked in favor of examining psychological states before or after surgery. This research fills a significant gap in evidence-based psychological care by evaluating the reduction of anxiety and depression during iodine-131 treatment, highlighting diverse and controversial psychological care approaches. It provides reference information and an evidence-based foundation for standardizing future psychological care methods.

This study has limitations, including its reliance on a meta-analysis of 12 studies without direct experimental research on psychological nursing interventions for postoperative anxiety and depression in thyroid cancer patients undergoing iodine-131 isolation treatment. The sample size was relatively small, potentially influenced by regional differences in patients' lifestyles and dietary habits, which may introduce bias in sample selection. In the heterogeneity examination, the anxiety and depression score results exhibited significant heterogeneity, which may be attributed to the diverse approaches to psychological care, with no standardized psychological intervention methods or international standards in place. Additionally, the limited information provided by the original studies hindered this research's ability to conduct subgroup analyses based on factors such as patient gender, disease stage, surgical methods, geographic location, and dietary habits, thereby preventing the derivation of more detailed results. Future studies could benefit from subgrouping based on these factors to gain insights into specific psychological care measures and plans, and to observe whether there are differences in the effects of psychological care. Extending follow-up times and conducting multidimensional grouped research in future studies could more effectively evaluate the impacts of various psychological nursing interventions.

In recent years, with the continuous evolution of social, cultural, and political environments, issues related to human mental

health have become increasingly prominent. The impact of various diseases on psychological well-being has garnered significant attention[39-41]. Looking ahead, personalized psychological care may represent a further development and refinement of conventional diagnostic and therapeutic models. This approach primarily embodies humanistic concern, fully utilizing the "person-centered" philosophy to formulate targeted psychological interventions based on the individual circumstances of patients. By acknowledging the differences among various populations, it aims to establish individualized and personalized diagnostic, treatment, and psychological care plans, thereby enhancing the therapeutic outcomes for patients.

## CONCLUSION

Psychological care significantly enhances the management of anxiety and depression in patients isolated during postoperative 131 iodine therapy for thyroid cancer. This care not only ensures sustained positive treatment outcomes but also expedites recovery, thereby establishing a virtuous cycle that improves the disease prognosis. Consequently, its broad implementation in clinical settings is highly recommended.

**Conflicts of interest**

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

**Author Contributions**

All the authors conceived the study, participated in the study selection process and quality appraisal and critically reviewed the manuscript. Z.Z. and F.B. extracted and analysed the data. Z.Z. and L.X. drafted the manuscript, F.B. and Z.L.made critical revisions of the final manuscript. R.C. and S.Z. took the lead in the study design and helped in the writing of the final draft of the manuscript.

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