

Article

# The improvement of cognitive function, activities of daily living, and pain management in Alzheimer's patients with concurrent malignant tumors through psychological nursing intervention: The role of cognitive training and rehabilitation

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**Abstract: Objective:** This study aims to explore the improvement of cognitive function, activities of daily living (ADLs), and pain management in Alzheimer's patients with concurrent malignant tumors through psychological nursing intervention, including an in-depth investigation into the role of cognitive training and rehabilitation. **Method:** In this study, 60 patients diagnosed with Alzheimer's disease (AD) and concurrent malignant tumors who were admitted to our hospital for treatment from April 2024 to October 2024. The participants were randomly divided into an intervention group and a control group, 30 in each group. The control group received standard medical care and routine nursing interventions. On the basis of the control group, the intervention group received a 4-week psychological nursing intervention, with a follow-up period of 4 weeks. Various indicators were assessed at baseline (week 0), at the end of the intervention (week 4) and during the follow-up periods at week 4 after the intervention. These indicators included psychological measures [Hamilton Anxiety Scale (HAMA), Hamilton Depression Scale (HAMD)], cognitive status measures [Mini-Mental State Examination (MMSE)], quality of life and self-care ability measures [Alzheimer's Disease Cooperative Study-Activities of Daily Living Scale (ADCS-ADL), Self-Care Ability Assessment Scale (ESCA)] and pain measures [Pain Self-Efficacy Questionnaire (PSEQ), Short-Form McGill Pain Questionnaire (SF-MPQ)]. **Results:** At 4 weeks after the intervention and 4 weeks after follow-up, compared with the control group, the intervention group showed lower scores in HAMA, HAMD and SF-MPQ ( $P < 0.05$ ), and higher scores in MMSE, ADCS-ADL, ESCA and PSEQ ( $P < 0.05$ ). **Conclusion:** Psychological nursing intervention can alleviate anxiety and depression in patients with AD and concurrent malignant tumors, improve their cognitive function, ADLs and pain management, and promote patient rehabilitation, demonstrating significant clinical application value.

**Keywords:** Alzheimer's disease; malignant tumor; psychological nursing; cognition; rehabilitation

## 1. Introduction

Alzheimer's disease (AD) is a common neurodegenerative disease that primarily affects the elderly. Its main pathological features include the activation of inflammatory cells such as macrophages and fibroblasts, as well as an increase in inflammatory factors, which initiate cell apoptosis and fibrosis, ultimately leading to neuronal loss, extracellular senile plaques, and the formation of neurofibrillary tangles [1]. It is generally believed that with increasing age, neuronal metabolic disorders, mental stress, and sleep disturbances are the main causes of AD. At the same time, AD can exacerbate behavioral and cognitive impairments as well as sleep disturbances in

patients, creating a vicious cycle [2]. AD patients usually show cognitive impairment, irreversible and progressive loss of memory, impaired activities of daily living (ADLs) and abnormal behavioral and psychological symptoms, severely affecting their quality of life [3]. AD is often treated with medication, primarily including cholinesterase inhibitors, glutamate receptor antagonists and other cognitive-enhancing drugs. Although these can alleviate the clinical symptoms of patients, the clinical efficacy is not satisfactory, and additional methods are still needed to improve patients' quality of life and cognitive abilities [4]. Clinically, there is no targeted treatment for AD, and nursing care is currently the only method to prolong the life of patients and delay the progress of the disease [5]. In terms of nursing, psychological nursing can play the most significant role. Psychological nursing intervention refers to the combination of actual or potential physical dysfunction with nursing knowledge or psychological nursing intervention, with the aim of improving patients' cognitive function [6]. Providing effective psychological nursing interventions, including cognitive training and rehabilitation exercises, for AD patients is an important therapeutic approach to improving AD symptoms [7]. Some researchers have pointed out that the effective application of kinship nursing in the care of AD patients can significantly improve their cognitive level and protect their memory abilities [8].

Malignant tumors are a type of disease with a high degree of complexity and diversity, not only exhibiting varied clinical manifestations but also being extremely complex to treat, posing a serious threat to people's lives and health [9]. With the extension of the average human lifespan, increased environmental pollution, and changes in lifestyle, the incidence of malignant tumors is also on the rise [10]. The World Health Organization has classified malignant tumors as chronic diseases, and their treatment is not a quick fix. The struggle between the patient's body and tumor cells is a lengthy process. Currently, the treatment methods of malignant tumors include surgery, radiotherapy, chemotherapy, targeted therapy, and interventional therapy, with the primary goal of eliminating cancer cells. However, in actual treatment, there is no single method that can completely eliminate cancer cells, and it may even increase the patient's suffering [11]. Due to the high mortality rate of malignant tumors, most patients experience negative emotions such as anxiety and fear after diagnosis, which may also adversely affect their treatment adherence and motivation [12]. Currently, radiotherapy and chemotherapy are the main treatment options for malignant tumors. However, since the treatment cycle for this regimen is relatively long, patients not only have to endure symptoms such as pain but also face a heavy financial burden, leading to further increases in their psychological stress [13]. In this situation, it is particularly important to supplement patients with nursing intervention measures. In past diagnoses, treatment, and nursing processes, healthcare providers have focused more on how to extend patients' life expectancy, somewhat neglecting psychological nursing intervention for patients [14]. However, relevant studies have confirmed that maintaining a positive psychological state is beneficial for the progression and effectiveness of treatment in patients with malignant tumors [15]. Therefore, during the treatment process, effective and scientific nursing plans should be actively adopted to better assist the treatment.

Malignant tumors, as another major disease that seriously threatens human health, are also increasingly common comorbid with AD. When AD and malignant tumors coexist, not only do patients have to suffer from physical pain caused by the tumor itself, the side effects of treatment, and the fear of death, but also face a series of problems caused by the cognitive decline associated with AD, such as difficulties

in understanding the disease and non-compliance with treatment, greatly reducing the patients' quality of life [16]. Therefore, exploring effective nursing intervention measures to improve cognitive function, ADLs, and pain management of these complex patients holds significant clinical and social value. Psychological nursing is particularly important in the intervention measures for AD patients, as this disease is closely related to psychological and psychiatric factors [17]. By closely monitoring the patient's mental state and promptly providing psychological counseling and adjustment, it is possible to help patients overcome negative emotions and maintain a cheerful mood [18]. Cognitive training and rehabilitation, as important components of psychological nursing interventions, have been proven to have a positive influence on improving the cognitive function of AD patients [19]. Through targeted cognitive stimulation, memory training, and thinking ability exercises, the relevant functional areas of the brain can be activated, promoting neural plasticity and thereby delaying further deterioration of cognitive function [20]. However, for patients with concurrent AD and malignant tumors, there is a scarcity of systematic research and validation on whether existing nursing intervention measures and cognitive training methods are equally effective, and their specific mechanisms of action and intervention effects still need to be further explored. Therefore, this study selected 60 patients diagnosed with concurrent AD and malignant tumors who were admitted to our hospital from April 2024 to October 2024 to conduct research. The aim is to design a psychological nursing intervention experiment to deeply investigate the improving effects of psychological nursing intervention, cognitive training, and rehabilitation on the cognitive function, ADLs, and pain of patients with concurrent AD and malignant tumors, providing a scientific basis for clinical nursing practice. The goal is to develop more effective nursing strategies for these patients and improve overall health.

## **2. Materials and methods**

### **2.1. Study subjects and inclusion/exclusion criteria**

The study was conducted at a single center from April 2024 to October 2024, involving 60 hospitalized patients diagnosed with concurrent AD and malignant tumors. After a multidisciplinary consultation involving experts from oncology, surgical oncology, radiation oncology, radiology and pathology, the diagnosis of malignant tumors was comprehensively evaluated and confirmed through PET-CT, ultrasonography, and necessary tissue or cytological examination techniques, such as sputum cytology, thoracentesis and biopsy. This study has been approved by The Affiliated Hospital of Shao Xing University Ethics Committee. Batch number: 2024-019-01.

Inclusion criteria: (1) Meeting the diagnostic criteria for AD [21]; (2) clinically, pathologically and radiologically confirmed malignant tumor patients who are at a treatment stage suitable for surgical, chemotherapeutic, or other interventional measures; (3) stable condition after routine inpatient treatment; (4) able to communicate fluently in Mandarin Chinese, understand the questionnaire content and complete various survey assessments; (5) patients voluntarily participating in this study and agreeing to sign the informed consent form.

Exclusion criteria: (1) Presence of congenital central and peripheral nervous system diseases; (2) anticipated lifespan is under 3 months; (3) currently receiving other psychological interventions that cannot be discontinued; (4) unwilling to comply with the follow-up and evaluation plan of this study.

## **2.2. Study design and grouping methods**

This clinical study is a randomized controlled trial involving 60 participants, allocated at random to either an intervention or control group. Each group consists of 30 subjects. The research utilized independent samples *t*-tests for data analysis and G-power software for sample size calculation. An effect size of 0.8 was chosen, with a significance level ( $\alpha$ ) of 0.05 (two-tailed) and a statistical power ( $1-\beta$ ) of 0.8. These parameters yielded a sample size of 26 participants per group ( $N_1 = N_2 = 26$ ), totaling 52. Ultimately, 60 participants were recruited, surpassing the target and meeting the study's statistical criteria.

**Randomization Method:** This study employed a computer-generated random number sequence for random assignment of participants into intervention and control groups, ensuring balanced baseline characteristics between the two groups. The randomization process was carried out by an independent statistician, with no involvement from the research team in the grouping process.

**Blinding Implementation:** This study adopted a single-blind design, where participants were unaware of their group assignment (intervention or control), to minimize subjective bias. Due to the nature of the intervention, a double-blind design was not feasible for the researchers. However, data analysis was conducted by researchers who did not participate in the experiment implementation to ensure the objectivity of the results analysis.

The control group received standard medical care and routine nursing interventions, including surgical or chemotherapeutic treatments for malignant tumor patients following clinical guidelines, comprehensive management for AD patients (including pharmacological treatment, nutritional intervention, etc.), as well as standard medical education services and basic psychological support.

In contrast, the intervention group, in addition to receiving the same standard medical care and routine nursing as the control group, also received a 4-week psychological nursing intervention. The observation periods of this study included the baseline period (week 0), the end of the intervention (week 4), and follow-up assessment periods at week 4 after the intervention ended.

## **2.3. Interventions**

### **2.3.1. Intervention measures of the control group**

Control group patients underwent standard clinical treatment and nursing. Clinical treatment included pharmacological therapy for AD (such as cholinesterase inhibitors, NMDA receptor antagonists, etc.) and individualized treatment plans for malignant tumors (such as surgical resection, radiotherapy, chemotherapy, or targeted therapy, etc.). Nursing staff provided regular health education, which covered daily care skills for AD, basic procedures and precautions for malignant tumor treatment, as well as medication management knowledge (such as medication timing, dosage, side effect monitoring, etc.). During routine ward rounds, nursing staff offered basic psychological nursing intervention to patients, including emotional comfort, listening to their concerns and needs, and providing encouragement and support as appropriate to alleviate their psychological burden.

### **2.3.2. Interventions in the intervention group**

In addition to the usual treatment and nursing, the intervention group was given a 4-week multidisciplinary collaborative nursing intervention implemented by a professional team comprising neurologists, oncologists, geriatricians, nurses, rehabilitation therapists, dietitians and other specialists. The intervention sessions

were conducted in a quiet hospital ward environment. The intervention steps are as follows:

(1) Trust building and preliminary evaluation

The initial meeting lasted about 40 min. The nursing staff engaged in a thorough conversation with the patient and their family to understand the patient's daily habits, hobbies, and cognitive changes after being diagnosed with AD, as well as their awareness and emotional response to the malignant tumor diagnosis. Simultaneously, an initial assessment of patients' cognitive function and emotional state was conducted using a cognitive assessment scale. The nursing staff provided detailed information to the patient and their family about the content, schedule, and expected goals of the entire intervention plan in order to obtain the patient's trust and active cooperation.

(2) Cognitive stimulation and emotional reassurance

During this phase, intervention activities were conducted 2–3 times a week, each lasting 30–40 min. Based on the patient's interests and cognitive level, the nursing staff designed personalized cognitive stimulation programs, such as showing old photos familiar to the patient, playing their favorite old songs, and guiding them to recall related people, events, and emotional experiences to stimulate memory function. Simple puzzles, block-building games, and other activities were used to exercise the patient's attention and thinking abilities. Meanwhile, during the activities, the nursing staff closely monitored the patient's emotional changes and provided comfort and encouragement promptly. For the psychological pressure brought by the two diseases, such as fear of death and anxiety about decreased ability to live independently, psychological counseling techniques were employed to guide the patient to view their illnesses correctly, encourage them to express their inner emotions and confusion, and provide positive responses and guidance to help them build confidence in overcoming their diseases. This helped the patients feel understood and supported, enhancing their sense of security and comfort. Additionally, specialized training and guidance were provided to the patient's family members, including understanding the patient's psychological needs, mastering basic psychological support skills, and learning how to collaborate with medical staff to ensure they could effectively participate in the psychological intervention.

(3) Activities of daily living and behavior, pain management

Three individual training sessions were scheduled each week, each lasting 40–50 min. The team members and the patient jointly set achievable daily goals, such as engaging in mild activities within the ward or having meaningful interactions with family members or nurses. Collaborating with the patient's family, a daily routine schedule was established, including regular times for waking up, meals, rest and activities, to help the patient develop a good life order. Behavioral management techniques were utilized to encourage the patient to participate in feasible and positive activities, enhancing their sense of self-efficacy and social support. For daily activities such as washing, dressing and eating, a step-by-step guidance and demonstration approach was used for training, with appropriate assistance or encouragement provided based on the patient's progress to complete tasks independently. When the patient exhibited abnormal behaviors, such as agitation or wandering tendencies, the underlying causes were analyzed, including physical discomfort, environmental changes, or unmet psychological needs, and targeted measures were taken to correct or soothe the patient. Group exchange activities were organized for the patient to interact with other patients or volunteers, such as sharing their illness experiences

and discussing methods for coping with their diseases, to enhance their social interaction skills and social support network. Meanwhile, the nursing staff closely observed the patient's pain expressions and used pain assessment scales to regularly evaluate the patient's pain level, nature and location. Based on the pain assessment results, following the three-step analgesic principle recommended by the WHO, an individualized pain management plan was developed for the patient. For patients with mild pain, non-pharmacological interventions were used, such as relaxation training (deep breathing, progressive muscle relaxation) and distraction techniques (listening to music, watching videos). For patients suffering from moderate to severe pain, timely communication with doctors was established to ensure the rational use of analgesics, and the efficacy and adverse reactions of the medications were closely monitored, with adjustments made to the dosage and types of medications as needed to ensure effective pain relief for the patient.

#### (4) Intervention consolidation and summary

One summary meeting was held weekly, each lasting 30–40 min. The nursing staff and the patient reviewed the progress and achievements made throughout the intervention process, summarized effective cognitive training methods and psychological adjustment strategies, and formulated a self-care and rehabilitation plan for after discharge. Detailed follow-up information was provided to the patient and their family, including the timing and manner of follow-up, as well as available professional support resources, to ensure that the patient could continue to receive ongoing care and guidance after discharge, maintain the intervention effects, and promote the patient's long-term recovery.

## **2.4. Observation indicators and assessment tools**

### **2.4.1. Time point of assessment**

Each index was evaluated before the intervention (week 0), at the end of the intervention (week 4), and at week 4 after the intervention.

### **2.4.2. Psychological indicators**

Hamilton Anxiety Scale (HAMA) [22]: It consists of 14 items. 0–7 indicates no anxiety, 8–14 indicates possible anxiety, 15–21 indicates anxiety, 22–29 indicates moderate anxiety, and more than 30 indicates severe anxiety.

Hamilton Depression Scale (HAMD) [23]: It comprises 24 items. 0–8 is no depression, 9–20 is mild depression, 21–35 is moderate depression, and more than 36 is severe depression.

### **2.4.3. Cognitive status indicators**

Mini-Mental State Examination (MMSE) [24]: The MMSE, as one of the most extensively utilized cognitive screening tools in clinical practice, offers significant advantages. Its assessment encompasses multiple core cognitive domains, including orientation, memory, attention, language abilities and visuospatial skills, thereby providing a comprehensive reflection of the subject's cognitive functional status. Furthermore, the MMSE is characterized by its user-friendly administration, short administration time and ease of dissemination, making it highly suitable for rapid screening and large-scale evaluation in both clinical and research settings. These features establish it as one of the preferred tools for assessing cognitive impairment. The total score of the MMSE is 30, and the higher the score, the better the cognitive function. Generally speaking, the score of normal elderly people should be between 27 and 30; 21–26 indicates that there may be mild cognitive impairment; 10–20 is divided into moderate cognitive impairment; a score below 9 may mean a risk of

severe cognitive impairment or dementia.

#### **2.4.4. Quality of life and self-care ability indicators**

Alzheimer's Disease Cooperative Study-Activities of Daily Living Scale (ADCS-ADL) [25]: This scale includes Basic Activities of Daily Living (BADL) and Instrumental Activities of Daily Living (IADL). The BADL section assesses more fundamental activities such as dressing, eating, and toileting, with a maximum score of 22 points. The IADL section covers complex daily or social activities such as visiting, working, and household tasks, which require more cognitive function, with a total score range of 0 to 56 points. Lower scores indicate more severe functional impairment.

Self-Care Ability Assessment Scale (ESCA) [26]: This scale consists of 43 items. Each item is scored from 0 to 4, with 32 items scored positively and 11 items scored negatively, for a total score of 172 points. The higher the score, the stronger the self-care ability.

#### **2.4.5. Pain indicators**

Pain Self-Efficacy Questionnaire (PSEQ) [27]: A tool used to assess the confidence and ability of patients with chronic pain in managing their pain. The PSEQ consists of 10 items, each rated on a scale from 0 to 6, where 0 represents "completely not confident" and 6 represents "completely confident". The total score ranges from 0 to 60. The higher the score, the stronger the pain self-efficacy.

Short-Form McGill Pain Questionnaire (SF-MPQ) [28]: A multidimensional tool used to assess pain, including three main components: Pain Rating Index (PRI), Visual Analog Scale (VAS) and Present Pain Intensity (PPI), for a comprehensive evaluation of the nature, intensity and impact of pain, particularly suitable for cancer pain patients. PRI: The sensory dimension is scored from 0 to 33, and the affective dimension from 0 to 12, with higher scores indicating greater pain severity. VAS: The score ranges from 0 to 10, with the ends labeled as "no pain" and "worst possible pain", allowing participants to select a corresponding line length based on their pain level. PPI: It is divided into six levels from "no pain" to "unbearable pain", represented by scores from 0 to 5.

### **2.5. Statistical analysis methods**

Data analysis was conducted using SPSS statistical software. Continuous variables that followed a normal distribution were expressed as mean  $\pm$  standard deviation (SD), and baseline comparisons between two groups were performed using independent sample *t*-tests. Categorical variables were assessed for between-group differences using the chi-square test. For continuous variables that did not follow a normal distribution, appropriate non-parametric tests were used. Comparisons of data collected at multiple time points were conducted using repeated measures analysis of variance (ANOVA), with Bonferroni correction for multiple comparisons. All statistical tests were two-tailed, and  $P < 0.05$  was considered statistically significant.

## **3. Results**

### **3.1. Comparison of baseline characteristics baseline characteristics comparison**

No statistically significant disparities were observed in the baseline demographic and clinical characteristics of the two groups ( $P > 0.05$ ), ensuring the comparability of subsequent intervention effects. Detailed data and statistical results are presented in Table 1.

**Table 1.** Comparison of baseline demographic and clinical characteristics between the two groups.

| Characteristic                                    | Control group ( <i>n</i> = 30) | Intervention group ( <i>n</i> = 30) | Statistic        | <i>P</i> -value |
|---------------------------------------------------|--------------------------------|-------------------------------------|------------------|-----------------|
| Gender                                            |                                |                                     | $\chi^2 = 0.318$ | 0.573           |
| male                                              | 22(73.33%)                     | 20(66.67%)                          |                  |                 |
| female                                            | 8(26.67%)                      | 10(33.33%)                          |                  |                 |
| Age (years)                                       | 83.47 ± 2.54                   | 83.70 ± 2.49                        | <i>t</i> = 0.359 | 0.721           |
| Marital status                                    |                                |                                     | $\chi^2 = 0.218$ | 0.640           |
| Married                                           | 28(93.33%)                     | 27(90.00%)                          |                  |                 |
| unmarried                                         | 2(6.67%)                       | 3(10.00%)                           |                  |                 |
| Educational level                                 |                                |                                     | $\chi^2 = 0.287$ | 0.592           |
| Junior high school and below                      | 18(60.00%)                     | 20(66.67%)                          |                  |                 |
| High school and above                             | 12(40.00%)                     | 10(33.33%)                          |                  |                 |
| AD duration (years)                               | 8.63 ± 1.99                    | 8.43 ± 1.87                         | <i>t</i> = 0.401 | 0.690           |
| Duration since malignant tumor diagnosis (months) | 5.13 ± 2.32                    | 5.27 ± 2.18                         | <i>t</i> = 0.230 | 0.819           |
| Malignant tumor type                              |                                |                                     | $\chi^2 = 0.673$ | 0.955           |
| Lung cancer                                       | 8(26.67%)                      | 7(23.33%)                           |                  |                 |
| Gastric cancer                                    | 6(20%)                         | 8(26.67%)                           |                  |                 |
| Colorectal cancer                                 | 7(23.33%)                      | 8(26.67%)                           |                  |                 |
| Liver cancer                                      | 5(16.67%)                      | 4(13.33%)                           |                  |                 |
| Other tumors                                      | 4(13.33%)                      | 3(10.00%)                           |                  |                 |

### 3.2. Changes in anxiety and depressive symptoms over time

At 4 weeks after the intervention and 4 weeks after follow-up, the HAMA and HAMD scores of the intervention group were lower than those of the control group (*P* < 0.05). See **Tables 2** and **3**.

**Table 2.** Changes in HAMA scores over time between the two groups.

| Time Point                    | Control Group ( <i>n</i> = 30) | Intervention Group ( <i>n</i> = 30) | <i>t</i> -value | <i>P</i> -value |
|-------------------------------|--------------------------------|-------------------------------------|-----------------|-----------------|
| Week 0                        | 26.80 ± 3.69                   | 26.10 ± 3.10                        | 0.796           | 0.430           |
| End of Intervention (4 Weeks) | 22.37 ± 2.80                   | 19.50 ± 2.52                        | 4.173           | < 0.001         |
| End of Follow-up (4 Weeks)    | 17.90 ± 2.14                   | 15.10 ± 2.27                        | 4.906           | < 0.001         |

**Table 3.** Changes in HAMD scores over time between the two groups.

| Time Point                    | Control Group ( <i>n</i> = 30) | Intervention Group ( <i>n</i> = 30) | <i>t</i> -value | <i>P</i> -value |
|-------------------------------|--------------------------------|-------------------------------------|-----------------|-----------------|
| Week 0                        | 30.67 ± 2.77                   | 30.43 ± 3.43                        | 0.290           | 0.773           |
| End of Intervention (4 Weeks) | 25.90 ± 4.40                   | 19.93 ± 3.33                        | 5.917           | < 0.001         |
| End of Follow-up (4 Weeks)    | 20.63 ± 2.19                   | 14.67 ± 2.54                        | 9.753           | < 0.001         |

### 3.3. Changes in cognitive status over time

At 4 weeks after the intervention and 4 weeks after follow-up, the MMSE scores of the intervention group were higher than those of the control group ( $P < 0.05$ ). See Table 4.

**Table 4.** Changes in MMSE scores over time between the two groups.

| Time Point                    | Control Group ( $n = 30$ ) | Intervention Group ( $n = 30$ ) | <i>t</i> -value | <i>P</i> -value |
|-------------------------------|----------------------------|---------------------------------|-----------------|-----------------|
| Week 0                        | 12.30 ± 2.15               | 11.97 ± 2.39                    | 0.568           | 0.572           |
| End of Intervention (4 Weeks) | 15.03 ± 2.13               | 19.20 ± 1.83                    | −8.143          | < 0.001         |
| End of Follow-up (4 Weeks)    | 16.20 ± 1.35               | 20.97 ± 2.55                    | −9.042          | < 0.001         |

### 3.4. Changes in quality of life over time

At 4 weeks after the intervention and 4 weeks after follow-up, the ADCS-ADL scores of the intervention group were higher than those of the control group ( $P < 0.05$ ). See Tables 5 and 6.

**Table 5.** Changes in BADL scores over time between the two groups.

| Time Point                    | Control Group ( $n = 30$ ) | Intervention Group ( $n = 30$ ) | <i>t</i> -value | <i>P</i> -value |
|-------------------------------|----------------------------|---------------------------------|-----------------|-----------------|
| Week 0                        | 8.30 ± 1.53                | 8.27 ± 1.70                     | 0.080           | 0.937           |
| End of Intervention (4 Weeks) | 10.10 ± 1.40               | 14.60 ± 1.35                    | −12.661         | < 0.001         |
| End of Follow-up (4 Weeks)    | 11.97 ± 1.22               | 16.60 ± 1.98                    | −10.936         | < 0.001         |

**Table 6.** Changes in IADL scores over time between the two groups.

| Time Point                    | Control Group ( $n = 30$ ) | Intervention Group ( $n = 30$ ) | <i>t</i> -value | <i>P</i> -value |
|-------------------------------|----------------------------|---------------------------------|-----------------|-----------------|
| Week 0                        | 18.60 ± 1.57               | 18.83 ± 1.80                    | −0.535          | 0.595           |
| End of Intervention (4 Weeks) | 20.37 ± 1.47               | 25.67 ± 1.27                    | −14.930         | < 0.001         |
| End of Follow-up (4 Weeks)    | 23.33 ± 1.63               | 26.77 ± 1.61                    | −8.213          | < 0.001         |

### 3.5. Changes in self-care ability over time

At 4 weeks after the intervention and 4 weeks after follow-up, the ESCA scores of the intervention group were higher than those of the control group ( $P < 0.05$ ). See Table 7.

**Table 7.** Changes in ESCA scores over time between the two groups.

| Time Point                    | Control Group ( $n = 30$ ) | Intervention Group ( $n = 30$ ) | <i>t</i> -value | <i>P</i> -value |
|-------------------------------|----------------------------|---------------------------------|-----------------|-----------------|
| Week 0                        | 52.63 ± 4.99               | 52.87 ± 4.13                    | −0.197          | 0.884           |
| End of Intervention (4 Weeks) | 65.53 ± 4.67               | 74.67 ± 4.60                    | −7.638          | < 0.001         |
| End of Follow-up (4 Weeks)    | 70.10 ± 4.91               | 84.83 ± 3.49                    | −13.363         | < 0.001         |

### 3.6. Pain changes over time

At 4 weeks after the intervention and 4 weeks after follow-up, the PSEQ scores of the intervention group were higher than those of the control group; all SF-MPQ

scores, including PRI, VAS and PPI scores, were lower in the intervention group compared to the control group ( $P < 0.05$ ). See **Tables 8–11**.

**Table 8.** Changes in PSEQ scores over time between the two groups.

| Time Point                    | Control Group ( $n = 30$ ) | Intervention Group ( $n = 30$ ) | <i>t</i> -value | <i>P</i> -value |
|-------------------------------|----------------------------|---------------------------------|-----------------|-----------------|
| Week 0                        | 22.20 ± 2.46               | 21.63 ± 2.48                    | 0.889           | 0.378           |
| End of Intervention (4 Weeks) | 27.33 ± 2.28               | 32.63 ± 3.26                    | −7.292          | < 0.001         |
| End of Follow-up (4 Weeks)    | 29.97 ± 3.29               | 38.00 ± 4.01                    | −8.490          | < 0.001         |

**Table 9.** Changes in PRI scores over time between the two groups.

| Time Point                    | Control Group ( $n = 30$ ) | Intervention Group ( $n = 30$ ) | <i>t</i> -value | <i>P</i> -value |
|-------------------------------|----------------------------|---------------------------------|-----------------|-----------------|
| Week 0                        | 26.67 ± 2.23               | 25.97 ± 2.36                    | 1.181           | 0.242           |
| End of Intervention (4 Weeks) | 22.07 ± 2.07               | 18.93 ± 2.30                    | 5.546           | < 0.001         |
| End of Follow-up (4 Weeks)    | 18.47 ± 2.70               | 15.30 ± 2.61                    | 4.614           | < 0.001         |

**Table 10.** Changes in VAS scores over time between the two groups.

| Time Point                    | Control Group ( $n = 30$ ) | Intervention Group ( $n = 30$ ) | <i>t</i> -value | <i>P</i> -value |
|-------------------------------|----------------------------|---------------------------------|-----------------|-----------------|
| Week 0                        | 7.00 ± 0.98                | 7.10 ± 0.92                     | −0.406          | 0.686           |
| End of Intervention (4 Weeks) | 6.03 ± 1.00                | 5.37 ± 0.76                     | 2.901           | 0.005           |
| End of Follow-up (4 Weeks)    | 5.20 ± 1.10                | 4.17 ± 1.05                     | 3.725           | < 0.001         |

**Table 11.** Changes in PPI scores over time between the two groups.

| Time Point                    | Control Group ( $n = 30$ ) | Intervention Group ( $n = 30$ ) | <i>t</i> -value | <i>P</i> -value |
|-------------------------------|----------------------------|---------------------------------|-----------------|-----------------|
| Week 0                        | 4.03 ± 0.61                | 4.10 ± 0.48                     | −0.468          | 0.642           |
| End of Intervention (4 Weeks) | 3.23 ± 0.68                | 2.80 ± 0.55                     | 2.715           | 0.009           |
| End of Follow-up (4 Weeks)    | 2.80 ± 0.66                | 2.10 ± 0.31                     | 5.244           | < 0.001         |

## 4. Discussion

At 4 weeks after the intervention and 4 weeks after follow-up, the intervention group exhibited lower HAMA and HAMD scores compared to the control group, indicating the effectiveness of psychological nursing intervention in alleviating patients' negative emotions. From a psychological nursing perspective, for AD patients, anxiety and depression not only affect their daily quality of life but may also lead to abnormal behaviors such as wandering and aggressive behavior. The emergence of these symptoms increases the difficulty of care and imposes a heavy psychological burden on patients' families [29]. Furthermore, anxiety and depressive symptoms in patients with malignant tumors may interact with bodily manifestations such as pain, nausea, and insomnia, further deteriorating the patients' quality of life, leading to suicidal tendencies, and increasing the difficulty of treatment [30]. Additionally, these emotional disorders may affect the patients' immune system function, thereby influencing the outcome of the disease [31]. Psychological

nursing intervention, by providing emotional support, cognitive restructuring, and coping strategy training, helps patients better understand and accept their condition, contributing to a reduction in anxiety and depressive emotions resulting from the unpredictability of the illness and the pain experienced during treatment [32]. Moreover, during the intervention process, patients are encouraged to establish closer communication with family members, friends, and healthcare providers, creating a supportive social environment that not only provides emotional comfort but also offers practical assistance and information resources, alleviating their feelings of loneliness and helplessness [33]. Following a 4-week systematic psychological intervention and a subsequent 4-week follow-up evaluation, this study further confirms the enduring and consistent beneficial effects of psychological intervention on reducing anxiety and depressive symptoms. These findings not only complement existing evidence of the short-term effectiveness of psychological intervention but also provide stronger support for its widespread application in clinical practice, highlighting the necessity and effectiveness of incorporating psychological intervention into management strategies for complex diseases.

As the disease progresses, AD patients experience a gradual decline in cognitive abilities, manifested as memory loss, language impairments, decreased judgment, executive dysfunction, and other symptoms [34]. Furthermore, AD may lead to a loss of self-care abilities, requiring round-the-clock care from others [35]. As the disease progresses, patients may also develop physical impairments, such as difficulty walking, swallowing problems, and other functional limitations, which further exacerbate the decline in their quality of life and increase the burden on caregivers [36]. Therefore, this study focused on intervening in cognitive function in patients with AD complicated by malignant tumors. The results showed that at 4 weeks after the intervention and 4 weeks after follow-up, the MMSE, ADCS-ADL, and ESCA scores of the intervention group surpassed those of the control group. The improvement in cognitive function observed in this study may be attributed to the principles of neuroplasticity, which refer to the brain's ability to reorganize and form new neural connections in response to environmental stimuli and learning experiences [37,38]. Cognitive stimulation activities, such as showing old photos and playing familiar songs, likely activated neural pathways associated with memory retrieval and consolidation, thereby enhancing cognitive reserve. Additionally, attention and thinking training games may have promoted synaptic plasticity in the prefrontal cortex, a region critical for executive functions and working memory [39]. These findings align with previous studies demonstrating that targeted cognitive interventions can induce structural and functional changes in the brain, leading to measurable improvements in cognitive performance [40]. Meanwhile, family members, after receiving specialized training, were better able to understand patients' psychological needs, master supportive techniques, and collaborate with healthcare providers to create a favorable family support environment and ensure a regular daily routine, which was of great significance for the overall recovery of patients. Jointly setting daily goals and conducting behavioral training enhanced patients' sense of self-efficacy, enabling them to gradually master self-care skills and improve their self-care abilities. The application of behavioral management techniques and step-by-step guided training methods corrected abnormal behaviors, stabilized patients' psychological states, and comprehensively promoted improvements in patients' cognitive function, quality of life, and self-care abilities. Furthermore, enhanced social interactions provided patients with the necessary social support network. These

results demonstrate that psychological nursing intervention has significant clinical value, offering effective support and improvements for patients with AD complicated by malignant tumors, while also having a positive impact on their families and society.

The causes of pain in patients with malignant tumors are primarily related to the growth and spread of the tumor. The rapid proliferation of tumor cells and their infiltration into surrounding tissues and nerves often lead to the onset of pain, which can be acute or chronic. Acute pain typically lasts for 4 weeks, while chronic pain persists for more than 4 weeks [41]. Additionally, treatments such as chemotherapy and radiotherapy may also cause neuropathy, further exacerbating the pain [42]. Pain in patients with malignant tumors not only negatively affects their self-efficacy but also leads to functional impairments such as decreased appetite, sleep disturbances, and reduced work capacity [43,44]. From a pain psychology perspective, pain is not merely a sensory experience but also a complex interplay of emotional, cognitive, and behavioral factors. The gate control theory of pain posits that psychological factors can modulate pain perception by influencing neural gating mechanisms in the spinal cord [45]. Furthermore, the biopsychosocial model emphasizes the importance of addressing psychological and social dimensions in pain management, as these factors significantly influence pain perception and coping strategies [46].

The findings of this study indicated that, in comparison to the control group, the intervention group exhibited higher PSEQ scores and lower SF-MPQ scores, highlighting the significance of psychological interventions in the management of pain. Cognitive-behavioral therapy, a cornerstone of pain psychology interventions, was employed to help patients reframe maladaptive thoughts about pain, thereby reducing catastrophizing and enhancing pain coping strategies [47]. Relaxation training, grounded in the principles of psychophysiological regulation, was utilized to reduce muscle tension and autonomic arousal, which are known to exacerbate pain perception [48]. These methods collectively helped patients change their attitudes and perceptions towards pain, reduce anxiety and fear, enhance self-efficacy, and strengthen their ability to control pain.

Furthermore, nursing staff closely observed patients' pain manifestations and utilized pain assessment scales to accurately assess patients' pain intensity, nature, and location at regular intervals, which aided in the development of personalized pain management plans to ensure patients received the most appropriate treatment. Based on the pain assessment results, nursing staff could communicate promptly with doctors, administer analgesics rationally, and closely monitor drug efficacy and adverse reactions, adjusting dosage and types of medication in a timely manner to ensure effective pain relief for patients. Non-pharmacological interventions, such as deep breathing, muscle relaxation, and distraction techniques, were implemented based on the principles of attentional modulation and stress reduction. These methods alleviated pain by diverting patients' attention and reducing their focus on the pain, consistent with the neuromatrix theory of pain, which highlights the role of cognitive and emotional processes in shaping pain experiences [49,50]. For patients with moderate to severe pain, nursing staff provided enhanced emotional support and medication guidance, redirecting their attention away from the pain and administering appropriate analgesic drugs. At the same time, they closely monitored drug efficacy and adverse reactions, adjusting dosage and types of medication as needed to ensure the effectiveness and safety of drug therapy, avoiding additional suffering, stabilizing patients' physical and mental states, and promoting continuous improvement of pain

symptoms and steady enhancement of self-efficacy. Overall, through scientific pain assessment, personalized pain management plans, and other measures that jointly targeted patients' psychological and physiological aspects, patients' coping abilities and control over pain were enhanced, thereby improving their overall quality of life. Future research should further explore the underlying mechanisms of psychological interventions in pain management, particularly the neurobiological pathways through which psychological strategies modulate pain perception, to optimize therapeutic outcomes for patients with malignant tumors.

## 5. Conclusions

Psychological nursing intervention has proven to be of considerable clinical importance in the holistic treatment of patients with AD complicated by malignant tumors. By implementing targeted psychological interventions, not only can patients' anxiety and depression be significantly reduced, but their cognitive function can also be effectively improved, enhancing their ability to perform daily living activities independently and alleviating, to a certain extent, the physical pain and discomfort caused by malignant tumors. These positive intervention effects jointly promote the overall recovery process of patients and improve their quality of life, providing new ideas and methods for the therapy of patients with AD complicated by malignant tumors. This study has certain limitations. Firstly, the sample size is relatively small ( $n = 60$ ), which may affect the representativeness and generalizability of the results. Secondly, both the intervention period and the follow-up period are set at 4 weeks, and this short time span limits the assessment of the long-term effects of the intervention measures. Future research should further expand the sample size, extend the intervention period and follow-up time, and adopt a multicenter design to improve the generalizability of the study. At the same time, it is recommended to strengthen multidisciplinary collaboration, exploring the mechanisms of psychological nursing interventions from multiple dimensions such as psychology, neuroscience and clinical medicine, to optimize intervention programs, enhance their clinical application value in the target patient population, and ultimately promote the comprehensive rehabilitation and improvement of patients' quality of life.

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