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**Abstract.** Art therapy (AT) has been adopted in recent years as a possible non-pharmacological approach in older persons living with Alzheimer's disease (AD) to improve both cognitive and behavioral and psychological symptoms that accompany the disease. Our main aim was to conduct a systematic review of the methodological and practical effectiveness of different approaches using AT in older people living with AD. The systematic analysis of the studies finally selected (n = 12) suggests that the measures applied to evaluate the effectiveness of AT may not always be the most appropriate to assess the impact of this approach in this type of population, in many cases not being sufficiently sensitive to adequately capture all the significant changes produced by the intervention. Neurologically informed AT, as well as the use of biomarkers, could better identify and capture intervention-induced changes, being a step toward evidence-based practice in the application of this type of approach.

**Keywords:** Art Therapy; Alzheimer's disease; non-pharmacological interventions; multimodal approaches; systematic review

## 1. Introduction

Alzheimer's disease (AD) is characterized by a progressive deterioration of cognitive and behavioral functions and leads to a gradual loss of quality of life and autonomy (Knopman et al., 2021; Popa et al., 2021). The limited effectiveness of available pharmacological treatments has led to a growing interest in evaluating the effectiveness of non-pharmacological treatments for this neurodegenerative disease (Chalfont, Milligan, & Simpson, 2020; Savazzi et al., 2020). Recent studies have used different approaches to provide supportive opportunities for older people experiencing cognitive changes or living with Alzheimer's, such as through cognitive tasks (Gonzalez-Moreno, Satorres, Soria-Urios, & Meléndez, 2022; Klaming, Robbemond, Lemmens, & Hart de Ruijter, 2022), multicomponent psychosocial approaches (Mabire et al., 2021), music-based intervention (Huber et al., 2021), choral singing (Thompson et al., 2022), or physical activity (Meng, Lin, & Tzeng, 2020) and physical activity through ballroom dancing (Chipperfield & Stephenson, 2022). In general, the aim of these approaches is to maintain or stimulate cognitive functions, favoring the management of psychological and behavioral symptoms, maintaining functional performance, providing security, and increasing personal autonomy. This can contribute to improve the quality of life of both participants and their loved ones (Popa et al., 2021; Quail et al., 2020). Art-based psychosocial approaches provide a wide range of experiences related to different arts that allows us to access a larger proportion of older people compared to more traditional approaches (such as those based on cognitive training or physical activity) (Brown et al., 2020). Furthermore, research on arts participation in this population has mostly shown improvements in quality of life, emotional well-being, and social connectedness (Brown et al., 2020; Fong et al., 2021; Shoemith, Charura, & Surr, 2022). Psychosocial approaches such as Art Therapy (AT) are currently being evaluated as preventive strategies against age-related cognitive impairment (Marco & Redolat, 2022; Masika, Yu, & Li, 2020; Savazzi et al., 2020). In these prior studies, the evaluation of the subjects through commonly used standardized methods provides data about the impact of the disease and the follow-up of its evolution (Popa et al., 2021). However, it has been

reported that these methods can cause significant pressure and stress to the client during his/her performance, making the diagnosis more difficult (Heymann et al., 2018). It has also been suggested that the use of standardized tests to assess the main effects of non-pharmacological therapies may not be the most appropriate method, given that such therapies present many challenges in their implementation (Haeyen & Noorthoorn, 2021; Popa et al., 2021).

### **1.1. An introduction to art therapy**

There is no single definition of “Art Therapy” accepted by different organizations and entities in this field. However, there are coincidences regarding what conditions are key to an experience to be qualified as AT (Domínguez-Toscano, Román-Benticuaga, & Montero-Domínguez, 2017). For example, the Spanish Association of Art Therapy defines ‘Art Therapy’ as a psychodynamic-oriented therapeutic approach that uses artistic language as a means of communication (Asociación Profesional Española de Arteterapeutas, 2014). This definition is similar to the British one, where AT is defined as “a form of psychotherapy that uses artistic media as its primary mode of expression and communication” (British Association of Art Therapists, 2015). However, in the American context, it is directly defined by means of the term “therapy” as it is considered a therapeutic form in itself (American Art Therapy Association, 2018). Furthermore, depending on the context and demands coming from clients, AT can also be approached as a therapeutic, palliative, preventive, or even health strengthening treatment (Domínguez-Toscano et al., 2017), also contributing to obtain medical and psychological information from sources other than the conventional ones (Hu et al., 2021).

Although most of the scientific associations seem to agree with the term “visual and plastic arts,” some differences can be found in the type of artistic modalities related to this process. Active participation of older people in visual arts (painting, drawing, sculpture, and other art forms) can facilitate learning of new skills, generate pleasure and enjoyment, and facilitate emotional expression (Bowman & Lim, 2022; Fong et al., 2021). It has been suggested that visual arts experiences generate positive outcomes not only in quality of life or well-being but also in communication, confidence, engagement, socialization, cognition, and self-esteem (Bazooband, Courtney-Pratt, & Doherty, 2021; Shoesmith et al., 2022).

However, in the prior systematic reviews on studies of AT in older people experiencing cognitive changes, the term “Art Therapy” is often used to integrate other types of artistic languages such as music therapy, dance, or theater (Badía, 2017; Beard, 2011; Cowl & Gaugler, 2014; Emblad & Mukaetova-Ladinska, 2021; Shoesmith et al., 2022). In contrast, a couple of recent systematic reviews have focused their search on AT as “visual and plastic arts” (Deshmukh, Holmes, & Cardno, 2018; Masika et al., 2020). In general, the diagnoses of the participants included in these prior reviews spanned all types of dementia, and it is, therefore, difficult to replicate the findings. In contrast, in the present review, we have included only participants with a diagnosis of AD to make the samples as homogeneous as possible although there is some variability between different studies regarding the stage of the disease in the participants included.

In most prior reviews, the aim was to analyze the efficacy and benefits of creative arts therapies in people with AD or other types of dementia (Badía, 2017; Beard, 2011; Cowl & Gaugler, 2014). Recently Shoemith et al. (2022) examined the components of visual arts in older people with dementia, identifying a number of common features in the studies reviewed. Deshmukh et al. (2018) reviewed the effect of AT as an adjunctive treatment in people experiencing cognitive changes in randomized controlled trials (RCTs), finding only two studies that strictly complied with selection criteria. On the other hand, Emblad and Mukaetova-Ladinska (2021) evaluated the efficacy of AT as a nonpharmacological intervention for dementia on well-being, quality of life, and behavioral and psychological symptoms of dementia. Finally, Masika et al. (2020) compared the effects of visual AT on cognitive function and psychological symptoms in older adults with and without cognitive impairment.

In these prior systematic reviews, some methodological limitations were identified, including (a) poor documentation and inaccurate data that hinder replication of the findings (Beard, 2011; Masika et al., 2020); (b) reduced and heterogeneous samples (Badía, 2017; Cowl & Gaugler, 2014; Emblad & Mukaetova-Ladinska, 2021; Shoemith et al., 2022); (c) lack of conclusive evidence on sustained effects over time (Badía, 2017; Cowl & Gaugler, 2014) and (d) need for studies with higher quality and adequate statistical power (Deshmukh et al., 2018). In addition, Beard (2011) suggests that traditional scientific research methods may not be appropriate for understanding the impact of AT the subjective level.

### ***1.3. What are the possible benefits of AT for older people living with AD?***

Several authors support the idea that artistic processes involve multiple brain regions as well as interconnections between them through cortical and subcortical pathways (Carolan & Hill, 2017; Malik, 2021; Zaidel, 2016). Furthermore, artistic creation integrates visual, emotional, and behavioral aspects (King et al., 2019; Lusebrink & Hinz, 2019), favoring the integration of emotional and cognitive elements with the aim of promoting individual changes (Heymann et al., 2018; King et al., 2019; Malik, 2021). Brain damage associated with AD does not appear to affect all brain areas uniformly (Guseva, 2018). In general, at the onset of the disease process, interpersonal behavior and emotional processing may be conserved (Cowl & Gaugler, 2014; González-Alcaide et al., 2021), while motor skills and procedural memory remain relatively intact until advanced stages (De Wit et al., 2020). Furthermore, it has been suggested that even in advanced stages, artistic ability may remain intact, whereas positive experiences of the creative process may promote a sense of accomplishment (Heymann et al., 2018).

It has been proposed that AT can help exercise well-functioning areas of the brain and increase quality of life, through the self-expression and sensory stimulation that accompany the process of creation (Lusebrink, 2014; Malik, 2021). Therefore, the continuous exposure of participants to multisensory stimulation through artistic methods and materials, such as that usually performed in AT-based approaches, could help to slow down the sensory deterioration that often accompanies this disease (Domínguez-Toscano et al., 2017; Yang et al., 2021). On this basis, it is suggested that proposals involving

creativity may help the person to remain mentally active (Domínguez-Toscano et al., 2017; Marco & Redolat, 2022) and, on the other hand, encouraging the creation of works with emotional meaning promotes the awareness of the person by favoring self-perception and psychological well-being (Bazooband et al., 2021; Guseva, 2018; Haiblum- Itskovitch, Czamanski-Cohen, & Galili, 2018). These proposals also allow us to implement a whole-person care model in older people who have dementia (Li & Yan, 2021). In addition, it has been suggested that therapeutically accompanied artistic creation can help strengthen language, memory, visuospatial skills and executive function (Brown et al., 2020; Savazzi et al., 2020), attention, decision-making and emotional processing (Brown et al., 2020; Marco & Redolat, 2022), self-concept, socialization, learning, and reward associated with the performance of new activities (Haiblum-Itskovitch et al., 2018; Marco, Redolat, & Sáez, 2021). AT has been considered as a useful way to improve brain plasticity in people experiencing cognitive changes or brain injury (Malik, 2021).

In this regard, it would be necessary to use relevant measures that can explain the physiological and psychological mechanisms related to the effects of AT in older people affected by AD or other types of dementia. Advances in neuroimaging techniques and their possible applications can help to assess cognitive functions from different perspectives, as well as to raise hypotheses about how brain structure relates to symptoms in different diseases (King et al., 2019; Malik, 2021) such as AD. In this sense, the use of a neuroscientific perspective could help art therapists to improve participants' cognitive function, allowing the identification of areas of the brain affected by the disease, through the results of AT-based approach (Guseva, 2018; Malik, 2021). In addition, the artistic productions developed by people experiencing cognitive changes could also help to identify possible neurological changes that occur during the course of the disease, as well as to plan possible therapeutic strategies (Carolan & Hill, 2017; Guseva, 2018). And from a neuropsychological perspective, a better understanding of the emotional and behavioral changes that accompany this type of approach could be attempted (King et al., 2019). Creative ability can stimulate different brain functions: cognition, emotional memory, visual perception, motor planning, eye-hand coordination, manual skills, among others (Heymann et al., 2018). On that basis, Heymann et al. (2018) have created a digital neuropsychological testing tool that, through an art-therapeutic methodology, could contribute to detect different stages of AD or impaired cognitive functioning by working with people's creative abilities.

Furthermore, there is an increasing interest in the use of biomarkers (salivary measures, immune function, electrocardiogram, neuroimaging techniques) to identify the main changes taking place during artistic creation and within a therapeutic relationship (Belkofer, Van Hecke, & Konopka, 2014; Haiblum-Itskovitch et al., 2018; Kaimal, Ray, & Muniz, 2016). For example, functional magnetic resonance imaging (fMRI) has been previously applied in order to obtain more objective measures of brain activity during art-making in patients with traumatic brain injury (Walker, Stamper, Nathan, & Riedy, 2018). This approach can also be useful to compare the effects of "making" art or "seeing" art on the function of the default mode neural network (default mode network or DMN) in older adults (Bolwerk et al., 2014). Development of new non-pharmacological

interventions for older adults experiencing Mild Cognitive Impairment, combining visual arts with storytelling, has recently been published under the Expressive Therapy Continuum theoretical framework (ETC; Lin et al., 2020). ETC, briefly, is a theoretical model for the application and evaluation of artistic media in AT intervention (Malik, 2021). This study applies neuropsychological and structural and functional magnetic resonance imaging measures to assess the effects of AT on cognitive function (Lin et al., 2020).

#### **1.4. Purpose of the study**

The studies reviewed here raise the question of the main benefits of AT approaches in people living with AD. We also want to review which are the methods usually applied for the evaluation of these interventions, and whether significant gaps still persist in terms of the outcome measures and the evaluation process. In turn, the results of the present systematic review may provide an opportunity for future research to identify main limitations of the evaluation methods that have traditionally been used to evaluate the main outcomes of AT projects in older people living with AD and consider the implications results obtained in prior studies can have for designing future projects according to the needs of these participants.

Therefore, in this review, we ask the following questions: What methods have been used to assess the effects of AT on people who have AD? Are the methods used relevant to demonstrating the effects of AT on AD?; How have the studies been designed?; What findings regarding the benefits of this approach in older people living with AD have been reported? In asking these questions, this systematic review aims to examine the existing literature on the effect of AT as a non-pharmacological treatment for older people who have AD, reviewing the methods that have been carried out to assess the impact of AT in different domains (cognition, behavior, psychological well-being, mood, and quality of life). In contrast to prior reviews conducted in this population, the present review encompasses both randomized and non-randomized studies with a multicomponent approach since therapeutic experiences tend to include several types of experiences in addition to AT. We have also tried to limit the search to one type of diagnosis (Alzheimer's disease) in older people. The review includes overall scores on study quality including selection bias, study design, confounders, blinding, data collection, and withdrawals, ranked according to the Effective Public Health Practice Project (EPHPP) Quality Assessment Tool (Armijo-Olivo, Stiles, Hagen, Biondo, & Cummings, 2012). Furthermore, a neuroscientific perspective has also been taken into consideration, incorporating some articles, which include neuroimaging techniques (Bolwerk et al., 2014; Lin et al., 2020) or other biomarkers (Kaimal et al., 2016).

## **2. Methods**

### **2.1. Search strategy**

This review uses a systematic approach set out by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (Moher, Liberati, Tetzlaff, & Altman, 2009) guidelines for reporting systematic reviews and trying to follow the recommendations

proposed for each phase of the process. A comprehensive literature search was conducted between November 2020 and February 2021 to identify relevant peer-reviewed articles in which one of the main topics was the effects of AT as a non-pharmacological treatment in older people with AD, in different domains (cognition, behavior, psychological well-being, mood, and quality of life). Subsequently, an additional search was conducted in April 2022 to update the existing literature. The following scientific databases were searched: PubMed, Scopus, and PsychINFO. These databases were selected because they comprise millions of research articles related to the fields of psychology and related disciplines, as well as to the field of arts applied to the psychological and social needs of people with a specific health condition, in our case, AD. In addition, a manual search of the gray literature was conducted to identify possible relevant articles that met the inclusion criteria, as electronic databases are not fully comprehensive. The keywords applied for the search were established on two levels: 1) referring to the type of intervention: “Art therapy” OR “painting” OR “arts intervention “, 2) referring to AD: AND “Alzheimer disease” OR “Alzheimer” OR “Alzheimer’s”). Articles published between 2011 and April 2022. We did not apply any language restrictions.

The selection of studies was performed in two phases: 1) authors reviewed the titles and abstracts, excluding studies that did not meet selection criteria; 2) authors reviewed full-text articles to confirm that they met the selected criteria. The following data were extracted from each included study: authors and date, study design, sample (diagnosis, age, and gender), instruments used (physiological, psychological), type of intervention (activity, sample, and session), results of the experimental group, and main findings.

### 2.3. Selection criteria

The following selection criteria were applied: (a) Articles published between 2011 and April 2022; (b) studies that included at least one group of participants diagnosed with AD were selected for review; (c) aged approximately 60 years or older; (d) studies collected data before and after the experience in one of the following areas: cognition, behavior, psychological well-being, mood, and quality of life; (e) the study must include an AT approach or an Art-based experience (Table 1). In addition, approaches using AT without an implementing art therapist must be validated by a professional or carried out in a controlled environment to ensure compliance with established protocol. Articles were excluded if (a) publications were based on documentary reviews, meta-analyses, or that were not peer-reviewed, (b) AT approach was defined as the clinical use of multiple art forms such as music, dance, theater among others; (c) published as a single case report; (d) did not include evaluation methods to define the outcomes of the project or study; and (e) participants of the studies had a diagnosis other than AD.

Table 1. Inclusion and exclusion criteria used in the review

Inclusion criteria	Exclusion criteria
Articles published between 2011- April 2022	Reviews articles and no peer review
Participants were diagnosed with AD	Involve nonvisual arts
People over 60 years of age Participants were diagnosed with AD	Case studies
Studies have collected data before and after the intervention and	Pre- and post-study data collection

#### **2.4. Data extraction and method quality assessment**

Methodological quality and risk of bias were evaluated independently by the two authors based on the Rated according to the Effective Public Health Practice Project (EPHPP) Quality Assessment Tool (<https://www.ephpp.ca/quality-assessment-tool-for-quantitative-studies/>). This tool is considered adequate and effective for systematic reviews as well as for assessing observational, cross-sectional, before-and-after, and RCT studies (Armijo-Olivo et al., 2012). This tool assesses six domains: (1) selection bias, (2) study design, (3) confounders, (4) blinding, (5) data collection, and (6) withdrawals/dropouts. Each domain is rated as weak (1 point), moderate (2 points), or strong (3 points), and the scores obtained in each domain are averaged (maximum value per study is 3.00) and, based on their total score, assigned a quality rating of weak (1.00 to 1.50), moderate (1.51 to 2.50), or strong (2.51 to 3.00).

### 3. Results

#### 3.1. Identification of eligible studies

Our search of the databases resulted in the collection of 224 scientific articles that met the initial criteria. After eliminating duplicate articles in the different databases, 155 articles were included in the initial selection. After reviewing the titles and abstracts of each publication to establish whether they met the above criteria, 44 articles were identified. A thorough reading of the 44 papers resulted in 12 articles that met the criteria set for this review (Table 2 and 3) Figure 1 identifies all the steps in the selection of articles up to the 12 selected articles (Figure 1 for the PRISMA flow diagram of article eligibility).

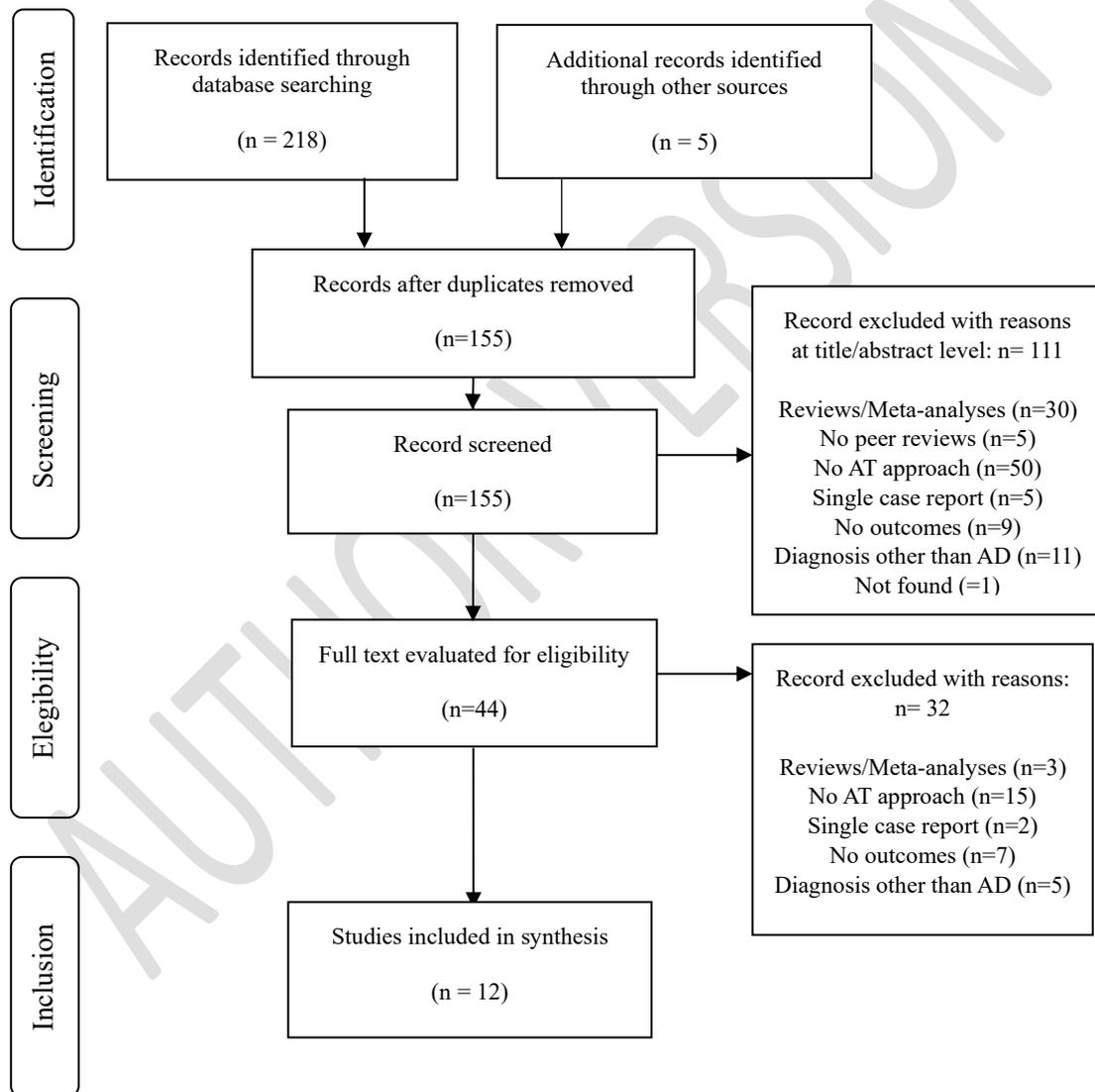


Figure 1. Flow diagram of paper selection process

Table 2. Characteristics of AT studies and art-based approaches

First author	Study design	Sample (diagnosis, age, gender)	Instruments		Type of intervention (activity, sample, session)	Results (experimental group)	Main findings
			(physiological, psychological...)	(psychological...)			
Savazzi (2020)	Quasi-experimental design	(N) 20 Mild AD  Average age:79 (n) 14 women, (n) 6 men	GCCWOT QoL-AD NPI ADAS-cog Verbal influence Token Test	ACE-t  2group ACE-t (n)10 CG (n)10  2h per week, 14 sessions	Significant increase in quality of life, and in the behavioral domain. Significant decrease in the cognitive scale. Significant improvements in phonemic and semantic fluencies.	ACE-t benefits in multiple domains of AD: quality of life, reduction of behavioral symptoms and positive effects on cognitive functions. Benefits of the intensive, long-term rehabilitation approach on cognition, socialization and maintenance of outcome gains.	
Pongan (2017)	Randomized controlled trial	(N) 59 Mild AD  Average age: 79 (n)39 women, (n) 20 men	MMSE BPI NRS STAI GDS EQ-5D *FCRT, TMT, DIGIT SPAN, STROOP, FAB	Singing group and painting group  2group SG (n)31 PG (n)28  12 sessions, 3 months	Decrease in pain-related scores. Improvement of depressive symptoms, anxiety and quality of life. Improvement in verbal memory, working memory and short-term memory.	First study to evaluate the effect of pictorial experience on pain and inhibition. Improvement of mood, self-esteem and quality of life by factors related to group membership, regularity of therapy and combination of both therapies.	
Gontard (2017)	Experimental study	(N) 4 Moderate-severe AD  Average age: 85 (n) 4 women (N) 32 Moderate & advanced AD  More than 60 years: AD.  No gender reported	MMSE Rosenberg's self-esteem scale	AT  1group  10 sessions, 2 months	Slight improvement in cognitive ability score (n)2, and stabilization (n)2. Reduction of anxiety. Reduced feeling of isolation.	The main results were obtained through the AT process: Group bonding, narrative reminiscences as socioemotional and exchange effects, gaining achievements and possibilities.	
Domínguez-Toscano (2017)	Experimental study with simple random assignment.	(N) 32 Moderate & advanced AD  More than 60 years: AD.  No gender reported	MMSE BDI-II COOP/WONCA	AT  2group 1 <sup>st</sup> phase: AT (n)16, CG(n)14 2 <sup>nd</sup> phase: AT (n)13, GC(n)12  23 months	Improvement of cognitive status. Reduction of depression. Positive reinforcement of the feeling of usefulness, security, self-esteem and social relationships.	Homogeneity in the characteristics of the sample. Use of the same evaluation methods as a previous study. Random assignment of subjects to intervention and control. Long-term follow-up and assessment of cognitive ability.	

(Continued)

Table 2. (Continued)

First author	Study design	Sample (diagnosis, age, gender)	Instruments (physiological, psychological...)	Type of intervention (activity, sample, session)	Results (experimental group)	Main findings
Gross (2015)	Experimental study	(N) 76 ADs & other dementias  Average age: 84  (n) 63 women, (n) 13 men	GCCWOT	AT  Several groups (n) 6 or (n) 8 in four centers  12 weeks	Slight improvement in the areas of well-being. Maintained attention, self-esteem, pleasure and interest	Modifications in the evaluation tool. Assessments and results possibly biased by the evaluators. Project design not appropriate for the individuals targeted. Need for data collection before and after the sessions.
Hattori (2011)	Randomized controlled trial	(N) 39 Mild AD  Average age: 75,5  (n) 21 women, (n) 18 men	MMSE WMS-R GDS, Apathy Scale SF-8, PCS-8 Y MCS-8 DBD	AT  2group AT (n) 20, CG (n) 19  12 weeks	Significant improvement in the apathy. Significant quality of life improvement.	Need to use methods to assess higher functions, such as instrumental Activities of Daily Living. Creation of a system that allows the selection of appropriate methods, considering the individual's disease condition and preference.

Abbreviations: GCCWOT: Cincinnati Chapter Wellbeing Observational Tool; QoL-AD: Quality of Life AD scale; NPI: Neuropsychiatric Inventory; ADAS-cog: Cognitive subscale of the AD Assessment Scale; ACE-t: Art, Colors & Emotions treatment; CG: control group; AT: art therapy; SP: singing group; PG: painting group; TNM: Major neurocognitive disorder; MMSE: Mini Mental State; BPI: brief pain questionnaire; NRS: Numerical rating scale; STAI: State Trait Anxiety Inventory; GDS: Geriatric Depression Scale; EQ-5D: EuroQol-5, questionnaire to measure quality of life; \*FCRT: Free and Cued Recall Test; TMT: Trail Making Test; FAB: Frontal evaluation battery; BDI-II: Spanish adaptation of the 2nd version of the Beck Depression Inventory; COOP/WONCA: self-reporting instrument for functional status and quality of life; WMS-R: revised Wechsler memory scale; SF-8: short assessment of quality of life: from the physical point of view (PCS-8) & from the mental component (MCS-8); DBD: Dementia Behavior Disturbance

(Continued)

Table 3. Characteristics of studies of multimodal approaches that include AT

First author	Study design	Sample ( <i>diagnosis, age, gender</i> )	Instruments		Type of intervention (activity, sample, session)	Results (experimental group)	Main findings
			(physiological, psychological...)	(physiological, psychological...)			
Jung (2020)	Experimental study	(N) 59 Mild & moderate AD	SNSB K-MMSE KDSQ-C GDS BAI S-IADL	EC, AT, MT No control group	Significant improvement in cognitive domains. Improvement in activities of daily living. Decrease in depression and anxiety.	The approach used helps to improve cognition, activities of daily living and mood in participants who have mild to moderate AD.	
		Average age: 77 (n)43 women; (n)16 men		1h per week, 8 weeks			
Lokon (2019)	Exploratory study	(N) 67 Moderate-severe AD	SM-GCCWOT	AT, MT, OMA, CRS, NOL, NOA.	Improvements in personal well-being such as social interest and pleasure.	Modification and simplification of the observation tool is required. No significant differences between creative and non-creative activities, as well as those led by therapists or regular staff.	
		No age reported (n)54 women; (n)13 men		No control group 4 weeks			
Hsu (2017)	Retrospective cohort study	(N) 121 Mild-moderate dementia, most common AD	MMSE NPI Barthel Index IADL Cornell Scale CMAI	MT, OE, AT, RT, H No control group	Significant improvement in depression and agitation. Improvement and maintenance of cognitive function	The use of antipsychotics could affect cognitive performance. The use of hearing aids could enhance the effect of the intervention. The characteristics of the participants and the evolution of the disease should be taken into account.	
		Average age: 86 (n)121 men		1h per week, 6 months			
Kim (2016)	Randomized controlled trial	(N) 53 Mild AD	K-MMSE K-BNT CERAD-K GDS QOL-AD	AT, MR, RT, H 2 group EG (n)23 CG (n)32	Significant maintenance of cognitive abilities. Reduction of depression.	Benefits of multidomain cognitive intervention: Increase maintenance of cognitive function; Assist in establishing interpersonal relationships; Improve executive function, depression and mood.	
		Average age: 78 (n)37 women, (n)16 men		1h per week, 6 months			

(Continued)

Table 3. (Continued)

First author (2015)	Study design	Sample (diagnosis, age, gender)	Instruments (physiological, psychological...)	Type of intervention (activity, sample, session)	Results (experimental group)	Main findings
Santos (2015)	Randomized controlled trial	(N) 62 Mild AD  Average age: 75 (n)37 women, (n)25 men	MMSE GDS QOL-AD	CR, CCT, ST, OT, AT, PT, CS  2 group EG (n)46 CG (n)16  2 per week, 24 sessions	Significant improvement of general cognitive status. Significant improvement of quality of life factors. Significant reduction of depressive symptoms.	The multimodal intervention was beneficial for participants living with mild AD. In participants living with moderate AD, this intervention was not beneficial.
Viola (2011)	Simple blind controlled study	(N) 41 Mild AD  Average age: 75 (n)26 women, (n)15 men	MMSE SKT NPI GDS QOL-AD	CCT, ST, AT, PT, CS  2 group EG (n)25 CG (n)16  12 weeks	Stable maintenance of cognitive ability with slight increase in memory and attention scores. Significant improvement in depressive symptoms. Reduction of distress.	SKT may be more sensitive to subtle changes in cognitive functioning. Participation in the program resulted in a slight reduction in loved ones' distress.

Abbreviations: AT: art therapy; EG: experimental group, CG: control group; SNSB: Seoul Neuropsychological Screening Battery; K-MMSE: Korean version Mini Mental State; KDSQ-C: Korean Dementia Screening Questionnaire-Cognition; GDS: Geriatric Depression Scale; BAI: Beck Anxiety Inventory; S-IADL: Seoul-Instrumental Activities of Daily Living; NPI: neuropsychiatric inventory; IADL: The Lawton-Brody scale of instrumental activities of daily life; CMAI: Cohen-Mansfield agitation inventory; SM-GCCWOT: Cincinnati Chapter Wellbeing Observational Tool; K-BNT: Korean Test of Boston Nomenclature; CERAD-K: Korean version of the Consortium to establish a registry for the AD evaluation package; QOL-AD: assessment of quality of life in Alzheimer's disease; SKT: short cognitive test.

Type of activities: EC: cognitive training, MT: music therapy, OE: orientation training, RT: reminiscence therapy, H: horticulture, OMA: intergenerational art and music led by artists, CRS: creative activity directed by non-artists, NOC: non-creative activities run by professionals, NOA: no activity, MR: musical reminiscence, CR: cognitive rehabilitation, CCT: cognitive computer training, ST: speech therapy, OT: occupational therapy, PT: physical training, CS: cognitive stimulation.

The reasons why a total of 32 articles were excluded from those initially identified are detailed below: is a literature review, or the full article could not be found, or they do not include sufficient research data, they do not include participants with AD, or they do not include methods to evaluate effects of AT or the sample is only one subject. Due to the large variability and heterogeneity found in the studies analyzed, it was not possible to integrate the data, so a meta-analysis was considered inappropriate. The results of the search are presented in two tables: Table 2 AT-only approach, and Table 3 showing studies with multimodal approach including AT.

### **3.2. Sample characteristics**

With regard to the selection of participants, all the studies selected included people over 65 years of age diagnosed with AD. The average age of the participants in the set of selected studies is 79.3 years, and the average number of subjects included in the sample of all the revised studies was 52.7 participants. In the different samples of each study, the diagnosis in which the subjects could be framed varied depending on the stage of the disease: in five studies the participants were in the mild stage of AD (Hattori, Hattori, Hokao, Mizushima, & Mase, 2011; Kim et al., 2016; Pongan et al., 2017; Santos et al., 2015; Savazzi et al., 2020), in three studies the stage was mild to moderate (Hsu, Tsai, Hwang, Chen, & Chen, 2017; Jung et al., 2020; Viola et al., 2011), and in four studies the stage was moderate to severe (Gross, Danilova, Vandehey, & Diekhoff, 2015; Domínguez-Toscano et al., 2017; Gontard, Lantheaume, Martinho, & Fernandez, 2017; Lokon, Sauer, & Li, 2019). The gender of the members of the sample was predominantly female in most studies, with an average of 33.8% versus 26.3% of male participants (Tables 2 and 3), and in one study the overall sample was composed of only women (Gontard et al., 2017) and in another study only men were included (Hsu et al., 2017).

### **3.3. Study characteristics**

Of the 12 selected articles, 4 were randomized controlled trials (Hattori et al. 2011; Kim et al., 2016; Pongan et al., 2017; Santos et al., 2015), 3 were experimental studies with control group (Domínguez-Toscano et al., 2017; Savazzi et al., 2020; Viola et al., 2011), and 5 used an experimental design without a control group (Gross et al., 2015; Gontard et al., 2017; Hsu et al., 2017; Jung et al., 2020; Lokon et al., 2019). The approaches were conducted in different settings: four studies in retirement homes and day care centers for older persons (Domínguez-Toscano et al., 2017; Gontard et al., 2017; Hsu et al., 2017; Lokon et al., 2019), four studies in geriatric hospitals (Hattori et al., 2011; Pongan et al., 2017; Santos et al., 2015; Viola et al., 2011) and four studies in specialized assisted living centers (Gross et al., 2015; Jung et al., 2020; Kim et al., 2016; Savazzi et al., 2020). The professionals who performed the AT approaches were mostly art therapists (Hattori et al., 2011; Gross et al., 2015; Domínguez-Toscano et al., 2017; Gontard et al., 2017; Jung et al., 2020; Lokon et al., 2019; Pongan et al., 2017; Savazzi et al., 2020), in two studies it was occupational therapists who carried out the experience (Hsu et al., 2017; Kim et al., 2016) and the studies by Viola et al. (2011) and Santos et al. (2015) do not specify which type of professionals carried out the experience.

### 3.4. Outcomes and measurements

In the studies analyzed, a great deal of variability and heterogeneity was found, with differences in objectives and outcome measures. In Figure 2, we show the methods used in the studies to evaluate the effects of AT organized according to the functions and symptoms evaluated. To assess cognitive ability, the Mini Mental State (MMS) was the most widely used questionnaire in 9 of the 12 studies reviewed (Figure 2A). For psychological and behavioral symptoms, the Geriatric Depression Scale (GDS) was the most used in half of the studies analyzed, to assess depressive symptoms, followed by the Neuropsychiatric Symptom Inventory (NPI) (Figure 2B). In the assessment of quality of life, the QoL-AD was the most used questionnaire (Figure 2C); and in the battery of neuropsychological tests, only one item performed these tests (Figure 2D).

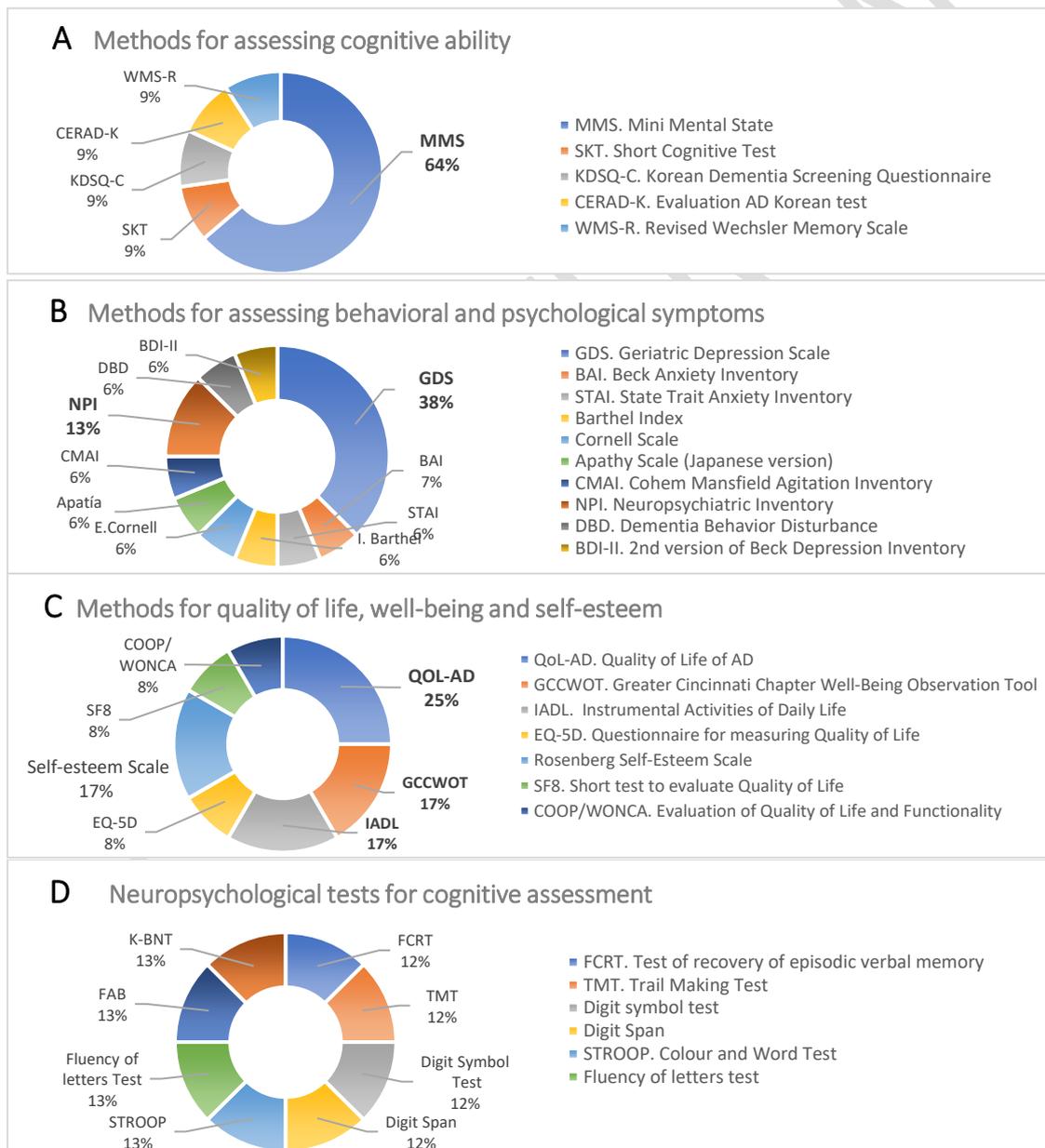


Figure 2. Representative diagrams of the methods used in the study reviewed, for assessing cognitive ability (A); for assessing behavioral and psychological symptoms (B); for quality of life (C); and neuropsychological tests (D).

### 3.5. Quality of research assessment

The evaluation of the quality of the studies analyzed (see Table 4) shows a heterogeneity in terms of methodological rigor. The overall rating of the evaluated studies shows five studies with a strong quality rating (Hattori et al., 2011; Gross et al., 2015; Domínguez-Toscano et al., 2017; Santos et al., 2015; Viola et al., 2011), four with moderate quality (Gross et al., 2015; Hsu et al., 2017; Pongan et al., 2017; Savazzi et al., 2020), and three studies were rated as weak (Gontard et al., 2017; Jung et al., 2020; Lokon et al., 2019). Common methodological areas of weakness were found in the selection bias, in most studies. Most studies reported confounding factors (except Lokon et al., 2019; Pongan et al., 2017). Detection bias was shown to be a common area of weakness, with only four studies reporting whether assessor blinding had been performed. However, a common area of strength was data collection methods, as most studies used standardized measurement tools reported as valid and reliable. For withdrawal and dropout factors, most reported these data.

### 3.6. Study outcomes

#### 3.6.1. Effects of AT-based approaches

Given the heterogeneity we found in the selected studies, we approached them as subgroups to analyze which measures, they used and their results.

Table 4. Quality of the evaluation of the studies included in this systematic review.

First author	Selection bias	Study design	Confounders	Blinding	Data collection	Withdrawals	Global rating
Savazzi (2020)	Weak	Moderate	Moderate	Moderate	Stronge	Stronge	Moderate
Pongan (2017)	Strong	Strong	Weak	Weak	Strong	Strong	Moderate
Gontard (2017)	Moderate	Weak	Weak	Weak	Weak	Mderate	Weak
Domínguez-Toscano (2017)	Strong	Strong	Weak	Strong	Strong	Moderate	Strong
Gross (2015)	Weak	Weak	Moderate	Moderate	Moderate	Moderate	Moderate
Hattori (2011)	Strong	Strong	Moderate	Strong	Strong	Strong	Strong
Jung (2020)	Weak	Weak	Moderate	Strong	Strong	Weak	Weak
Hsu (2017)	Weak	Moderate	Moderate	Moderate	Strong	Moderate	Moderate
Lokon (2016)	Weak	Weak	Weak	Weak	Moderate	Moderate	Weak
Kim (2015)	Strong	Strong	Strong	Moderate	Strong	Strong	Strong
Santos (2015)	Moderate	Strong	Strong	Moderate	Strong	Strong	Strong
Viola (2011)	Moderate	Strong	Strong	Moderate	Strong	Strong	Strong

Note: Rated according to the Effective Public Health Practice Project (EPHPP) Quality Assessment Tool (Armijo-Olivo et al., 2012).

#### 1) Participants living with mild AD

Three of the selected articles evaluated the AT approach in participants living with mild AD. In the study by Savazzi et al. (2020), results were compared between a group with an arts-based intervention (Art, Colors, and Emotions treatment, ACE-t) and a control

group, with a total of 14 sessions (Table 2). The aim was to evaluate the efficacy of ACE-t on quality of life, behavior, and cognition of participants living with AD using different standardized methods. The analysis of the measures showed an improvement in general cognitive functions, executive functioning and access to language and comprehension, an improvement in behavioral mastery and quality of life, and an increase in well-being.

The study by Hattori et al., (2011) assessed the effects of AT on cognitive function, vitality, behavioral symptoms, and loved ones' overload over 12 weeks (Table 2). Comparison of pre- and post-intervention results in the AT group and the control group showed no clear evidence that AT improved cognitive function in individuals who has mild AD, although improvements in vitality and quality of life were noted. The authors suggest that the brevity of the intervention may have been one of the reasons why more conclusive results were not found. A follow-up reevaluation 12 weeks later showed a worsening of cognitive function and vitality, suggesting that a longer period may induce greater benefits. In the clinical trial conducted by Pongan et al. (2017), results were compared between one group with a singing-based and a painting-based approach involving a total of 12 sessions (Table 2). The aim was to evaluate the effectiveness of these approaches on chronic pain in persons who have AD, using different standardized methods at baseline, at 12 and 16 weeks of follow-up. Analysis of the measures showed a reduction in pain assessment test scores, but no differences were observed between the two experiences. The painting-based approach improved depressive symptoms and decreased anxiety, while the improvement in cognitive ability was more significant in the singing group.

## **2) Participants living with moderate or advanced AD**

In the more advanced stages of the disease, the experimental study by Domínguez-Toscano et al. (2017) assessed whether the application of AT can improve cognitive parameters, depressive symptoms, functional status, and self-perception of quality of life in older people living with AD (Table 2). The study was carried out in two phases (4 months and 16 months) with a total duration of 23 months. The results obtained in this research reflected a significant improvement in the level of depression and in the perceived quality of life. Regarding the results on the cognitive levels, in the first phase (4 months) the effect was not significant, but when the project time was increased (up to 16 months) an improvement was evidenced in comparison with the control group. In this study, it was confirmed that over time the cognitive deterioration increased in the control group, while in the experimental group, it was maintained and even slowed down. The research conducted by Gontard et al. (2017) aimed to assess possible changes in self-esteem using the Rosenberg Self-Esteem Scale (Table 2). The approach consisted of 10 sessions using clay as an artistic language. The data obtained revealed an improvement in two participants and stabilization in two other participants who were at a very advanced stage of the disease. Gross et al. (2015) evaluated well-being after an AT-based approach for 12 weeks (Table 2). This study also extends the results of previous research by looking for evidence of the long-term effects of this type of treatment, beyond the time limits of the intervention. The evaluation was carried out with observers inside the session (therapist carrying out the experience and outside the session (center staff)), although this

created some confusion in the results. The in-session observers reported significant improvements in five areas of well-being (interest, sustained attention, pleasure, self-esteem, and normality), while the center staff did not detect significant improvements after the study.

In conclusion, AT in older people living with AD improves depressive symptoms, mood, personal well-being, and perception of quality of life. However, regarding cognitive parameters, results may not be conclusive since these depend largely on the duration of the experience, the degree of the disease and the methods used. In general, the authors of this research suggest that the longer the intervention time, the more significant improvements can be observed (including the maintenance and even the deceleration of cognitive impairment in some participants).

### **3.6.2. Effects of multimodal approaches**

As a result of the search for projects or studies that have been conducted on AT in individuals living with AD, the systematic review of the 12 papers selected (in total) revealed that half of them were investigations based on multimodal programs (including AT). These approaches use different types of non-pharmacological therapies in order to address the multiple factors that influence this condition (Chalfont et al., 2020). These multi-component approaches can help maintain cognitive function, decrease symptoms of depression, and improve the quality of life of both themselves and their loved ones (Chalfont et al., 2020; Masika et al., 2020).

#### **1) Participants living with mild AD**

In the early stages of the disease, Viola et al. (2011) evaluated the effect of a program based on multifunctional stimulation (comprising different therapies, including AT) on cognition, neuropsychiatric symptoms, and quality of life in participants who have mild AD (Table 3). In the experimental group, cognitive function scores remained stable while in the control group a slight worsening (attention and overall performance) was confirmed. A significant decrease in depressive symptoms was also observed in the experimental group, whereas the incidence of neuropsychiatric symptoms was low in both groups. The study by Kim et al. (2016) aimed to evaluate the usefulness of a multi-domain approach to improve cognitive function in people living with probable-mild AD over 6 months (Table 3). Results on neuropsychological tests showed a trend showing an increase in treatment group scores and a slight reduction in the control group. Regarding the assessment of depressive symptoms, a reduction was observed after the experience and the measurement of quality of life showed a tendency to a slight increase after the intervention in the loved ones.

#### **2) Participants living with mild-moderate AD**

In the mild-moderate stage of the disease, Jung et al. (2020) developed an integrated cognitive approach comprising several types of therapies: cognitive training, AT, and music therapy (Table 3). This study investigated the effect of these therapies on cognition, mood, and activities of daily living, during 16 sessions. The results showed a significant improvement of cognitive functions, activities of daily living and mood of the

participants. In the study by Hsu et al. (2017), they investigated the benefits of a non-pharmacological approach including AT, for 6 months, on the psychological and behavioral symptoms of dementia (Table 3). As a result, scores in cognition and in the activities of daily living domains remained stable, while there was an especially significant improvement in the subcategories of psychotic, affective, and behavioral syndrome, and in the reduction of depressive symptoms and agitation. The research carried out by Santos et al. (2015) aimed to evaluate the effectiveness of a multimodal rehabilitation project, during 12 weeks, clinically oriented to global function; cognition and quality of life (Table 3). The results indicated an improvement in cognitive outcomes, and a reduction in depressive symptoms, while quality of life improved compared to the control group.

### **3) Participants living with advanced AD**

In more advanced stages of the disease, the exploratory study performed by Lokon et al. (2019) examines how different types of art-based programs might promote the well-being of older people living with AD (Table 3). In the case of the AT approach carried out by art therapists, the main aim was to improve and restore personal functioning and well-being. The outcome of the evaluation of the art-based therapy showed an improvement in quality of life scores, especially in the parameters of increased well-being and social interest and increased enjoyment.

In summary, we can conclude that multimodal programs induce an improvement in the quality of life of older people living with AD, since they can cover the multiple symptoms that accompany the disease. This type of approach is based on different types of experiences and therapies for both rehabilitation and cognitive, physical, and psychosocial stimulation, in order to improve general function, mental health, and quality of life. In these programs, a significant improvement in depressive and behavioral symptoms and a significant increase in quality of life are observed. With respect to cognitive function, improvements are observed in the early stages of AD, while in moderate stages they tend to remain stable.

#### **3.6.3. Effects of AT-based approaches within the framework of multimodal programs**

In three of the studies that used a multi-domain intervention (Hsu et al., 2017; Santos et al., 2015; Viola et al., 2011) it was concluded that AT provided significant stimulation in cognitive, emotional, and interpersonal skills through expressive and artistic techniques, especially in the non-verbal expression of creation. Hsu et al. (2017) suggest that AT promotes physical relaxation and stress reduction and may improve mood. In addition, artistic creation has been shown to promote cognitive training and fine motor skills. In these studies, the impact of the global rehabilitation protocol was evaluated, observing a reduction in depressive symptoms, an improvement in global cognitive parameters and quality of life. In the evaluation of an integrated cognitive program conducted by Jung et al. (2020), it was concluded that the inclusion of art-based therapies alleviates depression and anxiety in people who have mild-to-moderate AD and promotes social interaction

among these participants who often experience social isolation. In addition, including AT along with cognitive training may offer more effective results (Jung et al., 2020).

In the research by Kim et al. (2016), AT was used to promote fine motor skills, and participants were encouraged to create images of the natural world (landscapes, animals, and insects). The study concluded that AT helped foster interpersonal relationships, contributing to the reduction of depressive symptoms and the improvement of mood. It is suggested that AT could also help to improve executive function through the creation of artwork, a process that involves many cognitive functions (Kim et al., 2016).

#### **4. Discussion**

The review carried out in the present paper has shown that the topic of research related to the effects of AT on people living with AD is relatively new. Furthermore, the studies identified vary in terms of their methodological quality, making it complex to provide a comparative review that allows us to perform an overview of the state of the art in this field with the aim of establishing comprehensive conclusions. Taking into account the results of the present review, we can suggest that there is inconclusive evidence can cover the multiple symptoms that accompany the disease. This type of approach is based on different types of experiences and therapies for both rehabilitation and cognitive, physical, and psychosocial stimulation, in order to improve general function, mental health, and quality of life. In these programs, a significant improvement in depressive and behavioral symptoms and a significant increase in quality of life are observed. With respect to cognitive function, improvements are observed in the early stages of AD, while in moderate stages they tend to remain stable supporting the idea that AT improves cognitive function in people living with AD (Hattori et al., 2011; Kim et al., 2016; Pongan et al., 2017). However, some experimental data suggest that this approach may help to slow down or prevent the progression of cognitive decline (Hattori et al., 2011; Domínguez-Toscano et al., 2017; Santos et al., 2015). In contrast, most research shows improvements in levels of depression, anxiety, self-esteem and in fostering interpersonal relationships (Domínguez-Toscano et al., 2017; Gontard et al., 2017; Hsu et al., 2017; Kim et al., 2016; Pongan et al., 2017; Viola et al., 2011), as well as improvements in attention and increased interest in tasks being performed (Gross et al., 2015; Jung et al., 2020; Lokon et al., 2019). In addition, some studies report increases in psychomotor and other executive functions (Hsu et al., 2017). There is also agreement on the benefits on vitality and quality of life (Hattori et al., 2011; Jung et al., 2020; Pongan et al., 2017; Savazzi et al., 2020).

Multidimensional studies generally did not evaluate each method separately but collected the data as a whole. Generally, most publications describe AT in a brief way, pointing out the main benefits obtained for participants and describing the methodology of delivery of the activity.

Therapies aimed at people experiencing changing cognitive abilities are usually multi-dimensional since these individuals often live in retirement homes where they carry out multiple experiences including rehabilitation, physical and/or cognitive stimulation, and leisure activities. Furthermore, given that AD is a complex disease that encompasses a

great diversity of symptoms (cognitive, functional, psychological, and behavioral) the adoption of multi-domain approaches can be an effective rehabilitation strategy, in accordance with the biopsychosocial care model (Bowman & Lim, 2022). It is suggested that non-pharmacological treatments with a multimodal approach improve the symptoms that accompany dementia at the level of cognitive impairment, social behavior, and mood (Chalfont et al., 2020; Quail et al., 2020). It has been proposed that when AT is integrated within these multi-component programs could cover all three levels (cognitive impairment, social behavior, and mood) since accompanied artistic creation can help to promote significant stimulation in cognitive, physical, emotional, and social skills (Hsu et al., 2017; Jung et al., 2020; Kim et al., 2016). In addition to these benefits, there is also the gratification derived from the spectator's gaze in the case that exhibitions are held with the productions made during the therapeutic interchange (Domínguez-Toscano et al., 2017; Quail et al., 2020).

With regard to the measures used in the different studies both in the diagnosis and in the evaluation of the treatment, the authors agree that this type of tests it is unlikely that detect small changes produced during the experience in older people living with AD or other dementias, either because of the short period of time during which the procedure is carried out (Hattori et al., 2011; Quail et al., 2020) or because they are not sufficiently sensitive measures to capture non-significant changes in test scores (Domínguez-Toscano et al., 2017; Jung et al., 2020). However, the creation of a specific scale could contribute to a better understanding of the contribution of AT to the treatment process itself (Haeyen & Noorthoorn, 2021).

Other aspects that should be taken into account when conducting assessments in this population would be the heterogeneity of the disease, the patient's mood, the lack of confidence, the feeling of being examined, or the anxiety in performing the task, which are sometimes coupled with the lack of motivation to participate in the task. For the person being tested, the situation of exploration and response to cognitive tasks could generate stress, and this, in turn, could negatively influence performance in standardized neuropsychological tests (Heymann et al., 2018). All these factors can lead to a low performance than would be expected if the test were applied at another time or place or depending on who performs the intervention (Chalfont et al., 2020). For these reasons, it has been suggested that commonly used psychometric tests may not be the most appropriate tools for assessing these non-pharmacological approaches and may be difficult to administer with varying reliability and validity (Chalfont et al., 2020; Webster et al., 2017). Viola et al. (2011) detail that the negative data obtained in quantitative tests should be interpreted with caution since qualitative benefits in global function are often observed in clinical experience by continuous and close monitoring in older persons who have AD. Webster et al. (2017) proposed that applying a broader package of specific measures than is generally used in these programs could provide a more holistic view of the individual and take into account more details of the method applied. Kenning and Visser (2021) also emphasize the need to evaluate the effects of creative interventions on quality of life and wellbeing. Another relevant issue is that there are few evaluation tools available to assess the impact of arts-based therapies (Bazooband et al., 2021; Gross et

al., 2015). For these reasons, there is a need to develop new approaches more sensitive to the potential impact of arts-based therapies on older people living with AD or other dementias (Bazooband et al., 2021). Other non-pharmacological treatments such as music therapy are providing compelling evidence from research and evidence-based practice, which serve as the basis for the use of music in a therapeutic manner for older people living with AD and other dementias (Brown et al., 2020; Thaut & Koshimori, 2020).

#### **4.1. Limitations and contributions**

The present work has some limitations. First, although we searched three different databases, and both reviewers also hand searched the gray literature, it is possible that not all studies of AT, or including AT, for older people living with AD were identified. Second, this review could be limited by the small number of studies included. Third, a meta-analytic approach could not be used due to variation in the type of approaches used by the studies, heterogeneity in sample characteristics (age, gender, and diagnosis), duration, methods, and outcomes measured across studies.

In spite of the limitations that the present review may show, we consider that our work may be an interesting contribution to the existing literature in this field as it provides a comprehensive systematic review, as well as methodological guidelines and practical recommendations for the use of AT as a complementary treatment for older people living with AD. Furthermore, in prior reviews, selected studies encompassed all types of dementia; however, in the present review, we have narrowed the search in order to include only one type of diagnosis, AD (Table 5). There are many types of dementia, AD being the most prevalent, and this may be a factor that can condition results when replicating prior studies and published reviews emphasize this limitation (Emblad & Mukaetova-Ladinska, 2021; Masika et al., 2020). Furthermore, we have included several multimodal interventions since, in older people, such multicomponent approaches are often applied as non-pharmacological therapies (Chalfont et al., 2020). However, in prior reviews, this multimodal approach was a reason for exclusion (Badía, 2017; Deshmukh et al., 2018). There is no limitation in language, in order to cover the maximum number of studies. This factor is shared with the study by Deshmukh et al. (2018). In this review, we have used, as far as possible, the guidelines suggested recently by Bian, Wang, Zhao, Zhang, and Ding (2021) in order to avoid discriminatory language referring to age, changing terms such as “intervention” to “approach”; “patient” to “participant” or “person”; “activity” to “experience,” among others.

#### **4.2. Implications and future directions**

This review provides practical and methodological guidance for evidence-based best practices when conducting AT projects in older people living with AD. The systematic analysis of results obtained in studies that include AT in older people living with AD, either as a single intervention or within a multimodal approach, allows us to conclude that this approach could induce some benefits in areas such as cognition, depressive and behavioral symptoms, psychological well-being, and quality of life in these subjects. These results support those previously reported in the systematic review recently published by Emblad & Mukaetova-Ladinska 2021 (Table 5).

Table 5. Contributions and limitations of existing reviews of AT in people living with AD or other dementias

Authors	Contributions	Limitations
Present review (2022)	<p>1) Inclusion of studies with a multicomponent approach (including art therapy).</p> <p>2) The search was not based solely on English-language studies.</p> <p>3) Focusing of the samples (collective, diagnosis).</p> <p>4) The quality of the evaluation of the studies included in this systematic review is mostly strong.</p> <p>5) Overall, it is concluded that AT in older people living with AD could improve certain areas: cognition, depressive and behavioral symptoms, psychological well-being, and quality of life.</p>	<p>1) Some studies of AT (or including AT) for older people living with AD may be missing.</p> <p>2) Small number of studies included in the review.</p> <p>3) A meta-analytic approach could not be used due to variation in the type of approaches used, heterogeneity in sample characteristics (age, gender, diagnosis), duration of the project, and the wide variety of methods and outcomes used in the studies.</p>
Shoosmith, Charura & Surr (2022)	<p>They examined and identified which components facilitate positive outcomes in visual arts interventions in dementia care, and this knowledge helps to:</p> <p>1) Inform the focus and content of visual arts experiences; 2) Provide data and specifics for funding;</p> <p>3) Provide greater clarity about the effects that proposals promote for people living with dementia.</p>	<p>1) Incomplete description and design of the studies.</p> <p>2) Only articles in English were included.</p> <p>3) The search strategy did not include a search of the gray literature.</p> <p>4) A meta-analytic approach was not possible due to the heterogeneity of the studies.</p>
Emblad & Mukaetova-Ladinskaa (2021)	<p>In people experiencing cognitive changes creative arts therapies (AT and music therapy) may induce improvement in four different domains: Cognitive function (attention, concentration and memory), psychological and behavioural symptoms of dementia (motivation, mood, apathy, agitation and sadness); well-being, quality of life (communication, satisfaction, engagement).</p>	<p>1) The study population was quite modest and did not include a control group.</p> <p>2) Heterogeneity regarding etiology of dementia in the participants of the reviewed studies. Only one study included participants with AD.</p> <p>3) Difficulty in reviewing all the available literature related to the influence of creative arts therapies available for people experiencing cognitive changes.</p>
Masika, Doris & Li (2020)	<p>1) Visual art therapy (VAT) is associated with cognitive benefits in people with impaired cognitive function, but not in those with normal cognition.</p> <p>2) Promising effects of VAT on psychological functions.</p> <p>3) Designs with a greater number of components (reminiscence, socialization, processing, analysis, and art sharing) may be more likely to improve cognition.</p> <p>4) VAT may have effects in different brain regions influencing possible benefits of the therapy on cognitive functions.</p>	<p>1) Only articles in English were included.</p> <p>2) Not adequately identified studies that enrolled older adults with different levels of cognitive impairment.</p> <p>3) A narrative analysis of the studies was conducted in order to provide preliminary insight.</p> <p>4) Low methodological quality (concealment in group assignment and blinding of assessors on results).</p>

(Continued)

**Table 5. (Continued)**

Authors	Contributions	Limitations
Deshmukh, Holmes & Cardno (2018)	<p>1) AT is reviewed as an adjunctive treatment in people with dementia, including only randomized controlled trials.</p> <p>2) It is difficult to draw reliable conclusions about the efficacy of AT in people experiencing cognitive changes.</p> <p>3) More and higher quality evaluations, covering a wider range of outcomes in participants and companions, are needed, as well as a detailed descriptions and monitoring of AT.</p> <p>4) Need to describe the evaluation process (formal follow-up and influence of contextual factors, study outcomes, outcome data and recommendations).</p>	<p>1) Meta-analysis was not possible.</p> <p>2) Lack of primary or secondary endpoints in outcome measures, and no clear differences in outcome measures.</p> <p>3) Low quality of evidence in both analyzed studies.</p> <p>4) Multimodal interventions that did not distinguish the specific effects of art therapy were excluded and only randomized controlled trials were included.</p>
Badia (2017)	<p>The effects of visual arts in people living with AD and other dementias are reported, including:</p> <p>1) Description of changes in artistic production as a function of clinical characteristics and severity of the disease.</p> <p>2) Analysis of the aesthetic experiences of participants.</p> <p>3) Evaluation of the cognitive and behavioral effects of various art therapy based-interventions.</p> <p>4) Analysis of visual arts projects as an opportunity to improve the quality of life of people living with dementias and their loved ones.</p>	<p>1) Only studies on visual arts were included.</p> <p>2) Possible lack of inclusion of some studies on visual arts therapies for people living with dementia and their loved ones.</p> <p>3) The review conducted does not strictly comply with the Cochrane methodology for reviews.</p> <p>4) Studies analyzed displayed low evidence.</p>
Cowl & Gaugler (2014)	<p>1) Several types of non-pharmacological therapies (visual arts, music, drama/movement, songwriting and poetry) for people affected by AD and other dementias are covered.</p> <p>2) Creative arts therapies are potentially beneficial in treating the behavioral and emotional symptoms of dementia, although the effect on cognition is not as evident.</p>	<p>1) A Possible bias in the selection of conclusions from the reviewed studies due to space limitations.</p> <p>2) Possible lack of additional studies examining the effects of creative arts therapy on people living with Alzheimer's disease and their loved ones.</p> <p>3) Material was not available at the research center.</p> <p>4) A synthesis approach was used instead of a meta-analytic approach.</p>
Beard (2011)	<p>Need of developing a more integrated professional identity as artists and scientists including:</p> <p>1) The use of self-reports of satisfaction and meaning of the activities under study.</p> <p>2) The incorporation of participants in the early stages of the disease.</p> <p>3) the application of creative arts therapy in a variety of settings (e.g., private homes, retirement homes, etc.).</p> <p>4) The emphasis on the process rather than simply on the outcome measures (e.g., quality - of life and 'enjoyment' measures versus clinical scales).</p>	<p>1) Lack of explanation of study design (description of activities and methods used).</p> <p>2) Poor or unspecified measurement tools, overemphasis on clinical outcomes, and lack of systematic data analysis.</p> <p>3) Lack of self-reporting by participants.</p> <p>4) Lack of adaptation of projects to people experiencing the early stages of the disease, those conducted in the home, and focus on product versus process.</p>

As a result of the systematic review performed, we consider that significant gaps still persist in terms of outcome measures and evaluation methods applied to assess this type of research (Table 6).

Table 6. Conclusions, implications and recommendations for the application of the studies reviewed, and future research

Main conclusions	Implications and recommendations	Future research
1. AT in AD may improve depressive symptoms, mood, personal well-being and perceived quality of life.	1. It would be necessary to include AT as a complementary therapy for individuals experiencing AD.	1. In future studies it is necessary to detail the design of the AT approach, including objectives, mechanism of intervention, materials and methods, characteristics of participants (including disease type and stage, age range, location, professional delivering the intervention) in order to replicate the studies.
2. Cognitive effects of AT in AD may vary depending on the duration of the study, methods used and stage of the disease.	2. A greater number of therapy sessions could be needed to observe the effects of the AT experience on cognitive ability. The use of more sensitive measures of change, such as the Short Cognitive Test (SKT) tool, is suggested.	2. Long-term cognitive stimulation through multiple AT sessions could lead to improved cognitive functioning (more than once a week and more than 12 sessions). 2.1. In multimodal approaches, these effects could be enhanced with AT approaches.
3. Standardized psychometric and neuropsychological tests may not be the most appropriate to assess the impact of AT as non-pharmacological treatment in people living with AD.	3. Traditional standardized methods may not be appropriate for assessing the impact of AT on older people living with AD. 3.1. These tests may not be sensitive enough to capture the significant changes that AT causes in the subject. 3.2. Methods of assessing the effects of AT are proposed to encompass subjective experience, using validated measures and quantitative outcomes. 3.3. In multimodal approaches, it would be necessary to evaluate each therapy separately to analyze its effects on participants.	3. Adequate standardized methods are needed to assess and capture all changes and developments of participants during AT sessions. 3.1. AT with neurological information and the use of biological markers could contribute to capture AT-induced changes in brain function. 3.2. A specific scale would be necessary to measure the specific effects of the AT experience in multidisciplinary programs.
4. Need of developing new approaches that are more sensitive to the potential impact of AT on older people living with AD.	4. It would be necessary to conduct randomized controlled trials that include: a homogeneous sample (age, diagnosis, disease stage), a comparison group and adequate methods that can support the efficacy of AT use in older people with AD.	4. Digitization-based devices could be of great help to measure the main effects of AT-based interventions, follow the development of the disease or serve as an artistic tool.

Traditional standardized methods may not be the most appropriate for understanding and assessing the impact that the AT approach may have on older people living with AD at subjective level and may not be sensitive enough to capture the significant changes that the experience brings about in the person. The short period of time of the study would also be another factor to take into account together with the emotional state of the person being evaluated (mood, feeling of being examined, anxiety that the test may generate, among others) when evaluated with this type of commonly used measures. Given the limitations found in the evidence reviewed regarding the effectiveness of AT-based

approaches in this AD-affected population, there is a need to improve the design and methods used for research. We need to perform more randomized controlled trials involving a homogenous sample at the disease stage, comparison group, and with appropriate methods that can support the efficacy of AT use in older people who have AD.

Future research in the field of AT in this population could focus on the following directions (Table 6). First, in order to make objective comparisons between studies, the details of the AT experience should be more clearly specified. Thus, objectives, intervention mechanisms, materials, and methods, and characteristics of the participants (including the type of disease and phase, age range, and location) should be detailed. Second, methods for evaluating the effects of the AT experience should be able to encompass the subjective experience, through validated measures and quantitative outcomes. Digitizing devices could be of great help to measure the effects of the interventions as well as to follow the development of the disease. Third, neurologically informed AT, as well as the use of biological markers that can aid to capture the changes induced by the intervention, will allow the recognition and validation of the art-therapeutic approach on brain function, being a way of progress that would contribute to generate knowledge for this discipline, and could be a good first step in the direction of evidence-based practice.

In addition to these proposals and based on the main findings of the analyzed studies, we believe that a specific scale is needed to measure the effect of the AT experience in multidisciplinary programs, as such a tool would isolate the results and it would be possible to analyze in which aspects the art-therapeutic experience benefits the participants (Haeyen & Noorthoorn, 2021). Finally, we agree with those authors who propose that modern digitalizing devices (digital tablets) could serve to measure a wide range of visuoconstructive skills, being helpful to detect or follow the evolution of this disease (Heymann et al., 2018; Huber et al., 2021). During the COVID-19 pandemic, this type of online approach is increasingly being used and offers numerous intervention possibilities (Zubala, Kennell, & Hackett, 2021).

## **5. Conclusions**

The findings reported in the studies reviewed conclude that the benefits of AT-based approach in this AD population suggest improvements in depressive symptoms, mood, personal well-being, and perceived quality of life. Within the multi-domain programs that incorporate interventions that include different approaches (nutrition, physical activity, cognitive stimulation, art-based experiences, and others), AT provides significant stimulation in cognitive, emotional, and interpersonal skills, contributing to stress reduction, mood enhancement, and quality of life. However, as far as cognitive parameters are concerned, results may vary depending on the duration of the study and the methods used, as the commonly used psychometric tests may not be the most appropriate to assess the impact of this type of non-pharmacological treatment with this type of population. Therefore, it would be necessary to develop new methodological approaches that are sensitive to the potential impact of artistic therapies on older persons living with AD.

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