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Author	Taeyoung Kil ¹ , Minkyu Kim ^{2*}
Affiliation	¹ Department of Social Welfare, Joongbu University, Geumsan 32713, South Korea ² Department of Animal Science and Biotechnology, College of Agriculture and Life Science, Chungnam National University, Daejeon 34134, South Korea
ORCID (for more information, please visit https://orcid.org)	Taeyoung Kil (https://orcid.org/0000-0003-4143-449X) Minkyu Kim (https://orcid.org/0000-0001-7099-9735)
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4

5 **CORRESPONDING AUTHOR CONTACT INFORMATION**

For the corresponding author (responsible for correspondence, proofreading, and reprints)	Fill in information in each box below
First name, middle initial, last name	Minkyu Kim
Email address – this is where your proofs will be sent	kminkyu@cnu.ac.kr
Secondary Email address	vet1987@naver.com
Address	Chungnam National University, 99 Daehak-ro, Yuseong-gu, Daejeon 34134, Republic of Korea.
Cell phone number	+82-10-5208-1995
Office phone number	+82-42-821-5773
Fax number	+82-42-825-9754

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8 Abstract

9

10 This review paper aims to identify effective animal-assisted therapy (AAT) programs for older adults and
11 explore the practical and policy implications of these programs by analyzing the assessment tools used to
12 measure depression and cognitive function. South Korea became a super-aged society in 2025, when those
13 aged 65 and older exceeded 20% of the population. Mental health issues, such as cognitive decline,
14 depression, and dementia, have emerged as significant social and structural challenges. In response, AAT
15 has gained attention as a preventive and therapeutic intervention. Canine-assisted AAT has been shown to
16 reduce depression by promoting emotional bonding, social interaction, and physical activity, as well as by
17 enhancing emotional stability through increased oxytocin secretion. AAT has also demonstrated
18 improvements in cognitive domains, including attention, memory, and language ability, even among older
19 adults with mild cognitive impairment and dementia. Tools such as the Mini-Mental State Examination
20 (MMSE), Montreal Cognitive Assessment (MoCA), Addenbrooke's Cognitive Examination III (ACE-III),
21 and Geriatric Depression Scale-Korean Version (GDS-K) have been widely used to verify these changes.
22 Overall, AAT is evaluated as an effective, non-pharmacological intervention with high preventive and
23 clinical applicability, promoting multidimensional improvements in the cognitive, emotional, and social
24 functioning of older adults.

25

26 **Keywords:** Animal-Assisted Therapy, Depression, Cognitive Function, Older adults in Korea

27

28

29 INTRODUCTION

30

31 As of 2025, South Korea has entered a super-aged society, with adults aged 65 and over accounting for
32 more than 20% of the population. As the older population increases, the welfare, healthcare, and economic
33 burdens have intensified, and mental health issues among older adults—such as cognitive decline,
34 depression, and dementia—have expanded beyond individual and family concerns into broader social and
35 structural challenges (1). Therefore, not only preventive approaches—such as alternative intervention
36 programs, mental health support services, and expanded opportunities for social interaction and
37 participation—but also multidimensional interventions addressing the societal consequences of declining
38 quality of life and increasing suicide rates among older adults are urgently required.

39 In response, the Human–Animal Bond (HAB) and Animal-Assisted Therapy (AAT) have emerged as both
40 preventive and post-therapeutic approaches. For older adults, HAB extends beyond simple affection for
41 animals; it functions as a factor that promotes psychological and emotional stability and supports mental
42 health. Moreover, HAB has become an important research domain that connects health, welfare, society,

43 and the environment, surpassing mere interest or fondness for animals among older adults (2-6)

44 AAT refers to a structured and goal-oriented intervention that incorporates animals to achieve therapeutic
45 objectives in professional fields such as healthcare, social welfare, education, and rehabilitation. Recent
46 studies have highlighted AAT as an effective intervention method for operationalizing the HAB. AAT has
47 primarily explained the human–animal relationship through theory- and research-based inquiry and has
48 scientifically demonstrated its effects on health and welfare. By applying HAB in practice, AAT has evolved
49 into a goal-directed intervention used across therapeutic, educational, and rehabilitative settings (3, 7, 8)

50 Previous domestic and international studies applying canine-assisted AAT to older adults have reported that
51 it is highly beneficial as a fundamental therapeutic approach aimed at treating chronic illnesses and
52 psychiatric disorders and improving the quality of life of older adults. These benefits have been
53 demonstrated through clinical treatment for patients with dementia and psychiatric conditions (9-11),
54 evaluations of psychological and behavioral outcomes among residents in long-term care facilities (12-14),
55 and improvements in cognitive functioning and mental health among older adults living alone (14, 15).
56 Furthermore, AAT has also been identified as a preventive and alternative therapeutic method grounded in
57 human–animal (dog) interaction delivered in collaboration with professional teams. However,
58 comprehensive trend analyses that strategically synthesize research flows, gaps, and future development
59 potential are still lacking.

60 In this context, analyzing research trends on the effects of AAT on depression and cognitive function among
61 older adults is closely interconnected, and understanding overall research trends serves as a foundation for
62 both academic and practical advancement. Therefore, identifying the overall research trends provides an
63 essential foundation for both academic advancement and practical implementation. The importance of
64 conducting a research trend analysis in the field of AAT can be outlined as follows. First, since AAT is
65 associated with various academic disciplines—such as psychology, social welfare, education, and
66 nursing—its conceptual definitions and application scopes vary across fields and scholars. Accordingly,
67 conducting a trend analysis makes it possible to trace changes in the concepts, mechanisms, and application
68 approaches of AAT and to elaborate its theoretical foundations. Second, empirical studies on the
69 effectiveness of AAT have been conducted not only with general older adults but also with those who have
70 specific needs or conditions. In addition, the selection of assessment tools varies depending on the type of
71 animal used in the intervention. Therefore, a trend analysis makes it possible to distinguish between
72 outcome domains that show consistent effectiveness and those that require further empirical validation.

73 Third, trend analysis allows for the identification of research gaps regarding understudied populations,
74 cultural differences in effectiveness, and the long-term sustainability of AAT outcomes. These insights
75 provide a basis for proposing new research directions and connecting them to practical implementation.

76 Fourth, institutionalizing AAT in elderly welfare, rehabilitation, and mental health policy frameworks
77 necessitates a robust accumulation of research regarding its effectiveness, safety, and ethical validity.

78 Accordingly, the trend analysis conducted in this study provides an important empirical foundation for
79 future policy development.

80

81

82 **Animal-assisted therapy programs for older adults**

83

84 AAT is a psychotherapeutic technique that utilizes animals as a medium and applies structured, professional
85 programs to achieve therapeutic outcomes aligned with the client's symptoms and intervention goals. For
86 older adults, canine-assisted AAT has several distinct features. First, it provides emotional stability through
87 bonding with the animal and can alleviate feelings of loneliness and depression. Second, interactions among
88 older adults and communication with therapists occur naturally through the presence of the animal. Third,
89 activities conducted with the animal—such as walking, petting, and feeding—promote physical movement
90 and support functional maintenance and rehabilitation. Fourth, the process of remembering the animal's
91 name or taking care of it stimulates cognitive functions, including memory and attention. Fifth, emotional
92 bonding with the animal can help older adults find meaning and enjoyment in life. Sixth, AAT can be
93 tailored to the health status of older adults, allows for a multidisciplinary approach involving collaboration
94 among various professionals, and can incorporate both short- and long-term effects (11, 16-19).

95 In South Korea, several studies have conducted trend analyses of AAT programs. Paik and Choi (17)
96 examined the types of animal-assisted activities and therapy, theoretical frameworks, developmental stages,
97 units of intervention, problem types, intervention goals, types of therapy animals, hygiene and ethical
98 considerations, researchers' academic backgrounds, and contextual factors. Bae et al.(8) analyzed
99 authorship, publication year, research design, study participants (including sample size, age, and participant
100 characteristics), intervention characteristics (content, duration, and methods), types of therapy animals,
101 measurement tools, and statements regarding ethical considerations. In addition, Lee et al. (20) analyzed
102 publication year and source, research methodology, target population, clinical characteristics (such as group
103 size and experimental group size), and dependent variables. Lee and Kim (21) examined the following
104 factors: publication year, intervention type, sample size of the experimental group, number of sessions,
105 duration per session, and dependent variables. However, Lee and Kim's study was the only one to conduct
106 a systematic literature review of animal-assisted interventions for older adults, and their trend analysis
107 focused primarily on comparisons between domestic and international studies (1). Therefore, it is necessary
108 to establish research directions that integrate accumulated knowledge and contextual understanding,
109 strengthen academic, practical, and policy linkages, and outline future research roadmaps based on
110 emerging topics, methodologies, and comparative trend analyses.

111

112 **THE PSYCHIATRIC AND PSYCHOSOCIAL-ENVIRONMENTAL**

113 FOUNDATIONS OF DEPRESSION

114

115 Depression is one of the mood disorders and is characterized by persistent and severe emotional states such
116 as sadness, feelings of worthlessness, and loss of interest. Unlike temporary mood fluctuations, depression
117 causes significant impairment in daily functioning. From a psychiatric perspective, the DSM-5 identifies
118 Major Depressive Disorder (MDD) as the representative diagnostic category for depression, defining its
119 core symptoms as depressed mood and a loss of interest or pleasure lasting for at least two weeks (22, 23).
120 Recent neuroscientific approaches have identified imbalances in neurotransmitters such as serotonin,
121 norepinephrine, and dopamine, as well as abnormalities in amygdala and prefrontal cortex functioning
122 based on neuroimaging studies using fMRI (24, 25).

123 From a psychological perspective, psychoanalytic theory posits that internal conflict, experiences of loss,
124 and repressed aggression give rise to depression (26). Cognitive theory explains that negative cognitive
125 schemas and distorted thinking patterns contribute to the maintenance of depressive symptoms (27). From
126 social and environmental perspectives, stress-inducing events, lack of social support, and economic
127 hardship have been reported to be closely associated with the onset and exacerbation of depression (28-30).
128 Recent studies suggest a shift toward an integrative model in which genetic vulnerability, stressful life
129 events, and social context interact to produce depressive symptoms. Research has also expanded to include
130 digital healthcare approaches (such as mobile app-based CBT and online counseling), the identification of
131 biomarkers, and AI-assisted diagnostic tools (31-34).

132

133

134 Depression assessment tools for older adults

135

136 To measure depression, psychiatry and psychology-social sciences widely employ epidemiological
137 depression scales, clinician-rated instruments, and brief self-report questionnaires (Table 1).
138 Epidemiological and depression screening scales such as the Center for Epidemiologic Studies Depression
139 Scale (CES-D) and the Patient Health Questionnaire-9 (PHQ-9) are commonly used, and they are
140 particularly useful for screening depressive symptoms in epidemiological research and for identifying
141 depressive disorders (35, 36). Clinical diagnostic and severity assessment scales commonly include the
142 Beck Depression Inventory (BDI), the Hamilton Depression Rating Scale (HAM-D), and the Montgomery-
143 Åsberg Depression Rating Scale (MADRS), all of which are widely utilized in psychiatric clinical settings
144 and in evaluating treatment outcomes (37-39). In addition, the Zung Self-Rating Depression Scale (SDS)
145 is a brief self-report measure that enables a comprehensive assessment of depressive symptoms among both
146 general populations and clinical patients (40).

147

148

149 1. Research and epidemiological investigations: CES-D, PHQ-9

150

151 CES-D is a brief self-report instrument developed by Radloff (41) to measure depressive symptoms in the
152 general population. The items of this scale encompass depressive symptoms previously identified and
153 validated in longer instruments, including depressed mood, feelings of guilt and worthlessness, helplessness
154 and hopelessness, psychomotor retardation, loss of appetite, and sleep disturbances. The revised Korean
155 version of the Epidemiologic Studies Depression Scale developed by Lee et al.(42) has been widely utilized
156 for depression screening in both epidemiological research and clinical settings.

157

158 PHQ-9, developed by Kroenke et al. (35), is a self-administered version of the PRIME-MD diagnostic
159 instrument for common mental disorders and is one of the most widely used tools for the screening and
160 assessment of depression in both clinical practice and research. The PHQ-9 consists of nine items based on
161 the DSM-IV diagnostic criteria and was designed to identify major depressive disorder. This scale is a self-
162 report measure assessing the frequency of symptoms experienced over the past two weeks, and it is simple
163 to administer while providing useful information for supporting clinical diagnosis and evaluating symptom
164 severity. The Korean version was revised by Park et al. (43), and its satisfactory validity and reliability have
165 been demonstrated.

166

167 2. Clinical diagnosis and severity assessment: BDI, HAM-D, MADRS

168

169 BDI is one of the most widely used 21-item self-report scales for assessing the severity of depression in
170 both general populations and psychiatric patient groups (37). Developed by Beck and colleagues in 1961
171 on the basis of the cognitive theory of negative distortions as a central mechanism of depression, the scale
172 was later revised into the BDI-IA in 1978 and the BDI-II in 1996, and it no longer adheres to a specific
173 theoretical model of depression. A shortened version suitable for use in primary care, the BDI-FS (BDI Fast
174 Screen for Medical Patients), is also available; this version consists of seven self-report items corresponding
175 to major depressive symptoms experienced over the previous two weeks (44).

176

177 HAM-D was designed for use exclusively with patients diagnosed with depressive affective disorders. This
178 clinician-administered scale quantifies interview findings based on the clinician's observations and
179 interview with the patient, and its usefulness depends heavily on the interviewer's skill in eliciting the
180 necessary information. Clinicians may utilize all available information to conduct the interview and derive
181 a final rating. As such, the HAM-D is frequently employed in depression treatment and research and holds
182 substantial practical value for evaluating treatment outcomes (38).

183

184 MADRS is a representative clinician-rated scale widely used in clinical research and psychiatric practice
185 to assess the severity of depression and evaluate treatment response. Developed by Montgomery and
186 Åsberg (39), the scale is designed to sensitively detect the effects of antidepressant treatment and places
187 greater emphasis on emotional and cognitive symptoms. The Korean version of the MADRS, developed by
188 Kim et al. (45), has demonstrated satisfactory reliability and validity across multiple studies and is
189 commonly employed in psychiatric clinical settings and in research evaluating the efficacy of antidepressant
190 medications.

191

192

193 **3. Brief self-report assessments: SDS**

194

195 SDS is one of the oldest and most widely used self-report instruments for measuring depression. Developed
196 by Zung (40), this scale is a simple tool that enables a comprehensive assessment of the physical,
197 psychological, and emotional symptoms of depression. It is completed by patients themselves and is useful
198 not only for diagnostic purposes but also for evaluating the severity of depressive symptoms.

199

200

201 **4. Geriatric depression scale Korea version**

202

203 **Geriatric Depression Scale Korea version (GDS-K)** was developed to assess the level of depression in
204 older adults and can be administered within a short period of time. The original Geriatric Depression Scale
205 by Yesavage et al. (46) was standardized into a Korean version by Kee and Lee (47) for the purpose of
206 measuring depression in patients with dementia. **GDS-K**, developed by Cho et al. (48), was designed to
207 screen for major depressive disorder based on DSM-III-R criteria in clinical populations.

208

209

210 **THE EFFECTS OF ANIMAL-ASSISTED THERAPY ON DEPRESSION IN** 211 **OLDER ADULTS**

212

213 Several studies have demonstrated that canine-assisted AAT is an effective intervention program for
214 reducing depression in older adults by providing emotional support, facilitating direct interaction,
215 promoting physical activity, and encouraging human–animal bonding (12, 15, 25, 49-52). In particular,
216 interactions with therapy dogs have been shown to increase oxytocin secretion, thereby enhancing
217 emotional stability and positive affect, which significantly contributes to reducing depressive symptoms

218 (53).

219 As shown in Table 2, the AAT program was found to be effective in reducing depression among older adults.
220 Among institutionalized elderly residents, the depression scores of the experimental group decreased from
221 8.00 (± 3.18) at baseline to 4.74 (± 2.54) one week after the intervention and 4.05 (± 2.32) four weeks after
222 the intervention. In contrast, the depression scores of the control group were 7.85 (± 3.13) at baseline, 7.85
223 (± 3.01) one week after the intervention, and 8.10 (± 2.90) four weeks after the intervention. These results
224 indicate that the pre–post differences in the experimental group were statistically significant, whereas those
225 in the control group were not. This finding suggests that animal-assisted intervention can positively
226 influence the psychological and emotional states of institutionalized older adults (12). In addition, among
227 older adults suspected of having mild cognitive impairment, the scores for all sessions remained below the
228 band threshold, demonstrating that AAT had a positive effect on reducing depressive symptoms in this
229 population (49).

230 When an activity program with a companion dog was applied to older adults with mild to moderate
231 dementia residing in long-term care facilities, the depression score of the experimental group (47 points)
232 was approximately 10 points lower than that of the comparison group (57 points) (54). In another study, the
233 application of AAT to dementia patients hospitalized in a geriatric hospital resulted in a decrease in the
234 experimental group's depression score from 8.00 at pretest to 4.00 at posttest, which was statistically
235 significant ($z = -2.22$, $p < .05$), whereas the control group showed no significant change (from 8.33 to 9.67)
236 (15). Furthermore, when AAT was provided to an older couple with mild cognitive impairment, their
237 depression score decreased from 1.33 at pretest to 0.67 at posttest (55).

238 In an AAT intervention conducted at a senior day-care center with older adults diagnosed with mild
239 cognitive impairment, a significant difference was found between the pretest and posttest depression scores
240 in the experimental group ($Z = -2.11$, $p < .05$), whereas no significant change was observed in the control
241 group (50). In addition, when AAT was administered to older adults residing in a nursing home, analysis of
242 changes in depressive symptoms showed that depression scores in the experimental group began to decrease
243 from the sixth session and exhibited a more pronounced reduction after the twelfth session. In contrast, no
244 significant changes were observed in the comparison group (51).

245

246 Taken together, all studies consistently demonstrated that dog-mediated AAT interventions exerted positive
247 effects in reducing and alleviating depressive symptoms among various groups of older adults. Accordingly,
248 AAT has been validated as a non-pharmacological and non-invasive intervention that significantly
249 decreases depression in older adults through several psychological and physiological mechanisms,
250 including affective bonding, increased physical activity and social interaction, and enhanced emotional
251 stability via elevated oxytocin secretion. Notably, the effects of AAT were also maintained among older
252 adults with cognitive impairment or dementia, suggesting that AAT is an effective psychotherapeutic

253 approach capable of integratively improving cognitive, emotional, and social functioning in this population.

254

255

256 **PSYCHIATRIC, PSYCHOLOGICAL, SOCIAL, AND ENVIRONMENTAL** 257 **FOUNDATIONS OF COGNITIVE FUNCTION**

258

259 Cognitive function refers to the mental processes involved in perceiving, remembering, thinking, judging,
260 and solving problems, and represents a higher-order function essential for human adaptation to the
261 environment and for engaging in social interactions. Aging is accompanied by physiological and
262 psychological changes, which affect multiple domains of cognitive function, including attention, memory,
263 executive function, language ability, and visuospatial ability (56, 57).

264 Age-related changes in cognitive function lead to declines in cognitive processing speed and working
265 memory; however, not all cognitive domains deteriorate uniformly. In the domain of attention, selective
266 attention and divided attention tend to decline, whereas in the domain of memory, short-term memory and
267 working memory decrease, but semantic memory and procedural memory remain relatively preserved.
268 Moreover, executive functions such as problem-solving, planning, and inhibitory control gradually decline,
269 and in the domain of language, vocabulary tends to remain stable, whereas name recall and word-finding
270 abilities become slower. In addition, visuospatial abilities, including spatial perception and sense of
271 direction, may weaken. Therefore, to mitigate such cognitive declines, it is essential to enhance cognitive
272 reserve through intellectual activities and social engagement (58, 59).

273 In neuropsychiatry, cognitive reserve refers to the brain's adaptive capacity to mitigate or delay the clinical
274 manifestations of cognitive impairment even in the presence of brain injury or pathological changes (56,
275 60). Cognitive reserve is conceptualized as the efficiency and flexibility of existing neural networks and is
276 explained through two major mechanisms: neural reserve, which enables the maintenance of efficient
277 functioning despite damage, and neural compensation, an adaptive process in which new neural pathways
278 are recruited or alternative brain regions are activated to compensate for impaired functions. Therefore,
279 cognitive reserve should be understood as an integrative model in which lifelong intellectual and social
280 experiences determine the brain's efficiency and compensatory capacity, rather than as a simple
281 consequence of structural or functional brain damage (61, 62).

282

283 **Tools for Assessing Cognitive Function in Older Adults**

284

285 Cognitive assessment in older adults involves the comprehensive evaluation of various cognitive domains
286 such as memory, attention, executive function, language, and visuospatial abilities to screen for and monitor
287 cognitive decline, mild cognitive impairment (MCI), and dementia. Global cognitive function measures

288 commonly used for this purpose include the Mini-Mental State Examination (MMSE), the Montreal
289 Cognitive Assessment (MoCA), the Addenbrooke's Cognitive Examination-Revised/ACE-III (ACE-
290 R/ACE-III), and the Cognitive Assessment Screening Instrument (CASI) (63-66). In addition, specific
291 cognitive domains are assessed using a variety of standardized instruments, including the Rey Auditory
292 Verbal Learning Test (RAVLT), the Wechsler Memory Scale (WMS), the Trail Making Test (TMT-A/B),
293 the Digit Span Test (forward/backward), the Stroop Color-Word Test, the Wisconsin Card Sorting Test
294 (WCST), the Clock Drawing Test, the Boston Naming Test (BNT), the Semantic Fluency Test, the Rey-
295 Osterrieth Complex Figure Test, and the Block Design subtest of the WAIS (67-77). Screening tools for
296 dementia and cognitive impairment include the Korean Dementia Screening Questionnaire (KDSQ), the
297 CERAD Neuropsychological Battery, and the Cognitive Impairment Screening Test (CIST) (78-80).
298 Cognitive measures used to evaluate the effects of AAT interventions encompass global cognitive function
299 assessments such as the MMSE and MoCA; memory function tests such as the RAVLT and CERAD-K;
300 attention and executive function measures including the TMT-A/B and the Rey-Osterrieth Complex Figure
301 Test (ROCF); multidimensional cognitive-emotional assessments such as the ACE-III combined with the
302 MoCA; and standardized quantitative measures such as the CERAD-K and K-MoCA.

303

304 **1. Mini-Mental State Examination (MMSE)**

305

306 The Mini-Mental State Examination (MMSE), developed by Folstein et al (81), is a global cognitive
307 assessment tool that evaluates basic cognitive functions such as orientation, memory, attention, language,
308 and visuospatial constructional abilities. Its key advantages are that it is brief, simple to administer, and
309 widely used for screening cognitive impairment and dementia. It is also useful for measuring overall
310 cognitive changes before and after AAT interventions. Korean versions of the instrument, including the K-
311 MMSE and MMSE-DS, have been validated and are commonly employed in clinical and research settings
312 (82).

313

314 **2. Montreal Cognitive Assessment (MoCA)**

315

316 The Montreal Cognitive Assessment (MoCA), developed by Nasreddine et al.(66), is a cognitive screening
317 tool that evaluates attention, executive function, visuospatial ability, language, memory, abstract reasoning,
318 and orientation. It is more sensitive than the MMSE in detecting mild cognitive impairment (MCI).
319 Therefore, the MoCA is suitable for detecting subtle cognitive improvements resulting from AAT in older
320 adults with mild cognitive impairment. In Korea, a version adapted for specific clinical populations, the K-
321 MoCA, has also been developed (83).

322

323 **3. Rey Auditory Verbal Learning Test (RAVLT)**

324

325 The Rey Auditory Verbal Learning Test (RAVLT), developed by Rey (84), is an assessment tool that
326 evaluates verbal learning and memory abilities, including immediate recall, delayed recall, and recognition
327 memory. It is one of the most widely used instruments for measuring improvements in memory functioning
328 and is particularly useful for objectively verifying the cognitive pathway observed in AAT interventions—
329 where interaction with animals enhances emotional stability, which subsequently improves attention and
330 leads to better memory performance.

331

332 **4. Trail Making Test A & B (TMT-A/B)**

333

334 The Trail Making Test A and B (TMT-A/B), developed by Reitan (85), is a useful instrument for assessing
335 attention, processing speed, and executive functions, particularly cognitive switching. This measure is
336 highly effective in evaluating cognitive flexibility and working memory, thereby allowing the quantification
337 of improvements in attentional focus and planning abilities during participation in AAT.

338

339 **5. Rey-Osterrieth Complex Figure Test (ROCF)**

340

341 The Rey–Osterrieth Complex Figure Test (ROCF), developed by (86)fo, is a useful measure for assessing
342 visuospatial constructional ability, visual memory, and organizational strategies. A key feature of this
343 instrument is its capacity to evaluate cognitive restructuring abilities and the use of memory strategies. In
344 the context of evaluating the effectiveness of AAT, the ROCF allows for a comprehensive assessment of
345 cognitive stimulation effects derived from emotional engagement and social interaction.

346

347 **6. Addenbrooke's Cognitive Examination III (ACE-III)**

348

349 The Addenbrooke's Cognitive Examination–III (ACE-III), developed by Hodges and Larner (64), is a
350 multidimensional cognitive assessment tool useful for differentiating Alzheimer's disease (AD) from
351 frontotemporal dementia (FTD). The ACE series has evolved through several stages: the original ACE
352 (2000), which assessed five domains (orientation, attention/concentration, memory, language, and
353 visuospatial abilities); the ACE-Revised (ACE-R, 2006), which refined items and scoring criteria while
354 strengthening the language and memory components and enhancing international standardization; and the
355 ACE-III (2012), an independently administered version with the MMSE items removed. Subsequent
356 developments include the ACEapp (2013), designed to improve clinical and research efficiency through
357 tablet- and smartphone-based automated scoring, and the Mini-ACE (M-ACE, 2014), a brief version

358 derived from the ACE-III. A Korean version—the Korean Addenbrooke’s Cognitive Examination–Revised
359 (K-ACE)—was developed by Suk et al.(87). The ACE series has established itself as a clinically reliable,
360 multidimensional cognitive screening instrument that overcomes limitations of the MMSE, and ongoing
361 digitalization and development of short-form versions suggest substantial potential for broader clinical and
362 research applications.

363

364 **EFFECTS OF ANIMAL-ASSISTED THERAPY ON COGNITIVE FUNCTION IN** 365 **OLDER ADULTS**

366

367 To prevent cognitive decline in older adults and to maintain neuroplasticity, a multidimensional approach
368 is required—one that integrates not only cognitive training but also emotional stability, social stimulation,
369 and physical activity (56). AAT is regarded as a representative integrative intervention, as it simultaneously
370 stimulates psychiatric (emotional regulation), psychological (motivation and attention), social
371 (interpersonal engagement), and biological (neuroplasticity) mechanisms, making it highly suitable for
372 enhancing cognitive reserve. Unlike traditional cognitive training, AAT provides a more naturalistic and
373 sustainable environment for cognitive stimulation. It serves as a non-pharmacological cognitive-reserve
374 intervention strategy that strengthens the brain’s adaptive and compensatory capacities, and it can enhance
375 therapeutic outcomes for preventive purposes as well as for maintaining residual cognitive abilities in
376 clinical settings (18, 88).

377 Canine-assisted AAT programs have been shown to improve cognitive function among nursing home
378 residents. Specifically, the cognitive function scores of the experimental group increased from 23.16 (± 2.73)
379 at pretest to 24.63 (± 2.06) one week after the intervention and 24.79 (± 2.18) four weeks after the
380 intervention. In contrast, the control group’s scores were 23.65 (± 2.64) at pretest, 23.80 (± 2.28) one week
381 post-intervention, and 23.80 (± 2.35) four weeks post-intervention. The pre–post differences were
382 statistically significant in the experimental group but not in the control group. These findings suggest that
383 activities such as feeding, bathing, walking, holding, and playing with the dog increased physical activity
384 and stimulated cognitive functioning among institutionalized older adults (12). Moreover, even among
385 older adults suspected of having mild cognitive impairment, MMSE-KC scores improved from 15 to 19
386 following AAT (49).

387 In an activity program with a companion dog administered to older adults with mild to moderate dementia
388 residing in a long-term care facility, all participants in the experimental group showed improvements in
389 cognitive function compared to those in the comparison group (54). Furthermore, when AAT was applied
390 to older adults with dementia hospitalized in a geriatric specialty hospital, cognitive function scores in the
391 experimental group increased from 15.83 at pretest to 18.50 at posttest, with particularly significant
392 improvements observed in the subdomains of attention and calculation ($z = -2.07$, $p < .01$) and language

393 function ($z = -2.03, p < .05$) (15). Additionally, in a study applying an AAT program to older adults with
394 mild neurocognitive disorder, the experimental group showed statistically significant improvements in
395 overall cognitive function ($Z = -2.207, p < .05$). Notably, significant effects were also observed in naming
396 ($Z = -2.060, p < .05$) and language ($Z = -2.000, p < .05$). In contrast, the control group showed no
397 statistically significant differences in overall cognitive function ($Z = -1.104, p > .05$) (89).

398 Taken together, most studies indicate that canine-assisted AAT programs exert positive effects on cognitive
399 function in older adults. Significant improvements have been particularly noted in specific cognitive
400 subdomains such as attention, language, and naming.

401 These intervention effects may be attributed to increased physical activity, such as walking, caregiving, and
402 playing; cognitive stimulation; and motivational arousal, which are induced through emotional bonding
403 with the animal. Other benefits include enhanced social interaction and reductions in depression and apathy.
404 In Korea, cognitive outcome variables in AAT studies have primarily been measured using brief cognitive
405 screening instruments such as the MMSE-K and MMSE-KC, with repeated findings of improvement in
406 attention, language, and calculation abilities. Overall, evidence suggests that even short-term programs (4–
407 8 weeks) can produce meaningful cognitive gains, and AAT is evaluated as an effective non-
408 pharmacological intervention for mitigating cognitive decline among older adults with dementia and mild
409 cognitive impairment.

410

411

412 **DISCUSSION AND CONCLUSION**

413

414 This study aimed to identify effective AAT programs for various older adult populations and to propose
415 practical and policy-oriented strategies for maximizing intervention outcomes by conducting a multifaceted
416 analysis of assessment tools for depression and cognitive function—the two representative outcome
417 variables in AAT research. The conclusions drawn from the analysis of research trends on the effects of
418 AAT on depression and cognitive function in older adults are summarized as follows.

419 First, across multiple studies, AAT consistently demonstrated positive effects on depression in older adults.

420 Depression scores in the experimental groups significantly decreased following the intervention, whereas
421 no statistically significant changes were observed in the control groups. The primary mechanisms
422 underlying these effects include affective bonding, increased physical activity, enhanced social interaction,
423 and emotional stabilization through elevated oxytocin levels—encompassing key psychological and
424 physiological pathways. Importantly, reductions in depressive symptoms were also maintained among older
425 adults with cognitive decline or dementia, supporting the characterization of AAT as an integrated
426 psychotherapeutic approach that simultaneously enhances cognitive, emotional, and social functioning. A
427 variety of depression assessment tools—including the CES-D, PHQ-9, BDI, HAM-D, MADRS, SDS, and

428 GDS-K—were used, demonstrating the applicability of AAT across diverse clinical and research settings.
429 Second, canine-assisted AAT programs demonstrated significant improvements in overall cognitive
430 function across diverse older adult populations, including nursing home residents, individuals with mild
431 cognitive impairment (MCI), and older adults with mild to moderate dementia. Notable enhancements were
432 observed in specific cognitive subdomains such as attention, calculation, language, and naming. These
433 effects appear to result from multiple mechanisms, including increased physical activity through interaction
434 with the animal (e.g., walking, caregiving, play), cognitive stimulation, enhanced social engagement, and
435 emotional and motivational arousal. Meaningful improvements have been reported even in short-term
436 programs (4–8 weeks), supporting the conclusion that AAT is an effective non-pharmacological
437 intervention for mitigating cognitive decline in older adults with dementia or mild cognitive impairment. A
438 wide range of multidimensional cognitive assessment tools—including the MMSE, MMSE-KC, MoCA,
439 ACE-III, RAVLT, TMT, and ROCF—were used to evaluate these outcomes, confirming the suitability of
440 these instruments for quantitatively assessing AAT effectiveness. Lastly, although the term “AAT” was not
441 used, the thesis that used interventions that included animal-mediated factors was selected as the analysis
442 target. A list of related papers was secured using keyword search techniques in Research Information
443 Sharing Service (RISS), Koreastudies Information Service System (KISS), Korea Education and Research
444 Information Service (KERIS), DataBase Periodical Information Academic (DBpia), E-article, Kyobo
445 Scholar, Korean Social Science Data Center (KSDC DB), Korean Science (Korea Institute of Science and
446 Technology Information [KISTI]), National Discovery for Science Library (NDSL), National Assembly
447 Library, and Google Scholar, among others (as of September 1, 2025). Additionally, related research was
448 searched by linking animal mediation, animal mediation activity, animal mediation program, companion
449 animal mediation therapy, companion animal mediation activity, pet mediation activity, pet mediation
450 therapy, pet mediation activity, animal mediation, animal mediation activity, animal mediation activity,
451 mediation dog use, animal sympathizing activity, animal mediation education (AAE), animal mediation
452 healing, and animal auxiliary therapy, among others.

453
454 In conclusion, AAT for older adults functions as a non-pharmacological intervention that simultaneously
455 promotes emotional stability, cognitive enhancement, increased social participation, and greater physical
456 activity, making it applicable for both preventive and therapeutic purposes. Accordingly, future AAT
457 programs should incorporate individualized designs tailored to participants’ health conditions and needs,
458 along with multidisciplinary approaches to intervention delivery. Continued research is also required to
459 examine the long-term effects of AAT and its cultural applicability. From a policy perspective, accumulating
460 evidence on the effectiveness and safety of AAT is essential to support its institutionalization and wider
461 implementation in the fields of geriatric welfare, mental health, and rehabilitation.

462 A limitation of this study is that many of the key studies cited had small sample sizes (n=3–41) and

463 employed single-group or non-randomized designs, or adopted a single-case study approach. While this
 464 systematic review acknowledges these limitations, it did not critically assess issues such as risk of bias,
 465 blinding, or the appropriateness of the control groups.

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666 **A Review of Animal-Assisted Therapy for Older Adults in South Korea: Effects on**
667 **Depression and Cognitive Function and Implications for Practice**

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670 **Table 1. Depression Measurement Tools**

Measurement Tools	Description
CES-D	Self-report scale for assessing depression in the general population
PHQ-9	Self-administered diagnostic tool for psychiatric patients
BDI	Self-report scale for evaluating depression severity in both general and clinical populations
HAM-D	Scale designed for patients diagnosed with depressive affective disorders
MADRS	Clinician-rated scale used in clinical research and psychiatric practice to assess depression severity and treatment response
SDS	One of the most widely used self-report scales for measuring depression
GDS-K	Standardized Korean version of the Geriatric Depression Scale

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673 Table 2. Effects of AAT on Depression in Older Adults

Researchers (Reference)	Participants (n)	AAT Intervention Method	Measurement Tools and Key Findings
Shin et al. (12)	Older adults aged 65 or older residing in a nursing home in Daegu (n = 41)	<ul style="list-style-type: none"> □ 12 sessions, once weekly for 2 hours, nursing home residents □ Experimental group (n = 19), Control group (n = 22) 	<ul style="list-style-type: none"> • Pretest–posttest–follow-up assessment using the SGDS-K scale • Key findings: Depression scores in the experimental group showed a statistically significant reduction, whereas no significant change was observed in the control group
Choi et al. (49)	Older adults aged 65 or older suspected of mild cognitive impairment (n = 3)	<ul style="list-style-type: none"> □ 15 sessions, once weekly for 30 minutes, older adults suspected of mild cognitive impairment □ Single-case experimental design; Experimental group (n = 3) 	<ul style="list-style-type: none"> • Depression assessed at each session using the Geriatric Depression Scale-K • Key findings: A sustained reduction in depressive symptoms was observed in all participants throughout the intervention period
Kim et al. (52)	Older adults aged 65 or older with mild to moderate dementia residing in a nursing home (n = 6)	<ul style="list-style-type: none"> □ 12 sessions, twice weekly for 1 hour, nursing home residents with mild to moderate dementia □ Experimental group (n = 3), Comparison group (n = 3) 	<ul style="list-style-type: none"> • Pretest–posttest assessment using the Zung Self-Rating Depression Scale • Key findings: All participants showed reductions in depressive symptoms following the AAT
Lee et al. (15)	Older adults aged 70 or older with dementia hospitalized in a	<ul style="list-style-type: none"> □ 11 sessions, twice weekly for 60 minutes, dementia patients in a geriatric hospital 	<ul style="list-style-type: none"> • Pretest–posttest assessment using the SGDS-K scale • Key findings: A significant

	geriatric hospital K (n = 12)	<input type="checkbox"/> Experimental group (n = 6), Control group (n = 6) <input type="checkbox"/> Ethical considerations addressed	reduction in depressive symptoms was observed in the experimental group of older adults with dementia
Jang et al. (55)	Two older adult couples with mild cognitive impairment attending a Dementia Relief Center (n = 4)	<input type="checkbox"/> 8 sessions, once weekly for 50 minutes, older adult couples with mild cognitive impairment at a Dementia Relief Center <input type="checkbox"/> Experimental group (n = 4) <input type="checkbox"/> Ethical considerations addressed	<ul style="list-style-type: none"> •Pretest–posttest assessment using the SGDS-K scale •Key findings: A positive effect on depressive symptoms was observed in older adult couples with mild cognitive impairment
Oh et al. (2024)	Older adults diagnosed with mild cognitive impairment at two senior day-care centers (n = 20)	<input type="checkbox"/> 12 sessions, twice weekly for 60 minutes, older adults attending two senior day-care centers <input type="checkbox"/> Experimental group (n = 10), Control group (n = 10) <input type="checkbox"/> Ethical considerations addressed	<ul style="list-style-type: none"> •Pretest–posttest measurement using the Geriatric Depression Scale Short Form–Korean Version •Key findings: A significant difference was observed between pretest and posttest depression scores in the experimental group
Shin et al., (51)	Older adults residing in a nursing home (n = 14)	<input type="checkbox"/> 12 sessions, older adults residing in a nursing home <input type="checkbox"/> Experimental group (n = 7), Comparison group (n = 7) <input type="checkbox"/> Ethical considerations addressed	<ul style="list-style-type: none"> •Pretest–posttest comparison using the Center for Epidemiologic Studies Depression Scale •Key findings: Depression scores in the experimental group began to decrease from the sixth session and showed a more pronounced reduction after the twelfth session

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676 **Table 3. Cognitive Function Assessment Methods**

Assessment Tools	Measurement Methods	Assessment Domains
MMSE, K-MMSE	·Examiner reads questions, and examinee responds verbally or through actions	·Screens overall cognitive function, including orientation, memory registration and recall, attention, language, and visuospatial construction ·Widely used as an initial screening tool for dementia and cognitive decline
MoCA, K-MoCA	·Examiner provides step-by-step instructions for task performance	·More sensitive than the MMSE for detecting mild cognitive impairment (MCI).
RAVLT	·Fifteen words are presented auditorily over five trials, followed by immediate recall after each trial ·An interference list is presented, followed by delayed recall and recognition memory tasks	·Assesses changes in memory improvement or attentional performance
TMT-A/B	·TMT-A: Examinee connects numbers (1–25) sequentially with lines ·TMT-B: Examinee alternately connects numbers and letters (1–A–2–B..) while completion time is recorded.	·Measures attention, processing speed, working memory, and executive shifting ability ·TMT-B reflects frontal lobe executive functioning
ROCF	·Examinee copies a complex figure by visually observing it ·Reproduction from memory is performed after a 3–30 minute delay	·Assesses visuospatial constructional ability, visual memory, and planning/organizational strategies
ACE-III, K-ACE	·Comprehensive cognitive test including verbal and visuospatial tasks	·More detailed than the MMSE, assessing five cognitive domains: attention, memory, language,

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Table 4. Effects of AAT on Cognitive Function in Older Adults

Researchers (Reference)	Participants (n)	AAT Intervention Method	Measurement Tools and Key Findings
			verbal fluency, and visuospatial ability
Shin et al. (12)	Older adults aged 65 or older residing in a nursing home in Daegu (n = 41)	□ 12 sessions, once weekly for 2 hours, nursing home residents □ Experimental group (n = 19), Control group (n = 22)	• Pretest–posttest–follow-up assessment using the K-MMSE • Key findings: Cognitive scores in the experimental group showed statistically significant improvement, whereas no significant change was observed in the control group
Choi et al. (49)	Older adults aged 65 or older suspected of mild cognitive impairment (n = 3)	□ 15 sessions, once weekly for 30 minutes, older adults suspected of mild cognitive impairment □ Single-case experimental design; Experimental group (n = 3)	• Pretest–posttest assessment using the K-MMSE • Key findings: Word recall consistently improved during the intervention period, and verbal fluency and word recognition were maintained across sessions
Kim et al. (52)	Older adults aged 65 or older with mild to moderate dementia residing in a nursing home (n = 6)	□ 12 sessions, twice weekly for 1 hour, nursing home residents with mild to moderate dementia □ Experimental group (n = 3), Comparison group (n = 3)	• Pretest–posttest comparison using the CERAD-K evaluation items (K-MMSE, verbal fluency, Boston Naming, word list, constructional praxis, and constructional recall) • Key findings: All participants demonstrated improvements in cognitive function following animal-assisted activities

Lee et al. (15)	Older adults aged 70 or older with dementia hospitalized in a geriatric hospital K (n = 12)	<ul style="list-style-type: none"> □ 11 sessions, twice weekly for 60 minutes, dementia patients in a geriatric hospital □ Experimental group (n = 6), Control group (n = 6) □ Ethical considerations addressed 	<ul style="list-style-type: none"> • Pretest–posttest comparison using the K-MMSE • Key findings: Significant improvements were observed in the experimental group in the subdomains of attention/calculation and language
Jang et al. (89)	Older adults with mild neurocognitive disorder attending a senior day-care center (n = 10)	<ul style="list-style-type: none"> □ 12 sessions, once weekly for 50 minutes, older adults with mild neurocognitive disorder □ Experimental group (n = 6), Control group (n = 4) □ Ethical considerations addressed 	<ul style="list-style-type: none"> • Pretest–posttest measurement using the K-MoCA • Key findings: The experimental group receiving AAT showed statistically significant improvements in cognitive function

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