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Effect of animal assistant therapy on quality of life in older adults: A meta-analysis

Berna Dincer, RN, PhD[a,*], Nefise Bahçecik, RN, PhD[b], Alfonso Sollami, RN, PhD[c]

[a] Istanbul Medeniyet University Faculty of Health Sciences, Department of Medical Nursing, Istanbul Medeniyet University, Health Science Faculty, Cevizli Yerleşkesi, Şehit Hakan Kurban Caddesi, No:44, 34862, Kartal/İstanbul/Turkey
[b] Istanbul Sabahattin Zaim University Faculty of Health Sciences, Department of Nursing, Halkalı Kampüsü Eğitim Bilimleri Binası, 2. Kat - Küçükçekmece/ İstanbul /Turkey
[c] University Teaching Hospital, Via Don Tonani, 17, 43126 Parma, Italy

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ABSTRACT

This meta-analysis was conducted to determine the effect of animal-assistant therapy on the quality of life of older adults. This research systematically searched electronic databases (CINAHL, Cochrane Central, Medline/PubMed, Web of Science, Science Direct, and the National Thesis Centre and ULAKBİM of the Council of Higher Education) for studies published between April – June 2021. Seven studies with experimental design were used, three were quasi-experimental and four were randomly controlled studies. The total sample size in the meta-analysis was 375 (experimental group: 177 and control group: 198). The mean duration of animal-assistant therapy was 38.5 ± 12.4 min. Animal-assistant therapy had a significant effect on the quality of life of older adults (mean difference: -4.59 p: 0.03, Z:2.23). Therefore, animal assistant therapy is an effective method to improve older adults' quality of life.

Introduction

The human-animal bond is a mutual, beneficial, and dynamic relationship between humans and animals that positively affects both health and well-being.[1] Animal-Assistant Therapy (AAT) is a treatment method where eligible animals that have certain criteria are involved in a treatment process to promote improvement in human physical, social, emotional, or cognitive functions.[1–3] AAT is applied in all age groups for individuals with dementia or other mental problems that cause difficulty in communication. Research states that it is suitable for use in nursing care and practices in various patient populations.[1–4] AAT is a non-pharmacological treatment approach with scientifically proven efficacy that facilitates treatment, provides rehabilitation, increases quality of life, and offers motivational and therapeutic benefits.[4,5] Nearly half of the older adults in the USA own a pet.[6,7]

Older adults may suffer from chronic diseases and a reduced quality of life, restricting their activity in the society. Therefore, works done with the geriatric population have often focused on maintaining their quality of life. Quality of life is directly or indirectly affected by an individual's stress levels, pain levels, vital signs, mood, self-esteem, and social interaction. In older adults, quality of life is related to living without being isolated from the society, having suitable living conditions, maintaining relationships with friends and neighbors, and devoting time to meaningful pursuits for themselves and the society.[7,8] AAT is often used in this population to improve their quality of life.[8]

A study conducted in Italy determined that AAT, given over three months to 144 older adults living in a nursing home without cognitive impairment, had positive effects in terms of psychological symptoms and quality of life.[9] There are many clinical studies in the literature reporting that animals reduce the feelings of solitude and anxiety of older adults, encourage social interaction, make their lives more active, and increase their quality of life.[10–16] AAT is an interdisciplinary practice that serves human health. AAT teams include physicians, nurses, occupational therapists, physiotherapists, therapeutic recreation specialists, social workers, speech therapists, and mental health specialists.[3,17] Many studies in this field are carried out under the guidance of nurses.[17] Thus, important responsibilities fall upon nurses in AAT, as it is a clinical approach that aims to promote forming beneficial bonds between humans and animals for both preventive and therapeutic purposes.

The Nursing Interventions Classification (NIC) defines animal-assistant practices as "Animal-Assistant Therapy". In this context, it is an applicable intervention method within the scope of nursing

*Corresponding author at: Istanbul Medeniyet University Faculty of Health Sciences, Department of Medical Nursing, Istanbul Medeniyet University, Health Science Faculty, Cevizli Yerleşkesi, Şehit Hakan Kurban Caddesi, No:44, 34862, Kartal / İstanbul /Turkey.
E-mail addresses: berna.dincer@medeniyet.edu.tr, bernadincer3@gmail.com (B. Dincer), asollami@ao.pr.it (A. Sollami).

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practices. Nurses can perform AAT as a member of the team or as an independent nursing initiative during the care process.[17]

There are several studies in the literature which showed that AAT has a positive psychological effects in older adults,[10–16] who represent a major part of the population to whom this therapy is provided. Although several studies have focused on AAT, there has been no meta-analysis on AAT and its effect on the quality of life of older adults. This meta-analysis examines studies that investigate the effect of AAT applied as a nursing intervention on the quality of life of older adults. These results can provide evidence-based recommendations for patients, caregivers, and decision-makers in the fields of geriatric care and encourage further research with appropriate methodology. It was also believed that this meta-analysis could be effective in the dissemination of the use of AAT as an intervention method in nursing care and practices. The aim of this study is to determine the effectiveness of animal-assistant interventions in improving the quality of life of older adults in experimentally designed studies.

Methods

The PRISMA Statement (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) was followed to determine the effectiveness of AAT in improving quality of life in older adults.[18] Before starting the study, a meeting was held with the researchers and a common roadmap was established. The review was registered in the International Prospective Register of Systematic Reviews (PROSPERO - Registry No CRD42021257665).

Eligibility criteria

7 studies published in both Turkish and English between 2014-2019 were included. The eligibility of the studies for the meta-analysis was tested independently by the researchers under the following criteria (PICOS):

Population: Older adults aged 65 years or higher, without cognitive disfunction, and to whom animal-assistant therapy was applied.

Intervention: Animal-assistant therapy.

Comparison: Individuals given or not given animal-assistant therapy.

Outcomes: Animal-assistant therapy involving nurses and assessing quality of life using the QUALID scale.

Study Design: Studies which have an experimental design suitable for the subject were included.

Reviews, case reports, qualitative studies, and congress papers that were published in both Turkish and English languages.

Search strategy

A search was made using CINAHL, Cochrane Central, Medline/PubMed, Web of Science, Science Direct, and the National Thesis Centre and ULAKBİM of the Council of Higher Education search engines to access articles published in international journals. The search was carried out in both Turkish and English languages between April 1st, 2021 and June 1st, 2021, without a limitation on year. During the search, medical subject headings (MESH) containing the keywords "elder\older," "quality of life," "animal therapy," "animal-assistant therapy," "nurse," and "nursing intervention" were combined with "or" and "and."

Studies selection

The identification and selection of studies for this systematic review and meta-analysis were performed independently by the first and second researchers based on the eligibility criteria by title, abstract, and full text, respectively. When there was a disagreement about a study, a discussion was made until a decision was reached. The bibliographies of the studies were searched to identify any further research that could be included. The PRISMA flowchart regarding the selection process of the studies was shown in Fig. 1.

Data extraction and bias risk assessment

A standard data extraction tool was used by the researchers to obtain the data. This tool included data regarding the year, country, sample size, data collection tools, quality assessment outcome, applied intervention and duration, study design and purpose, and quality of life measurement results of studies. This process was carried out independently by the first and second researchers. Meta-analysis data were determined to examine the efficacy of AAT. Finally, full-text articles that met the eligibility criteria were reviewed (Fig. 1). The results of the systematic search were imported to a reference manager, Endnote software. The risk of bias of studies with an experimental design was evaluated using the Joanna Briggs Institute critical evaluation checklist.[19] The quality review results were given in Table 1.

Data analysis

The findings of the studies were analyzed using Reviewer Manager version 5.4.1. The random-effects model is a strategy used to address statistical heterogeneity.[20] I^2 is considered a useful statistic for measuring statistical heterogeneity, where $I^2<50\%$ assumes absence of statistical heterogeneity and $I^2\geq50\%$ suggests significant heterogeneity.[20] Heterogeneity between studies was evaluated using the Higgins I^2 test and the random effect model was used when $I^2>50\%$ and $p>0.1$. A 95% confidence interval (CI) was calculated for each outcome variable. All tests were calculated as two-tailed and a p-value less than 0.05 was considered statistically significant.

Results

Search results

The search initially yielded 71014 articles. After examinations were made according to title, abstract, and full text, respectively, and repetitive records were removed, 230 articles were obtained. Studies published in different languages, those conducted in other populations, and those with different study protocols were removed, obtaining 7 remaining articles.[21–27] Data extraction was performed with 7 experimental studies. Explanations about the selection of the articles are shown in Fig. 1.

Risk of bias and quality assessment

The seven experimental studies included were three quasi-experimental [21,22,25] and four were randomized controlled studies. and four randomly controlled studies.[23,24,26,27] All studies evaluated the mental status of older adults.

Only one of the quasi-experimental studies did not clearly specify what was done in assistant intervention,[22] while the other two described the specifics.[21,25] Also, the pre-test to post-test evaluations and statistical methods were found to be appropriate.

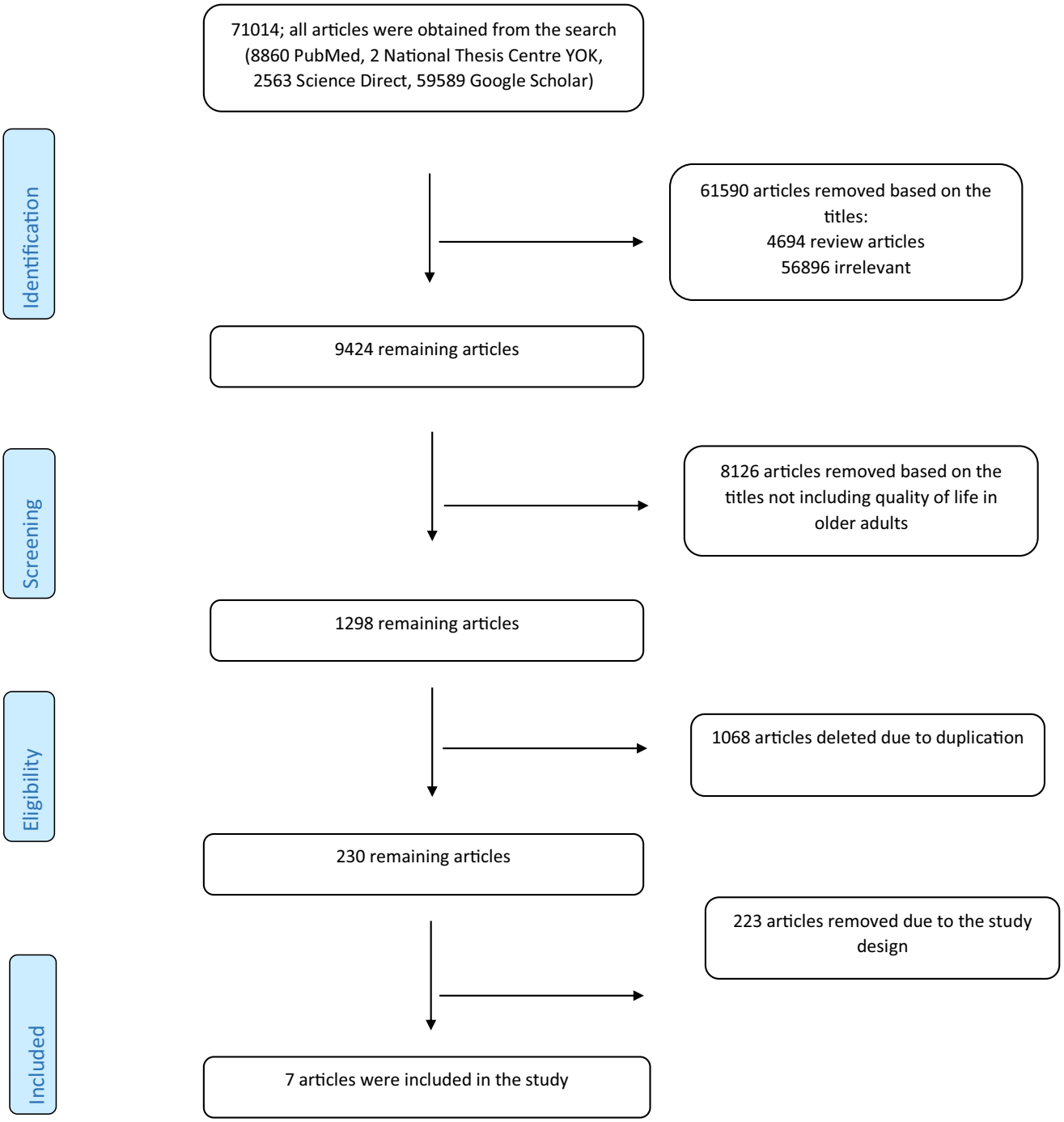

Fig. 1. Systematic Literature Review (PRISMA FLOW DIAGRAM).

All the randomly controlled studies clearly explained the allocation randomization, but none blinded the researchers to the allocation. However, it was not possible to blind the participants and the individuals conducting the research who performed the intervention during animal assistant ıntervention as it is easy to identify them.[28] In addition, scales with established validity and reliability were used in all studies and appropriate statistical analysis were performed. The completion rate of the animal-assistant ıntervention ranged from 85% to 100% in the seven studies. In addition to the possible risk of bias, the risk of compliance bias was also evaluated. Bias risk evaluation is shown in Table 1.

Study characteristics

The total sample size of the studies was 375 (experimental group: 177 and control group: 198). There were no studies in Turkish and all 7 were published in English. The mean age of the older adults was 82.35 ± 2.55 (min: 77, max: 85). Three studies were performed in Sweden,[21,22,25] two in Norway,[23,24] one in Spain,[26] and one in Italy.[27] In most of the studies, animal-assistant therapy was performed by a professional dog handler,[21,23–25,27] whereas in two of the studies, the therapist performed the intervention after receiving appropriate training[22,26]. Interventions with dogs often included playing with

Table 1
Characteristics of the Studies Included in the Review.

Author Country	Sample	Type of study	Data Collection	ROB	Study Duration Intervention	Aim of study	Results
Kårefjärd & Nordgren (2018)	Older adults with dementia residing in nursing homes. ■ 81 years ■ *N* = 59	Pre-test-Post-test study	QUALID	+?++-++++ 7\9	*Baseline- post-test:88 day *Playing with the dog, walking the dog, grooming, or sitting down or lying on the bed, petting and talking with the dog	The aim of the study was to investigate the effects of dog-assistant intervention on quality of life in nursing home residents with dementia.	The results indicate that dog-assistant interventions can have positive effects on quality of life in nursing home residents with moderate to severe dementia.
Nordgren & Engström (2014) Sweden	■ Older adults with dementia residing in nursing homes. ■ 83 years ■ *N* = 11	Pre-test-Post-test study	QUALID	+?-++++?? 5\9	*First, the therapy dog teams were trained for about 40 hr with an instructor. Next, they were clinically trained for approximately 200 hr (6-12 months) in different environments. The median duration of the intervention was 12 weeks.	To evaluate the effects of Animal-Assistant Therapy (AAT) on quality of life (QoL) in people with dementia in four Swedish nursing homes.	Even though the effects of AAT may not be discernible over longer periods of time, there are still immediate effects that can promote better QoL for people living with dementia.
Olsen et al. (2016) Norway	■ Older adults with Alzheimer's in a day care centre ■ 84 years ■ *N* = 42 → 41	Randomized controlled study	*Berg Balance Scale *QUALID	+++++-+++++++ 12\13	*The intervention consisted of 30-min sessions \twice per week for 12 weeks. *The participants were randomly seated in a half-circle, and the dog handler moved around the group so that each participant was able to greet the dog and feed it treats. Next, the handler organized different activities such as petting the dog, brushing the dog, feeding the dog a treat, or throwing a toy for the dog to fetch.	The purpose of the study was to examine if animal-assistant activity (AAA) with a dog in home-dwelling persons with dementia attending day-care centers would have an effect on factors related to risk of fall accidents, with balance and quality of life as main outcomes	No significant difference at pre-test was found in QUALID. For QUALID, the mean score of the control group was 15.94 at T0, 16.52 at T1, and 15.23 at T2, while for the AAA group the scores were 15.89, 16.28, and 16.65 respectively. No effect of the intervention was found on QoL
Olsen et al.(2016) Norway	■ Older adults with cognitive impairment or dementia residing in nursing home ■ 82.9 years ■ *N* = 28 → 25	Randomized controlled study	*Cornell Scale for Depression in Dementia *Brief Agitation Rating Scale * QUALID	++++-?++++++ 11\13	*■ Activities with a therapy dog for 30 min ■ 24 times ■ 12 weeks ■ Qualified dog handler *Each session started with a greeting round, when each participant had the opportunity to pet the dog and feed it treats. Thereafter, the handler started the different activities, which included any of the following: petting the dog, feeding the dog a treat and throwing a toy for the dog to fetch	To examine the possible effects on depression, agitation and QoL in nursing home residents with dementia or cognitive impairment	■ Significant changes in : Balance§ (IG) ■ Nonsignificant changes in : Balance§ (CG) : Quality of life¶ (IG, CG)
Sánchez-Valdeón et al. (2019) Sweden	Alzheimer-type dementia, being a regular user of the day care center	Pre-test-Post-test study	*Reisberg's Global Deterioration Scale *QUALID	+++-+++++ 8\9	*Activities with a therapy dog for half an hour ■ weekly ■ 3 months *Guided motion Exercises, walking (voluntary initiation of walking, running in a straight line, turning	Improving the quality of life of people with Alzheimer's disease, primarily as regards to behavioral and psychological symptoms. We implemented canine-assistant	QUALID scale decreased significantly

(*continued*)

Table 1 (*Continued*)

Author Country	Sample	Type of study	Data Collection	ROB	Study Duration Intervention	Aim of study	Results
					around, and stopping voluntarily), animal-human interaction techniques (eye-tracking, stroking, and reacting to stimuli from the dog)	therapy in a group of people with this disease.	
Soler et al. (2015) Spain	■ Older adults with dementia residing in nursing home ■ 84.7 years	Randomized controlled study	*Global Deterioration Scale (GDS) *Neuropsychiatric Inventory (NPI) Apathy Scale for Institutionalized Patients with Dementia Nursing Home version (APADEM-NH) *Apathy Inventory (AI) *QUALID	+??+?-+++++++ 9\13	*Activities with a therapy dog for 30-40 min ■ 2 days a week ■ 3 months * All sessions had the same overall structure: greeting the group, introduction, therapeutic exercises (cognitive or physical therapy) and ending	To test the effect of introducing a humanoid robot (NAO), a pet robot (PARO) and a real trained animal (DOG) in the therapeutic sessions for patients with dementia in relation to behavior changes, apathy and quality of life.	Patients in the robot groups showed an improvement in apathy; patients in NAO group showed a decline in cognition as measured by the MMSE scores, but not the sMMSE; the robot groups showed no significant changes between them; QUALID scores increased in the PARO group rather than dog group
Sollami et al. (2017) Italy	■ Older adults residing in nursing home ■ 85.07 years	Before and after intervention, Experimental-control group study	*Anxiety (HAM-A) *Depression (GDS) *Apathy (AES) *Loneliness (UCLA) *QUALID	++++-?+++++++ 11\13	* Activities with a therapy dog for 60 min ■ 2 times a week ■ 8 week *Participants played fun activities with the dog such as fetch games, hidden objects searches, fun dramas, giving basic and complex orders to the animal and walking with the dog.	To verify the effectiveness of pet therapy in improving the well-being of older adults living in a nursing home	Significant changes in *Reduction in anxiety, depression and apathy in the experimental group compared to the control group, * Improved quality of life.

ROB: Risk of Bias (JBI Critical Appraisal Checklist), **QUALID**: the Quality of Life in Late-Stage Dementia

dogs, walking, grooming and feeding dogs, and hidden objects searches.

The mean duration of AAT was 38.5 ± 12.4 min (min: 30 - max: 60), with 30-minute sessions being the most common. All studies used trained dogs. Each study was conducted at different times and the most common application period was 12 weeks. The baseline characteristics of all studies are shown in Table 1.

Efficacy of AAT

When the studies included in the meta-analysis were examined for heterogeneity, it was seen that there was heterogeneity among the studies (Heterogeneity: Tau^2 = 0.45; Chi^2 = 36.55, df = 6 $p < 0.00001$; I^2 = 84%)

Table 2 and Fig. 2 showed the analysis results of the 7 studies for examining the effect of AAT on the quality of life of older adults. The combined results of these studies showed that AAT positively affects the quality of life in older adults.

Discussion

It is known that animal-assistant therapy has therapeutic effects such as facilitating the rehabilitation and treatment of patients, improving their quality of life, supporting the treatment of disorders that negatively affect mental health, and consequently, positively affecting health by activating physiological and psychological mechanisms.[14,15]

This meta-analysis presented the combined results of 7 experimental studies on the effects of AAT on quality of life in older adults. Based on the data obtained from these studies, we determined that AAT positively affects the quality of life of older adults. Health professionals can increase the quality of life of older adults by both teaching and applying AAT.

A high level of heterogeneity was observed in this meta-analysis. High heterogeneity is recommended to sensitively analyze variables like population, intervention, outcomes, and measurement methods, which may affect the results of studies.[29] The population consisted of older adults, AAT was performed as an intervention, and the resulting quality of life in these individuals was evaluated. However, the styles, durations, and frequencies of the application varied among the studies. Most of the studies were performed by a professional AAT dog handler.[21,23–25,27] Hence, the high heterogeneity might be associated with the fact that there was no standard application for AAT among the studies.

Overall, the included studies were found to have a low risk of bias. Some studies did not provide sufficient information about the applied intervention or vaguely addressed their methodological evaluations and risk of bias. Participants and practitioners were not blinded in any study. The double-blind methodology can be difficult to apply in randomized trials regarding non-pharmacological treatments.[28]

Table 2
The effect of animal-assistant therapy.

Study	Animal-assistant therapy (n)	Control (n)	Total (n)	SMD	ES	95% CL (SMD)	Weight (%)
Kårefjärd & Nordgren (2018)	44	59	103	-0.53	1.4231	-0.93 to -0.13	16.7%
Nordgren & Engström (2014)	9	20	29	-0.68	2.9411	-1.49 to 0.13	13.2%
Olsen et al. (2016) (1)	41	38	79	0.35	0.9056	-0.09 to 0.79	16.4%
Olsen et al. (2016) (2)	23	25	48	-0.22	2.4336	-0.79 to 0.35	15.4%
Sánchez-Valdeón et al. (2019)	10	10	20	-2.13	2.5916	-3.28 to -0.99	10.4%
Soler et al. (2015)	36	32	68	-0.06	1.6229	-0.53 to 0.42	16.1%
Sollami et al. (2017)	14	14	28	-2.26	1.7609	-3.24 to -1.28	11.7%
Total (random effect)	177	198	375	-0.65	1.50	-1.21 to -0.09	100%
	Mean difference: -4.29 [-8.63 to -056] p: 0.03 Z:2.23						

Heterogeneity: $Tau^2 = 0.45$; $Chi^2 = 36.55$, df = 6, $p < 0.00001$; $I^2 = 84\%$.
Cl: Confidence Interval; ES: Effect size; SMD : Standard Mean Difference.

This meta-analysis covered studies conducted between 2014-2019 and included only those focusing on the effect of AAT on quality of life. Unlike previous meta-analysis, recent studies were also included. Although the studies differed in terms of results, duration of AAT, and method of application, AAT seems to contribute to the recovery of individuals both physically and spiritually. In the studies, nurses were included in the AAT teams. Intentional and planned activities were carried out by ensuring that the older adults and animals interacted within the scope of AAT. Almost all the studies used live dogs, while only one used live dogs along with NAO (a humanoid robot) and PARO (a pet robot) for AAT.[26] NAO and PARO along with live animals has been used before for AAT. The reason for using NAO and PARO was because the participating individuals could be afraid of live animals during the application or develop allergic reactions to the animals that make the use of robotic animal preferred over live ones in AAT.[26,30] In all studies, a run-in session with a live animal was performed with the participants and their allergic reactions were questioned initially.

AAT is applied in many different institutions and organizations such as nursing homes, day-care centers, and hospitals with a team approach that involves nurses. In these studies, AAT was mostly applied to individuals who received care in healthcare institutions.

In almost all studies, quality of life increased significantly in individuals who performed AAT, except for two, which reported no significant change.[23,24] In both studies, the quality of life of the participants was found quite high at baseline. As a result of the meta-analysis, we found that AAT is an effective method in increasing people's quality of life. Many meta-analysis and systematic reviews, both with AAT only [10,12–14] and AAT + robot animals[11,16] concluded that the practice improved quality of life in older adults.

Limitations

One of the limitations of this study was that only studies published in Turkish and English were included. In addition, it is not possible to generalize the results of the study to the geriatric population worldwide. Another limitation was the inability to access the full texts of studies while scanning the literature. Also, in most of the studies reached, the sample did not only include older adults and some of the experimental methods were not appropriate. These factors have caused some loss of data for the meta-analysis and thus were considered limitations that increase heterogeneity.

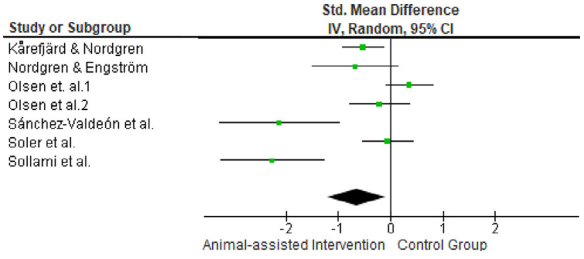

Fig. 2. Forest plot showing changes after animal-assistant therapy.

Implications for future research

In future research, random sequence and allocation concealment should be considered and reported for randomized controlled studies. Where blinding of patients or researchers is not possible, we recommend to hide and blind the allocation of outcome assessors to avoid selection bias and detection bias. There was no study on this subject in Turkish, which suggests a need for such research in Turkish by taking into consideration the cultural characteristics. During the conduct of animal-assistant intervention, consideration should be given to factors that may affect the application and protocol and these should be appropriately reported.

Conclusion

AAT is simple and easy to perform for healthcare professionals. This meta-analysis found that AAT has the potential to improve quality of life in older adults. Health professionals, caregivers, family members, and patients themselves can apply this simple technique to improve their quality of life. With this practice, people can also achieve a happier, more peaceful, and healthier life, along with an improved quality of life. However, more research could still increase the strength of evidence regarding the efficacy of AAT and contribute to the literature. Further systematic reviews and meta-analysis are needed to provide more conclusive evidence for using AAT to improve quality of life.

Contributions

Study design: BD, NB, AS,; data collection and management: BD, NB; data analysis; BD; manuscript preparation: BD, NB, AS

Declaration of Competing Interest

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

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