Effects of Dog Assisted Therapy on Social Behaviors and Emotional Expressions: A Single-case Experimental Design in Three People with Dementia

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Authors' Note

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Supplemental Material

Supplemental material for this article is available online.

Abstract

This study examined the effects of dog assisted therapy (DAT) on social behaviors, emotional manifestations and experience during the activity of 3 people with dementia residing in a specialized dementia unit. The study used an A-B-A-B withdrawal single-case experimental design with two five-session phases, baseline and DAT, replicating the same activities in each phase. The sessions were recorded and two independent coders quantified the frequency of social behaviors along with an assessment of the emotional manifestations and experience during the activity. Comparing with baseline sessions, DAT sessions showed an increase in prosocial behaviors (leans, looks, and verbalizations) and a significant impact on emotional manifestations with heightened pleasure. DAT sessions also led to a better experience, with higher participation, pleasure and relationship with others, together with lower rejection and displeasure than in the baseline sessions. DAT seems to be a non-pharmacological therapy with potential to improve quality of life of people with dementia through promoting social behaviors and positive emotional manifestations.

Keywords

Animal-assisted therapy, dementia, non-pharmacological therapy, social behavior, emotion

Introduction

Dementia is one of the main causes of disability among older people, and its incidence is increasing in step with an ageing population. Current estimates suggest that 46.8 million people worldwide are living with dementia, and this number is expected to double every 20 years to 131.5 million by 2050.[1]

The lack of an effective pharmacological treatment for stopping or delaying the progression of dementia has generated an interest in non-pharmacological therapies (NPT) as a complement to the pharmacological treatment that may improve the quality of life of people with dementia (PwD). Physical comfort, emotional wellbeing and interpersonal relationships are considered key components of quality of life,[2] together with participation in meaningful activities.[3] However, PwD often lack the necessary skills to establish effective communication, which means their social interactions are limited. Some studies report that nursing home residents with dementia may spend up to 22% of their waking hours on their own.[4] Furthermore, in many cases the feeling of helplessness and lack of initiative that many PwD experience, together with the dearth of activities provided in nursing homes, mean they may spend most of their time doing nothing,[4-6] while on other occasions the activities that are provided do not suit the residents' functional level or interests.[7] Thus, it is important to identify those NPT that provide PwD with an opportunity to participate in meaningful activities that foster social interaction, stimulate mental skills, and increase their awareness and participation in the world around them,[8] which is seen as a way of reinforcing the participants' dignity and self-esteem.[9]

Animal-assisted intervention (AAI) is one such NPT that has shown promising results in this sense. AAI encompasses a series of intervention methods, and several different terms have been coined that reflect this: resident dogs, animal-assisted therapy, animal visitation, pet therapy, animal-assisted activities…[10] In this study we will focus on animal-assisted therapy (AAT), which can be defined as a form of intervention designed to promote the physical, social, emotional

and/or cognitive enhancement of the target population through a specialized and trained intervention team (human-animal team). AAT is supervised and developed by a health professional with experience within their professional scope. Each participant has their own specific goals, and the process is documented and assessed.[11]

Dogs are the most widely used animals in these kinds of interventions,[12] which are referred to as dog-assisted therapy (DAT). A review of the scientific literature suggests that DAT for PwD may be useful for reducing behavioral and psychological symptoms, increasing social interaction, improving emotional state and reducing apathy, as well as having relaxing effects and generally providing wellbeing and a better quality of life.[13] DAT provides PwD with meaningful activities, stimulation, pleasurable social interaction and comfort through physical contact,[14] and its efficacy is understood to be the result of a positive emotional response to an animal.[3] Furthermore, DAT seems to be especially suitable for PwD, as it provides social interaction that is not dependent on the user's cognitive level.[15]

Several studies have reported that DAT has a positive effect on the social behaviors and communication of PwD. A controlled study has shown that both staff and researchers noted that the visits made by a therapy dog to a psychiatric ward led to an increase in the social interaction both between patients and between staff and patients when the dog was present.[16] Other studies have applied a repeated measures designs and used an observational social behavior recording instrument to verify how the presence of a dog in a special care unit for PwD increased the frequency of social behaviors: smiles, laughter, looks, leans-toward stimulus, physical contact and verbalisations.[17] Subsequent studies based on similar criteria have also reported an increase in both the frequency and duration of social behaviors during visits by a therapy dog.[18,19] In a study that has served as the basis for this work,[20] Sellers has used the Social Behavior Observation Checklist (SBOC) to compare the social behaviors of four PwD at a long-term care facility during individual DAT sessions or during their everyday routines, finding a

significant improvement during all the DAT sessions for all those participating. A study by Richeson has revealed a significant improvement in social behavior after three weeks of DAT[21]; in addition, Richeson has observed that the participants not only interacted with the dog but also with its handler, other residents and facility staff, as they engaged in conversations with the other residents about the dogs that were going to visit them and about their own previous pets. This suggests that the visiting dogs provided a common topic that connected the residents with the staff and gave them something positive to talk about and remember together. Other studies of AAI have also confirmed an increase in meaningful communication and the number of verbal responses among PwD.[15,22,23] Despite their cognitive and communicative deficits, the PwD taking part in these activities often talk about their previous pets, ask about the animals, and talk to the handlers and other residents about this, thereby helping to reduce their social isolation and lack of activity. These results suggest that animals may act as social facilitators among people,[24-26] and that they have a great potential for engaging the participants.[15]

As noted earlier, DAT seems also effective for increasing wellbeing and improving the emotional state of PwD. An study of Mossello et al*.* have shown how an intervention based on dog-assisted activities prompted an increase in positive emotions such as pleasure and general alertness, together with a decrease in anxiety and sadness, compared to baseline periods of a similar duration (everyday activities at the day center) and a control activity (plush dog).[27] Furthermore, after three weeks of dog-assisted activities there was a reduction in depression, although it was not statistically significant. Other studies have found that DAT may help to improve emotional functions and reduce emotional lability,[28] alleviate symptoms of depression[29,30] and reduce apathy.[31]

In this study our aim is to compare the frequency of social behaviors, the emotional manifestations and the experience during the activity of PwD at a specialized dementia unit during DAT and baseline sessions. We expect that during the DAT sessions the participants will

show an increase in the frequency of social behaviors, a reduction in negative emotions and an increase in positive ones, along with a better experience in the activity with greater involvement and enjoyment.

Methods

Procedure

The study uses an A-B-A-B withdrawal single-case experimental design. This design involved an initial or baseline phase (A1), a treatment phase with DAT (B1), followed by a replication of these phases (A2, B2). Each phase lasted for five days with a two-day washout period between phases, resulting in a total of 20 data-gathering sessions in 28 days.

Through the five days of each baseline phase (A1 and A2), the participants performed different activities individually with the therapist, while the treatment phases with DAT (B1 and B2) involved replicating the activities performed in the baseline phases with the dog participating and assisting in activities. Both types of sessions lasted for 15 minutes. The intervention was held between 3.45 pm and 5 pm, in an area specifically designated for the activity and isolated from the residential units.

Both baseline and DAT sessions were the same for all participants and consisted in four phases: Welcome, time and place orientation, realization of main activity, and farewell. The sessions involved the following main activities: Session 1 bowling game, Session 2 throw ball to goal, Session 3 throw a disc to a hoop, Session 4 match socks hanging them on a rope with tweezers, and Session 5 creation of a necklace with colored beads.

In contrast with the study by Sellers,[20] in this study the baseline condition and the DAT sessions involved parallel activities that differed only in terms of the presence of the dog as a facilitator and had always the same structure in order to keep closer control over the study variables. In addition, in both conditions the activities were performed in the same place and with the same

people present (therapist and camera operator). In the study by Sellers, each condition involved different places and different people, the baseline condition was the residents' normal routine at the center, and no attempt was made to actively involve them in any activity.[20]

The sessions were recorded by a camera operator trained for the purpose of the research, with instructions to record the participant in the session. In addition, with the intention of maintaining control of the sessions without any interferences, the camera operator was told not to interact with any of those present in the session, although she could answer if any of the participants spoke to her directly. The final outcome was a total of 300 minutes of video per participant in a 28-day period.

Once all the sessions in both phases were completed, two coders, blind to the purpose and conditions of the study, separately watched the videos for each session and completed the coding sheets. The coders had previously reviewed the instruments and the definitions for each behavior together with the researchers, and had received instruction on the protocol for coding the videos. They had also completed a training period with the research team using a sample tape of each participant. The researchers reviewed the coding and discussed any problematic aspects with the coders. Both coders held degrees in psychology and had experience in intervention and assessment involving PwD.

Four participants were included in the study but one of them had to be withdrawn after the first week due to an unrelated illness. All remaining participants completed the established protocol with no deviations and no adverse events was registered for any of the participants.

Setting

The study was conducted at the National Reference Centre for Alzheimer's and Dementia care (henceforth CREA, in its Spanish acronym) in Salamanca (Spain), which belongs to the Spanish Institute for the Elderly and Social Services (IMSERSO, in its Spanish acronym) under the auspices

of the Spanish Government. CREA is a center that specializes in research, analysis, knowledge, assessment and training in Alzheimer's disease and other dementias, as well as providing care and attention for people with dementia and their families.

At the time of the intervention, the AAI professional and the dog involved in the study had already been working with the participants for an average period of 10 months, which avoided the novelty effect in the study because the participants knew both the therapist and the dog.

The therapist (EPR) was a social worker with specific training in dementia and AAI. At the time of the research she had been working in the field of social intervention for ten years, with five years of experience in DAT. The dog participating in the research was a three-year-old female Labrador retriever trained to the standards required for working in DAT.

Participants

Four users of CREA care facilities were chosen to take part in the study. One of the participants was withdrawn from the study after the first week of intervention due to a serious illness.

The following criteria were applied for inclusion in the study: diagnosis of Alzheimer's disease or another dementia; interest in and affection for animals; past involvement in previous DAT sessions to avoid the novelty effect; stable and controlled psychoactive medication. The exclusion criteria were as follows: to be bedridden or to have a serious illness; to suffer from sensory deficits that impede participation in the intervention; to have a medical history of allergic reactions to dogs, reactions of fear or aggression toward dogs, or refusal to interact with them in previous DAT sessions; refusal by a family member or legal guardian to grant permission to take part in the study.

This research was done in accordance with the Declaration of Helsinki. Prior to the study implementation, ethical approval was obtained from the IRB at CREA and informed consent was obtained by the researchers from each one of the participant's principal family caregiver or legal

guardian, after they had been provided with written information on the study. This information included the protocol of the research (duration, nature and number of sessions), the treatment of data pursuant to current legislation, the voluntary nature of participating in the study, and the right to withdraw consent for taking part in the study at any time, without this having any ramifications on the care and attention that users and caregivers normally receive at CREA.

Additionally, family caregivers were asked to complete a questionnaire with information on their relative's past experience with dogs; names of their favorite dogs, breed, color, type of relationship, major milestones, etc. All this information was used to inform and guide the entire DAT intervention. Previous research have linked having a pet and the participant's previous interest in animals with positive DAT outcomes,[21,32] and it has been generally reported that interventions based on past roles lead to greater interest, pleasure and engagement than the typical structured activities available for residents with dementia.[33]

Prior to study implementation all participants were informed about it and asked to participate by the therapist. The information given to the participants was that, if they wished, during the following month they could participate in several sessions of activities, some of them involving the dog. Also, prior to the study implementation and before each session began, participants were informed that the sessions would be video-recorded to help the researchers determine what factors make the activities more enjoyable for participants. Throughout the study, the therapist carefully monitored the participants to look for any indication that they did not wish to take part in the sessions.

The main characteristics of each one of the three participants are listed below:

Participant 1 was an 82-year-old man with higher education. Diagnosis of probable Alzheimer's disease. MMSE[34,35] score of 18/30, which indicates a moderate cognitive impairment. Close relationship with household pets. At the time of the research, he had been living in the residential unit for 13 months, and was fully mobile.

Participant 2 was an 84-year-old woman with elementary education. Diagnosis of probable Alzheimer's disease. MMSE score of 17/30, which indicates a moderate cognitive impairment. Close relationship with animals within a working environment (helping with livestock and farming activities) throughout her youth and adulthood. At the time of the research she had been living in the residential unit for eight months, and needed crutches to move around.

Participant 3 was a 50-year-old man with elementary education. Diagnosis of corticobasal degeneration. MMSE score of 7/30, which indicates a severe cognitive impairment. Contact with animals during childhood and youth. At the time of the research he had been living in the residential unit for ten months, and could move around on his own.

Materials

The following observational instruments and scales were used:

Social Behavior Observation Checklist[20]: this is an observational checklist created through the adaptation of definitions of social behaviors according to a review of the literature. Previous studies on AAT have used similar behaviors to those in this instrument to operationalize the social behavior construct.[17,19,36] This instrument codes five behaviors: Smile/laugh (gestural and/or voiced), looks (looking at the therapist, the dog or the camera), physical contact (touching, stroking, kissing, hugging… the therapist or the dog), leans toward stimulus (leaning toward the therapist or the dog), and verbalizations (intelligible utterances or not). In the study of Sellers[20] agreement between coders was highest for the behaviors of physical contact, verbalizations, and looks and lowest on leans and smile/laugh, with kappa values ranging from a low of -0.01 to a high of .86.

Each 15-minute videotape of a session, involving either the DAT or baseline phases, was divided into three-minute segments. The observers coded each three-minute segment registering the number of occurrences of each behavior defined in the SBOC. As is to be expected, these behaviors do not always appear as clearly differentiated discrete units, so the coders were

instructed to code a behavior as *constant* if it appeared very frequently or continued throughout the three-minute period, although this was to be avoided as much as possible.

Observed Emotion Rating Scale[37,38]: this instrument assesses the emotional states of PwD by rating the frequency of behavioral expressions of five primary emotions (pleasure, anger, anxiety/fear, sadness, and general alertness) on a five-point scale (1 = Never, 2 = Under 16 seconds, 3 = 16-59 sec, 4 = 1-5 minutes, and 5 = More than 5 min). The OERS have a good validity[37,38] and reliability, with Kappa values ranging from .78 for anxiety/fear to .89 for anger[37]. The coders completed this instrument after watching the first 10 minutes of the video recorded in each session. For illustrative purposes, the coding sheet provided some examples of each affective state.

Non-Pharmacological Therapy Experience Scale[39]: this instrument quantifies the experience of PwD during any therapy or activity by measuring its immediate affective and social effect. It consists of five items (participation, pleasure, relationship with others, displeasure, and rejection) that must be scored using a four-point scale (0 = Never, 1 = Sometimes, 2 = Often, 3 = Always, except for the dimensions of Displeasure and Rejection, which range from 3 = Never, to 0 = Always). Internal consistency of NPT-ES was good or excellent (α 0.73-0.88). Also, good inter-rater agreement was attained by internal observers (ICC 0.83) and by external observers (ICC 0.79) [39].

This instrument was completed at the end of each session by the therapist and by the camera operator, as well as by the coders after they had watched each recorded session.

Data analysis

In this study, the object of interest was to discover whether the participants showed differences between the two levels of treatment: when the intervention involved the presence of the dog

(Phase B or DAT) and when the dog was not present (Phase A or Baseline). As there were two weeks (Week 2 and Week 4) in which the dog was present, and two weeks in which it was not (Week 1 and Week 3), the difference between the treatments refers to the average of the participants' level of response in the two weeks within each level of treatment.

For SBOC, OERS and NPT-ES the mean of the observations performed by each coder was calculated for each participant, therefore OERS and NPT-ES were treated as continuous variables despite using an ordinal categorical scale. Multiple mixed ANOVAs and mixed MANOVAs were performed to analyze the effects of the treatment as a two-level between-subject factor (Phase A-Baseline and Phase B-DAT), and the participant (three levels) as a within-subject factor. Results are provided solely for the between-subject factor (treatment). Normality of data was checked using the Shapiro-Wilk test for the residuals of ANOVAs and MANOVAs. Normality was judged as acceptable for SBOC, but not for OERS nor NPT-ES, so confirmatory non-parametric analysis with Mann-Whitney test were also performed. All the results of ANOVAs and MANOVAs were confirmed in the non-parametric analysis unless otherwise stated. The level of significance was set at $p < 0.05$ for all the analyses. The statistical analyses were performed using IBM SPSS Statistics 20.0 software.

Results

Inter-rater reliability

The intraclass correlation coefficient was used to calculate the agreement between the two coders on the items in the SBOC and OERS, while for the NPT-ES the agreement was calculated among four coders (the two external coders along with the therapist and the camera operator). The results (see Table 1) indicate that the coders reached an acceptable level of agreement for each individual behavior of the SBOC, with values that ranged from a low of .403 for Physical contact to a high of .929 for Smiles. In the case of the OERS, the level of agreement was low for

Pleasure, Sadness and General alertness, with no calculation possible for the categories of Anger and Anxiety/Fear because coder 2 always rated their occurrence as *Never*. In the case of NPT-ES, which involved four coders, a suitable degree of agreement was also reached.

Table 1. Inter-rater agreement between coders using the intraclass correlation coefficient (ICC).

Instrument	Item	ICC	Lower L	Upper L	*F*	*df*	*p*
SBOC	Smiles	.929	.764	.969	20.589	59, 59	.000
	Leans	.565	-.168	.815	4.103	59, 59	.000
	Looks	.831	.459	.927	8.838	59, 59	.000
	Physical contact	.403	.034	.636	1.799	59, 59	.013
	Verbalizations	.676	-.042	.869	5.403	59, 59	.000
	SBOC Total	.723	-.167	.906	8.466	59, 59	.000
OERS	Pleasure	.277	-.137	.556	1.705	59, 59	.021
	Anger[a]	-	-	-	-	-	-
	Anxiety/Fear[a]	-	-	-	-	-	-
	Sadness	.341	-.100	.606	1.519	59, 59	.056
	General alertness	-.054	-.764	.371	.949	59, 59	.579
NPT-ES	Participation	.671	.502	.790	3.444	59, 177	.000
	Pleasure	.720	.572	.823	4.080	59, 177	.000
	Relationship with others	.547	.330	.708	2.234	59, 177	.000
	Displeasure	.786	.679	.863	5.049	59, 177	.000
	Rejection	.809	.708	.880	5.359	59, 177	.000
	Total NPT-ES	.784	.652	.868	5.657	59, 177	.000

[a] The ICC cannot be calculated because coder 2 considers the variable has zero variance.

Abbreviations: SBOC, Social Behavior Observation Scale; OERS, Observed Emotion Rating Scale; NPT-ES, Non-Pharmacological Therapy Experience Scale; ICC, Intraclass correlation coefficient.

Social Behavior Observation Checklist (SBOC)

For the SBOC the sum of all the social behaviors coded in each session was calculated and used as a total score. The ANOVA revealed a significant effect of the treatment, $F_{(1, 18)} = 59.642$, $p < .001$, $\eta_p^2 = .768$, as there was an increase in social behaviors between the baseline phase (M = 157.48, SD = 16.23) and the DAT phase (M = 200.8, SD = 7.16). The pairwise comparisons revealed a significant effect of the treatment for the three participants (Participants 1 and 2: $p < .001$, Participant 3: $p = .009$). Figure 1 shows that individually each participant showed an increase in the overall number of social behaviors during each phase of DAT (B1 and B2) compared to each baseline phase (A1 and A2).

In addition, a mixed MANOVA was conducted with the five different behaviors evaluated by the SBOC as measures of the dependent variable that revealed a significant effect of the treatment (See Table 2). Individual tests (See Table 2) showed that during the DAT sessions there was a significant increase in Leans, for which the pairwise comparisons revealed that the treatment had a significant effect for the three participants. In the case of Looks, the treatment had a significant effect, although the pairwise comparisons only showed significant differences for participant 1 but not for participant 2 or 3. The treatment also had a significant effect for Physical contact, and the pairwise comparisons revealed a significant difference between the treatment phases for the three participants. The treatment was not found to have any significant effect in the case of Smiles, but the univariate tests revealed a significant difference between phases A and B of the treatment for participants 1 and 2 (results for participant 2 were only marginally confirmed in non-parametric test, U = 24.50, z = -1.931, p = .052, r = -.43), but not so for participant 3, who showed a drop in the number of smiles in the DAT sessions, while the number of smiles for the other two participants increased significantly.

Participant 3 had certain specific features: he was the youngest, he showed the greatest cognitive impairment according to his MMSE score and has diagnosis of corticobasal degeneration. It has previously been noted that this participant has an almost permanent smile on his face. The recordings of the sessions of this study therefore seem to suggest that when this participant becomes more engaged in a task his usual smile disappears, which explains the number of smiles in the DAT phases.

As regards the number of Verbalizations, it should be clarified that in the case of participant 2 the coders were unable to log a specific number because she talked continuously, and they were unable to identify individual units of behavior for coding. As explained earlier, in such cases the coders were instructed to code the behavior as constant.[20] In order to conduct the analyses, those behaviors assessed as constant were assigned the highest value registered for the

corresponding participant in that category. Nevertheless, the treatment did not have a significant effect on the number of verbalizations recorded in the SBOC, and the pairwise comparisons did not uncover any differences between phases for any one of the participants.

In view of the difficulties encountered in coding the verbalizations, one of the researchers (EPR) transcribed and coded the participants' verbalizations in the sessions corresponding to both baseline and DAT (see Table 3). An ANOVA was conducted that revealed a significant effect of the treatment, $F_{(1, 18)} = 8.290$, $p = .010$, $\eta_p^2 = .315$, as there was an increase in verbalizations between the baseline phase (M = 103,5) and the DAT phase (M = 119,6). The pairwise comparisons revealed a significant difference between the treatment phases for participant 2 ($p = .028$), but not for participants 1 ($p = .300$) or 3 ($p = .070$). Nevertheless, Table 3 shows that each participant showed an increase in the number of verbalizations transcribed in each DAT phase (B1 and B2), compared to each baseline phase (A1 and A2).

Table 2. Mean scores (and standard deviations) of prosocial behaviors (SBOC) in each treatment condition. Results of repeated measures MANOVA and pairwise comparisons.

	A	B	*df*	*F*	*p*	η_p^2	Participant	A	B	*p*
Multivariate SBOC	157.48 (16.23)	200.80 (7.16)	5,14	40.257	.000	.935	1	106.45 (21.48)	155.10 (18.30)	.000
							2	223.05 (25.48)	275.20 (19.35)	.000
							3	142.95 (15.54)	172.10 (27.45)	.000
Smiles	22.30 (4.80)	25.70 (2.81)	1,18	3.734	.069	.172	1	11.05 (4.11)	15.75 (4.27)	.022
							2	25.45 (11.97)	35.40 (5.50)	.028
							3	30.40 (7.72)	25.95 (4.23)	.127
Leans	2.85 (1.47)	18.52 (3.57)	1,18	164.858	.000	.902	1	2.00 (1.90)	12.30 (5.33)	.000
							2	4.20 (2.15)	23.90 (5.60)	.000
							3	2.35 (2.80)	19.35 (5.61)	.000
Looks	49.65 (6.68)	59.28 (6.86)	1,18	10.110	.005	.360	1	28.05 (7.29)	49.70 (7.05)	.000
							2	79.15 (13.94)	80.55 (12.77)	.817
							3	41.75 (3.60)	47.60 (10.50)	.113
Physical contact	1.98 (0.94)	18.92 (6.98)	1,18	57.857	.000	.763	1	0.95 (1.26)	16.00 (14.61)	.004

							2	3.25 (2.66)	24.35 (12.65)	.000
							3	1.756 (1.57)	16.40 (5.98)	.000
Verbalizations	80.70 (7.14)	78.38 (5.36)	1,18	.673	.423	.036	1	64.4 (13.66)	61.35 (9.67)	.572
							2	111.00 (0.00)	111.00 (0.00)	-
							3	66.70 (11.50)	62.80 (9.80)	.425

Note: The values are the mean of the social behaviors coded by two coders in each phase. A higher mean reflects a higher frequency of the behavior. A = Baseline; B = DAT.

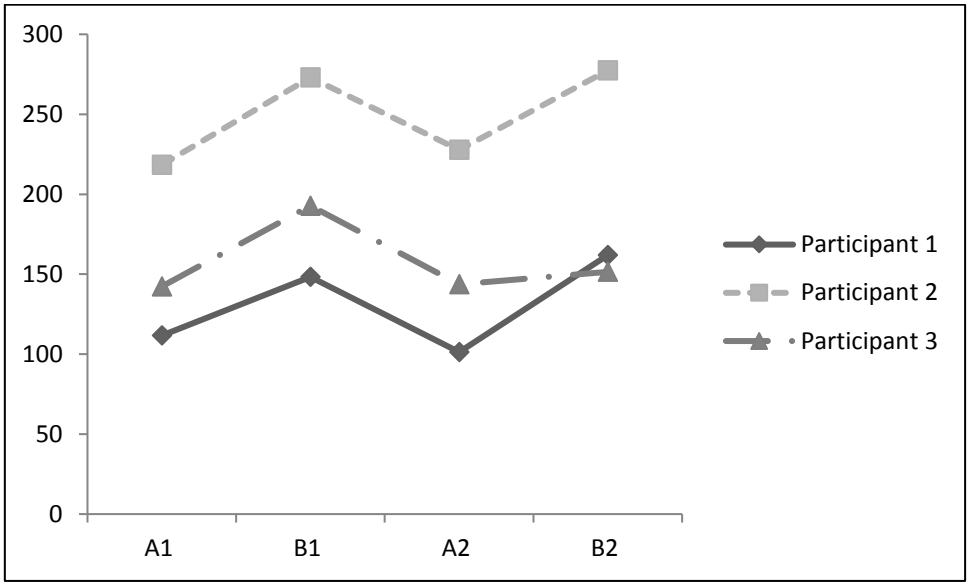

Figure 1. Participant's mean scores of SBOC in each phase.

Table 3. Mean scores (and standard deviations) of transcribed verbalizations in each phase.

	Participant	A1	B1	A2	B2
Verbalizations (Transcribed)	1	81 (25.47)	84.6 (9.79)	80 (9.35)	90.6 (11.95)
	2	125.6 (30.23)	155.2 (27.2)	119 (16.48)	142.8 (27.30)
	3	105 (11.96)	129.60 (9.34)	110.40 (26.45)	114.8 (13.85)

Note: The values are the mean of the verbalizations transcribed in each phase. A higher mean reflects a higher number of verbalizations. A1, A2 = Baseline; B1, B2 = DAT.

Observed Emotion Rating Scale (OERS)

A MANOVA was conducted with the five emotions scored in the OERS as different measures of the dependent variable that revealed a significant effect of the treatment, $F_{(5, 14)} = 23.423$, $p <$

.001, η_p^2 = .893. Univariate tests (see Table 4), revealed that the DAT sessions prompted a significant increase in Pleasure, and the pairwise comparisons showed significant differences for the three participants. The treatment also had a significant effect on Sadness, although in this case the pairwise comparisons revealed significant differences only for participant 2, whereas the scores for Sadness for participants 1 and 3 were the same in both phases. Confirmatory Mann-Whitney tests did not show a significant effect of DAT on sadness (*U* = 26.00, *z* = -1.884, *p* = .075, *r* = -.42) nor a significant difference for participant 2 (*U* = 25.00, *z* = -2.490, *p* = .063, *r* = -.56). The treatment did not have a significant effect on Anger, Anxiety/Fear or General alertness for any of the participants.

Table 4. Mean scores (and standard deviations) of emotional manifestations (OERS) in each treatment condition. Results of univariate tests of repeated measures MANOVA and pairwise comparisons.

	A	B	*df*	*F*	*p*	η_p^2	Participant	A	B	*p*
Pleasure	3.87 (0.27)	4.75 (0.12)	1,18	89.968	.000	.833	1	3.45 (0.64)	4.60 (0.32)	.000
							2	3.75 (0.72)	4.85 (0.24)	.000
							3	4.40 (0.39)	4.80 (0.26)	.015
Anger	1.10 (0.16)	1.08 (0.16)	1,18	.053	.820	.003	1	1.05 (0.16)	1.00 (0.00)	.331
							2	1.20 (0.42)	1.20 (0.48)	1.000
							3	1.05 (0.16)	1.05 (0.16)	1.000
Anxiety/Fear	1.13 (0.29)	1.12 (0.18)	1,18	.024	.879	.001	1	1.05 (0.16)	1.10 (0.21)	.556
							2	1.30 (0.63)	1.20 (0.48)	.696
							3	1.05 (0.16)	1.05 (0.16)	1.000
Sadness	1.32 (0.27)	1.12 (0.11)	1.18	4.800	.042	.211	1	1.35 (0.53)	1.35 (0.34)	1.000
							2	1.60 (0.81)	1.00 (0.00)	.031
							3	1.00 (0.00)	1.00 (0.00)	1.000
Alertness	4.98 (0.05)	4.95 (0.08)	1,18	1.200	.288	.063	1	4.95 (0.16)	5.00 (0.00)	.331
							2	5.00 (0.00)	4.90 (0.21)	.151

	3	5.00 (0.00)	4.95 (0.16)	.331

Note: The values are the mean of the OERS scores coded by two coders in each phase. A higher mean reflects more time displaying the affective response. A = Baseline; B = DAT.

Non-Pharmacological Therapy Experience Scale (NPT-ES)

Considering that the NPT-ES was completed by four people (the two coders plus the therapist and the camera operator during the sessions), the mean of the observations performed by each of the four coders was calculated for each participant. A mixed ANOVA was conducted to analyze the effect the treatment (two levels) had on NPT-ES overall score as a between-subject factor, and the Participant (three levels) as a within-subject factors. The results revealed that the treatment had a significant effect on NPT-ES overall score, $F_{(1, 18)} = 58.350$, $p < .001$, $\eta_p^2 = .764$. The pairwise comparisons showed a significant difference between the treatment phases for participant 1 ($p = .001$), participant 2 ($p < .001$) and participant 3 ($p = .001$), as the NPT-ES overall score increased for all three participants in each phase of the treatment with DAT (B1 and B2), compared to each baseline phase (A1 and A2) (see Figure 2).

A MANOVA was conducted with the same between and within-subject factors, with each one of the items in the NPT-ES as measures of the dependent variable that also revealed a significant effect of the treatment (See Table 5). Regarding each of the items in the NPT-ES (See Table 5) univariate tests showed that the treatment had a significant effect on Participation, and the pairwise comparisons found significant differences between both treatment phases for participant 2 and for participant 3 (results for participant 3 were not confirmed in non-parametric test, $U = 27.00$, $z = -1.982$, $p = .089$, $r = -.44$), but not for participant 1. The treatment also had a significant effect on Pleasure, with differences between both treatment phases in the pairwise comparisons for the three participants. Regarding Relationship with others, the MANOVA also revealed that the treatment had a significant effect, and although all three participants showed higher scores for this item in the DAT phases, the pairwise comparisons

only showed significant differences for participant 3. Displeasure fell significantly in the DAT phase, and the pairwise comparisons revealed that this drop was significant for all participants (significant difference for participant 3 was not confirmed in non-parametric test, $U = 30.00$, $z = -2.179$, $p = .143$, $r = -.49$). Finally, the treatment also had a significant effect on Rejection, and although all the participants showed lower Rejection, the pairwise comparisons only revealed significant differences for participant 2 but not for participants 1 or 3.

Table 5. Mean scores (and standard deviations) of NPT-ES in each treatment condition. Results of repeated measures MANOVA and pairwise comparisons.

	A	B	*df*	*F*	*p*	η_p^2	Participant	A	B	*p*
Total NPT-ES	11.83 (0.98)	14.29 (0.30)	5,14	23.426	.000	.893	1	12.78 (1.15)	14.30 (0.50)	.000
							2	9.83 (1.86)	14.02 (0.71)	.000
							3	12.88 (1.32)	14.55 (0.42)	.029
Participation	2.43 (0.21)	2.80 (0.09)	1,18	26.400	.000	.595	1	2.93 (0.24)	3.00 (0.00)	.331
							2	1.63 (0.38)	2.45 (0.23)	.000
							3	2.75 (0.26)	2.95 (0.11)	.039
Pleasure	1.73 (0.28)	2.75 (0.10)	1,18	113.908	.000	.864	1	1.73 (0.38)	2.65 (0.29)	.000
							2	1.47 (0.52)	2.90 (0.17)	.000
							3	2.00 (0.42)	2.70 (0.26)	.000
Relationship with others	2.78 (0.17)	2.95 (0.04)	1,18	10.309	.005	.364	1	2.85 (0.21)	2.90 (0.13)	.530
							2	2.93 (0.12)	3.00 (0.00)	.065
							3	2.55 (0.35)	2.95 (0.11)	.003
Displeasure	2.33 (0.30)	2.85 (0.10)	1,18	26.959	.000	.600	1	2.38 (0.43)	2.75 (0.20)	.022
							2	1.80 (0.73)	2.80 (0.28)	.001
							3	2.80 (0.26)	3.00 (0.00)	.025
Rejection	2.56 (0.20)	2.94 (0.10)	1,18	27.924	.000	.608	1	2.90 (0.17)	3.00 (0.00)	.087
							2	2.00 (0.41)	2.88 (0.18)	.000
							3	2.77 (0.32)	2.95 (0.16)	.140

Note: The values are the mean of the NPT-ES scores coded by fours coders in each phase. A higher mean reflects a better experience during the session. A = Baseline; B = DAT.

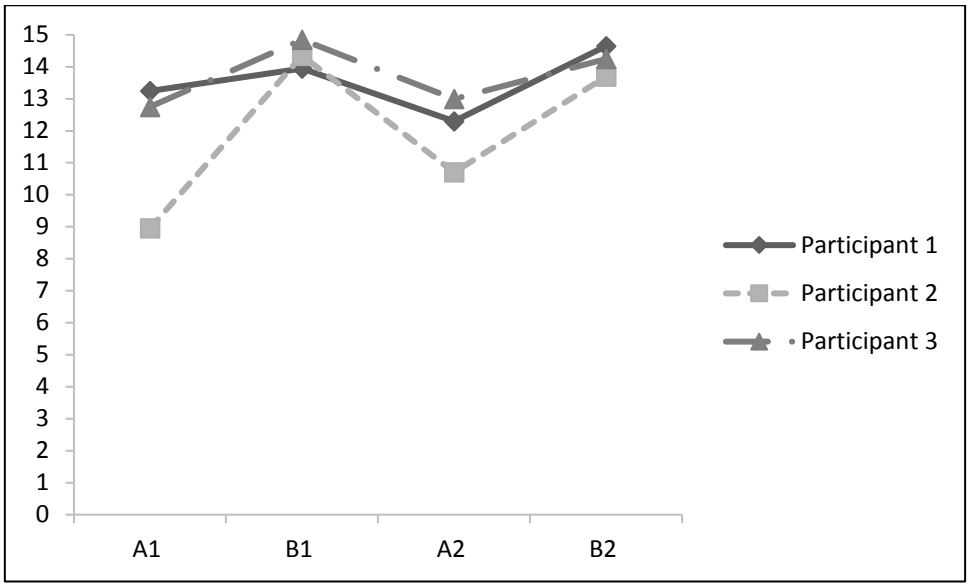

Figure 2. Participant's mean scores of NPT-ES (Total) in each phase.

Discussion

The results of the SBOC enable us to confirm the hypothesis that DAT sessions may lead to greater socialisation and the development of prosocial behaviors. This finding is in agreement with other studies that have used similar criteria to assess social behaviors,[17,19-21] and which have also reported an increase in the number, duration and frequency of these behaviors. Our findings revealed a significant increase in the overall number of social behaviors, and more specifically, we have found that DAT sessions have an impact on the number of leans, looks and physical contact. In the case of smiles, we found no significant effect, although their number increased significantly for two of the participants. Finally, the SBOC did not reflected an increase in the number of verbalizations, but we believe this was due to the difficulties the coders encountered when coding them, as a significant effect appeared when the analysis was conducted on the codding of verbalizations undertaken by the researchers. This result for the number of verbalizations is in line with other studies that have reported an increase in communication during AAI.[15,22,23,40] Considering that in our study the same therapist attended

both the DAT and baseline sessions, and that under both conditions sessions ran parallel in terms of structure and activities, we may attribute this increase in social behaviors to the impact of the dog.

In view of our own experience in applying DAT, both individually and in a group, and according to other researchers,[16,21,41] it seems clear that for PwD dogs may act as facilitators of social contact, as they provide a topic of conversation and reminiscence. Nevertheless, although our study has not directly registered the target of each behavior, the observations made by the coders and therapist indicate that many of the social behaviors (especially physical contact and leans) in DAT sessions have targeted the dog and not the therapist or camera operator. Nevertheless, we consider that interacting with animals is also a form of social contact[42] that provides PwD with pleasurable tactile stimulation, company, and the opportunity to establish non-verbal communication. Several authors consider that the non-verbal nature of interacting with animals means that PwD with impaired speech abilities look upon this contact as less demanding, more friendly, and non-judgmental than that of the best-intentioned staff members,[43] and so they are better disposed to communicate. Furthermore, interacting with animals provides an opportunity to establish close physical contact with a warm body, feel its heartbeat, stroke its soft fur, feel its breathing, and hug it,[9] experiences that may not be commonplace for PwD, and which may trigger pleasant memories and provide a sense of wellbeing. Other researchers do not specify whether the social behaviors coded were those that targeted the dog, other people, or both.[18,20] In our case, we have codded the behaviors directed toward both the dog and other people, which explains the sharp increase in physical contact and leans. Thus, DAT provides PwD with an opportunity to interact, talk to, and touch another living being without the complications possibly inherent to the interaction with other people.[8] The potential of DAT for promoting socialization may be based upon the animal's ability to provide the attention that is the foundation of all social interaction.[20] As several researchers have

noted,[10,21] animals may fulfil the unmet need among PwD to receive attention and form attachments, as one of the core psychological needs for upholding wellbeing in dementia.[44]

Following Sellers,[20] we may assume that the increase in social behaviors may reflect an improvement in emotional wellbeing among PwD. This approach is consistent with our findings here that enable us to say that DAT may improve the emotional state of PwD by providing a natural and undemanding affective setting. The results of the OERS revealed a significant increase in pleasure during DAT sessions for all the participants. These findings are once again consistent with those reported by Mossello et al. who, also using OERS, have reported an increase in positive emotions such as pleasure and general alertness together with a reduction in anxiety in AAT, compared to a control activity.[27] Although our study has not found an increase in general alertness, it should be noted that the participants in our study showed very high scores in general alertness throughout all the phases, which means there was a ceiling effect. In addition, we have not found a reduction in the negative emotions measured by the OERS (sadness, anxiety/fear and anger), as the ratings were consistently low in each session, producing a floor effect. Furthermore, the participants in the study by Mossello et al. showed a greater impairment than those participating in our study, which may explain the appearance of more negative emotions in the former.[27] In line with these findings, other researchers have also reported a positive effect of AAT on emotional functions,[28] or a reduction in symptoms of depression.[29,30] Thus, although the scientific literature on the effects of DAT on emotional state or depression is less conclusive than for socialization, we may consider it a promising strategy for indirectly treating the symptoms of depression in dementia, as through its effects on socialization DAT may reduce social isolation and loneliness[29] - known risk factors for depression among old people.

Finally, our study has shown that DAT had a significant effect on the participant's experience during the therapy sessions, as during the DAT sessions there was an increase in Participation,

Pleasure and Relationship with others, together with a reduction in Rejection and Displeasure in the NPT-ES. It should be noted that although a significant effect on Relationship with others was found, the pairwise comparisons only showed significant differences for one of the participants. This finding confirms our impression that most of the social behaviors during DAT was directed to the dog and not the therapist, which means there was no increase in the engagement with other people. The results of the NPT-ES scale confirm that DAT provides the participants with a positive experience at both affective and relational level, which implies greater engagement in the activity. This finding is consistent with those reported by other researchers that have shown that animals are capable of generating high engagement among PwD,[10,45] leading us to conclude that DAT may be useful for enhancing the participation and engagement of PwD in motor activities,[27] or reducing apathy[31]; in general, its motivational effect may be used to achieve other therapeutic goals. We consider that the presence of the dog fosters interaction with the environment and the expression of emotions, providing an opportunity to share a private space in which to feel a bond with another living creature, without the presence of judgements or compassion; it establishes a relationship through normality based on affection that implicitly drives engagement and interaction with the environment.

Conclusions

This study has assessed the social behaviors, emotional status and experience of an individual dog-assisted therapy (DAT) intervention, compared to sessions with the same therapist and parallel activities, but without the dog. Based on our findings, we may conclude that DAT is an intervention with great potential for positively impacting the quality of life of PwD, as it fosters socialization and communication, and has a positive influence on emotional state, generally providing a positive experience through participation in a meaningful activity that generates a high level of engagement.

One of the main methodological strengths of this study involves distinguishing between the impact the therapist has alone and when accompanied by the therapy dog, as both the baseline sessions and the DAT sessions were held within the same context, with the same therapist, and involved similar activities. We may therefore attribute the outcomes to the therapeutic benefits of the dog, and rule out the non-specific effects of the social care and attention provided. Furthermore, the participants already knew both the dog and the therapist, so we can also rule out the effect of the novelty of the intervention. The participants also acted as their own control with independent observations in the DAT or baseline sessions, thereby minimizing the influence of other factors. In relation to this, the replication of the treatment phases enables us to discard effects arising from the passage of time and the progression of the disease; since if the change in behavior had been maintained in the replication of the baseline we would not be able to attribute it to the impact of the dog, and we might suspect the influence of the passage of time, which has not happened in our study in which most of the behaviors returned to the level shown at the first baseline phase. Finally, it should be noted that we have used assessment instruments based on direct observation, which may offer a higher level of confidence than those based on the information provided by proxy reports, which are more susceptible to biases.

Our study does, however, have certain limitations and weaknesses, among which we should note the small sample, which means we cannot extrapolate our findings to the general population. We have nonetheless performed a large number of observations for each participant in each condition, which means we have considerable confidence in our findings. A further limitation refers to the use of instruments based on the direct observation of behaviors (SBOC), as they make it difficult to establish discrete coding units, which may generate encoding problems, as in the case of verbalizations. We should also be cautious about the results of SBOC, as it is not a validated instrument and its authors have not provided reliability data for it,[20] although in our study it has shown good agreement rates between observers. We should also note that the OERS and NPT-ES may not be particularly sensitive to small changes in behavior,

leading to ceiling/floor effects in some of their items that stop us from noticing the impact of the intervention on those variables. A final limitation involves the impossibility of keeping the coders blind to the research purpose, which may constitute a source of bias in the results.

Our findings suggest that DAT is a suitable and potentially effective intervention for PwD, although more research is needed to determine the extent and frequency that would be recommendable for the application of DAT, as well as the time of day it would be most beneficial. There is also a need to delimit the specific population that may benefit the most from it, and verify whether people with a history of affection and interest in animals are more sensitive to the effects of DAT. It would also be interesting to conduct a systematic study of the duration of the effects observed; that is, whether the increase in social behaviors and the improvement in emotional state persist beyond the intervention sessions.

References

1. Prince M, Wimo A, Guerchet M, et al. *World Alzheimer Report 2015. The global impact of dementia. An analysis of prevalence, incidence, cost & trends*. London: Alzheimer's Disease International (ADI); 2015.

2. Kuhn D, Ortigara A, Kasayka RE. Dementia Care Mapping: An innovative tool to Measure Person-Centered Care. *Alzheimers care today.* 2000;1(3):7-15.

3. Nordgren L, Engström G. Animal-Assisted Intervention in Dementia: Effects on Quality of Life. *Clin Nurs Res.* 2013;23(1):7-19. doi: 10.1177/1054773813492546.

4. Cohen-Mansfield J, Marx M, Werner P. Observational data on time use and behavior problems in the nursing home. *J Appl Gerontol.* 1992;11(1):111-121. doi: 10.1177/073346489201100109.

5. Chung JCC. Activity participation and well-being of people with dementia in long-term care settings. *OTJR (Thorofare N J).* 2004;24(1):22-31. doi: 10.1177/153944920402400104.

6. Kolanowski A, Buettner L, Litaker M, Yu F. Factors that relate to activity engagement in nursing home residents. *Am J Alzheimers Dis Other Demen.* 2006;21(1):15-22. doi: 10.1177/153331750602100109.

7. Buettner LL, Fitzsimmons S. Activity calendars for older adults with dementia: What you see is not what you get. *Am J Alzheimers Dis Other Demen.* 2003;18(4):215-226. doi: 10.1177/153331750301800405.

8. Bernstein PL, Friedmann E, Malaspina A. Animal-assisted therapy enhances resident social interaction and initiation in long-term care facilities. *Anthrozoos.* 2000;13(4):213-224. doi: 10.2752/089279300786999743.

9. Buettner LL, Fitzsimmons S, Barba B. Animal-assisted therapy for clients with dementia: Nurses' Role. *J Gerontol Nurs.* 2011;37(5):10-14. doi: 10.3928/00989134-20110329-05.

10. Williams E, Jenkins R. Dog visitation therapy in dementia care: a literature review. *Nurs Older People.* 2008;20(8):31-35. doi: 10.7748/nop2008.10.20.8.31.c6808.

11. AAII. Animal Assisted Intervention. Animal Assisted Intervention International. http://www.aai-int.org/aai/animal-assisted-intervention/.

12. Fine AH. *Handbook on Animal-Assisted Therapy: Theoretical Foundations and Guidelines for Practice*. 2nd ed. New York: Academic Press; 2000.

13. Peluso S, De Rosa A, De Lucia N, et al. Animal-assisted therapy in elderly patients: Evidence and controversies in dementia and psychiatric disorders and future perspectives in other neurological diseases. *J Geriatr Psychiatry Neurol.* 2018;31(3):149-157. doi: 10.1177/0891988718774634.

14. Travers C, Perkins J, Rand J, et al. An evaluation of dog-assisted therapy for residents of aged-care facilities with dementia. *Anthrozoos.* 2013;26(2):213-225. doi: 10.2752/175303713x13636846944169.

15. Marx MS, Cohen-Mansfield J, Regier NG, et al. The impact of different dog-related stimuli on engagement of persons with dementia. *Am J Alzheimers Dis Other Demen.* 2010;25(1):37-45. doi: 10.1177/1533317508326976.

16. Walsh PG, Mertin PG, Verlander DF, Pollard CF. The effects of a 'pets as terapy' dog on persons with dementia in a psychiatric ward. *Aust Occup Ther J.* 1995;42(4):161-166. doi: 10.1111/j.1440-1630.1995.tb01331.x.

17. Kongable LG, Buckwalter KC, Stolley JM. The effects of pet therapy on the social behavior of institutionalized Alzheimer's clients. *Arch Psychiatr Nurs.* 1989;3(4):191-198.

18. Batson K, McCabe BW, Baun MM, Wilson CM. The effect of a therapy dog on socialization and physiological indicators of stress in persons diagnosed with Alzheimer's disease. In: Wilson CC, Turner DC, eds. *Companion Animals in Human Health*. Thousand Oaks, CA: Sage Publications; 1998:203-215.

19. Churchill M, Safaoui J, McCabe BW, Baun, MM. Using a therapy dog to alleviate the agitation and desocialization of people with Alzheimer's disease. *J Psychosoc Nurs Ment Health Serv.* 1999;37(4):16-22. doi: 10.3928/0279-3695-19990401-12.

20. Sellers DM. The evaluation of an animal assisted therapy intervention for elders with dementia in long-term care. *Act Adapt Aging.* 2006;30(1):61-77. doi: 10.1300/j016v30n01_04.

21. Richeson NE. Effects of animal-assisted therapy on agitated behaviors and social interactions of older adults with dementia. *Am J Alzheimers Dis Other Demen.* 2003;18(6):353-358. doi: 10.1177/153331750301800610.

22. Curtright A, Turner GS. The influence of a stuffed and live animal on communication in a female with Alzheimer's dementia. *J Med Speech Lang Pathol.* 2002;10(1):61-71.

23. Greer KL, Pustay KA, Zaun TC, Coppens P. A comparison of the effects of toys versus live animals on the communication of patients with dementia of the Alzheimer's type. *Clin Gerontol.* 2002;24(3-4):157-182. doi: 10.1300/j018v24n03_13

24. Fick KM. The influence of an animal on social interactions of nursing home residents in a group setting. *Am J Occup Ther.* 1993;47(6):529-534. doi: 10.5014/ajot.47.6.529.

25. Hart LA. Psychological benefits of animal companionship. In: Fine AH, ed. *Handbook on Animal Assisted Therapy: Theoretical foundations and guidelines for practice*. New York: Academic Press; 2000:59-78.

26. Hunt SJ, Hart LA, Gomulkiewicz R. Role of small animals in social interactions between strangers. *J Soc Psychol.* 1992;132(2):245-256. doi: 10.1080/00224545.1992.9922976.

27. Mossello E, Ridolfi A, Mello AM, et al. Animal-assisted activity and emotional status of patients with Alzheimer's disease in day care. *Int Psychogeriatr.* 2011;23(6):899-905. doi: 10.1017/s1041610211000226

28. Kawamura N, Niiyama M, Niiyama H. Long Term evaluation of animal-assisted therapy for institutionalized elderly people: a preliminary result. *Psychogeriatrics.* 2007;7(1):8-13. doi: 10.1111/j.1479-8301.2006.00156.x.

29. Majić T, Gutzmann H, Heinz A, et al. Animal-assisted therapy and agitation and depression in nursing home residents with dementia: a matched case-control trial. *Am J Geriatr Psychiatry.* 2013;21(11):1052-1059. doi: 10.1016/j.jagp.2013.03.004.

30. Moretti F, De Ronchi D, Bernabei V, et al. Pet therapy in elderly patients with mental illness. *Psychogeriatrics.* 2010;11(2):125-129. doi: 10.1111/j.1479-8301.2010.00329.x.

31. Motomura N, Yagi T, Ohyama H. Animal assisted therapy for people with dementia. *Psychogeriatrics.* 2004;4(2):40-42. doi: 10.1111/j.1479-8301.2004.00062.x.

32. Banks MB, Banks WA. The effects of animal-assisted therapy on loneliness in an elderly population in long-term facilities. *J Gerontol A Biol Sci Med Sci.* 2002;57(7):M428-M432. doi: 10.1093/gerona/57.7.m428.

33. Cohen-Mansfield J, Parpura-Gill A, Golander H. Salience of self-identity roles in persons with dementia: Differences in perceptions among elderly persons, family members and caregivers. *Soc Sci Med.* 2006;62(3):745-757. doi: 10.1016/j.socscimed.2005.06.031.

34. Folstein MF, Folstein SE, McHugh PR. "Mini-mental state": a practical method for grading the cognitive state of patients for the clinician. *J Psychiatr Res.* 1975;12(3):189-198. doi: 10.1016/0022-3956(75)90026-6.

35. Lobo A, Saz P, Marcos G. *MMSE: Examen Cognoscitivo Mini-Mental*. Madrid: TEA; 2002.

36. Hendy HM. Effects of pet and/or people visits on nursing home residents. *Int J Aging Hum Dev.* 1987;25(4):279-291. doi: 10.2190/d3dd-vb2n-uqj8-8agn.

37. Lawton MP, Van Haitsma K, Klapper JA. Observed Affect in Nursing Home Residents With Alzheimer's Disease. *J Gerontol B Psychol Sci Soc Sci.* 1996;51(1):P3-P14.

38. Lawton MP, Van Haitsma K, Klapper JA. Observed Emotion Rating Scale; 1999. Retrieved from https://www.abramsoncenter.org/media/1199/observed-emotion-rating-scale.pdf

39. Muñiz R, Olazarán J, Poveda S, et al. NPT-ES: A measure of the experience of people with dementia during non-pharmacological interventions. *Nonpharmacol Ther Dement.* 2011;1(3):241-251.

40. LaFrance C, Garcia LJ, Labreche J. The effect of a therapy dog on the communication skills of an adult with aphasia. *J Commun Disord.* 2007;40(3):215-224. doi: 10.1016/j.jcomdis.2006.06.010.

41. Nordgren L, Engström G. Effects of dog-assisted intervention on behavioural and psychological symptoms of dementia. *Nurs Older People.* 2014;26(3):31-38. doi: 10.7748/nop2014.03.26.3.31.e517.

42. Beetz A, Uvnäs-Moberg K, Julius H, Kotrschal K. Psychosocial and psychophysiological effects of human-animal interactions: the possible role of oxytocin. *Front Psychol.* 2012;3:234. doi: 10.3389/fpsyg.2012.00234.

43. Perkins J, Bartlett H, Travers C, Rand J. Dog-assisted therapy for older people with dementia: A review. *Australas J Ageing.* 2008;27(4):177-182. doi: 10.1111/j.1741-6612.2008.00317.x.

44. Kitwood T. *Dementia Reconsidered: The Person Comes First*. Buckingham [England]: Open University Press; 1997.

45. Kramer SC, Friedmann E, Bernstein PL. Comparison of the effect of human interaction animal-assisted therapy, and AIBO-assisted therapy on long-term care residents with dementia. *Anthrozoos.* 2009;22(1):43-57. doi: 10.2752/175303708x390464.