doi:10.1111/j.1479-8301.2011.00393.x PSYCHOGERIATRICS 2011; ••: ••–••

ORIGINAL ARTICLE

Developing effective animal-assisted intervention programs involving visiting dogs for institutionalized geriatric patients: a pilot study

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Received 20 July 2011; accepted 21 November 2011.

Abstract

Aim: An ever increasing interest in the therapeutic aspects of the human-animal bond has led to a proliferation of animal-assisted interventions (AAI) involving dogs. However, most of these programs lack a solid methodological structure, and basic evaluative research is needed. The purpose of this study was to test the value of dog-assisted interventions as an innovative tool to increase quality of life in the geriatric population.

Methods: Nineteen patients (men and women) with a mean age of 85 years participated in the study. Interactions between patients and visiting dogs occurred either in a social situation (socialization sessions) or in a therapeutic context (physical therapy sessions). We derived and characterized a specific ethogram of elderly-dog interactions aimed at evaluating the effectiveness of visiting dogs in improving mood, catalyzing social interactions and reducing their everyday apathetic state. Cortisol levels were also measured in the saliva, and depressive state was evaluated.

Results: Overall, results show a time-dependent increase in social behaviour and spontaneous interactions with the dogs. Dog-mediated interactions affected the daily increase in cortisol levels, thus having an 'activational effect', in contrast to the apathetic state of institutionalized elderly.

Conclusions: Dog-mediated intervention programs appear to be promising tools to improve the social skills and enrich the daily activities of the institutionalized elderly.

Key words: *Animal-facilitated therapy, cortisol, dog, elderly, enrichment.*

INTRODUCTION

Aging is characterized by a progressive loss of the ability to cope with external challenges that leads to a condition of frailty, which can precipitate age-associated pathologies.[1,2] Since life expectancy greatly increased in the 20th century, developing specific programs to foster healthy lifestyles in old age has become increasingly important and will remain so over the next decades.

In the elderly, institutionalization can have serious implications for an individual's well-being because of the stress and loneliness caused by separation from the home environment, and a decline in physical and emotional health can consequently occur.[3,4] Depression and apathy are almost ubiquitous symptoms in nursing home patients,[5] and though the correlation between apathy and depression is still controversial,[6,7] apathy appears as a prominent feature of depression in subjects over 80 years of age.[8] Therefore, an important challenge is to devise low-cost and effective interventions that can reduce stress and apathy in institutionalized elderly by stimulating social responsiveness and physical activity.[9,10]

The recognition of the importance of the human-animal bond has led to a proliferation of programs known as animal-assisted interventions (AAI), which are designed to improve the lives of geriatric patients.[11,12] Visiting dogs are starting to be recognized

as an innovative tool to ameliorate psychological conditions of institutionalized geriatric patients thanks to their ability to improve communication and to reduce loneliness and symptoms linked to depression.[13–18] Patients' availability to communicate with and observe a pet animal has very often resulted in a reduction of their apathetic state. Notwithstanding such evidence, contradictory data present in the literature show the need for further research in this area to substantiate the potential beneficial effects of dog-mediated intervention programs.[19–22]

In our study we evaluated behavioural, physiological and psychological effects of visiting dogs in a geriatric population, either in a social context (i.e. socialization sessions) or a therapeutic and physically demanding context (i.e. physical therapy sessions). In particular, the aim of this study was to assess the effectiveness of an animal-assisted program in reducing depression symptoms and the everyday apathetic state of an institutionalized population of geriatric patients. To do this, we measured patients' social and communicative behaviours during the AAI sessions. To assess the relationship between stress mediators and activities involving dogs, salivary cortisol samples were collected before and immediately after the AAI sessions. A Geriatric Depression Scale (GDS) was administered at the beginning and end of our 5-month study in order to evaluate long-term changes in depressive symptoms as a result of the AAI program.

METHODS

Participants

This study was conducted in a nursing home for the elderly (Istituto San Michele, Rome, Italy). Experimental subjects were 19 elderly patients (6 men and 13 women) with a mean age of 85 years (range, 70–96 years). Cognitive state was assessed with the Mini-Mental State Examination (47% of patients scored more than 20; 53% scored 20 or less).[23] Most patients were diagnosed having hypertension, type 2 diabetes and/or locomotor disabilities (mainly related to serious arthrosis). Inclusion criteria were willingness to interact with dogs, no known allergies to animals and no major pathology seriously affecting the ability to interact with dogs. The main exclusion criterion was fear of dogs (a preliminary session, during which patients encountered visiting dogs, was run to exclude subjects who were afraid of dogs).

The dogs, a 5-year-old female golden retriever and a 6-year-old female cocker spaniel, met hospital policy for participating in AAI programs (i.e. documentation of current vaccinations, controllability and temperament). The dogs were trained by the Associazione Nazionale Uso del Cane per Scopi Sociali. All procedures necessary to guarantee a high standard of animal welfare were undertaken. When the dogs were found to manifest excessive calming signals (e.g. yowling, slapping) and avoiding/redirecting behaviours, the dog handler promptly intervened to minimize/avoid the stressing situation by changing activity, keeping distance between the dog and the stressing stimulus, or caressing the dog.

This study was approved by the Ethical Committee of the Istituto Superiore di Sanità, and it conforms to the provisions of the Declaration of Helsinki (1996). Informed consent was obtained from all participants. Sensitive data have been handled with confidentiality and securely stored.

Dog-assisted interventions

Two types of dog-assisted interventions were held twice a week for 5 months, from February to June 2010, at the same time each week (Tuesday and Thursday at 10:30). Because of the general lack of motivation characterizing these geriatric patients – especially in the afternoon when they spend most of the time in bed – the dog-assisted sessions took place in the morning when they were more willing to participate in the activities. Both sessions were video-recorded and successively scored for behavioural analysis.

At physical therapy sessions, two visiting dogs, two dog handlers and two physiotherapists were always present. Physical therapy lasted for 60 min, with 30 min dedicated to each patient, including 15 min (familiarization phase) for interaction with the dog (e.g. playing with, feeding or brushing it) and 15 min for physical therapy, during which each patient walked the dog on a lead as a rehabilitative treatment. Physical therapy took place in a quiet, dedicated room. All physical therapy subjects (PS) were allowed to stay in the room when they were not directly involved in the activities (usually watching other patients performing the activities). Four patients, who needed motor rehabilitation and met the inclusion criteria, attended physical therapy sessions (Table 1).

Table 1 Number of subjects in each group

Experimental group	Behavioural assessment	Physiological assessment (cortisol)	Psychological assessment (GDS)
PS (n = 4)	n = 4	n = 4	n = 4
PS-CG (n = 3)	Not observed†	n = 3	n = 3
SS (n = 9)	n = 9	n = 7	n = 6
SS-CG (n = 3)	Not observed†	n = 3	n = 3
Total n = 19	**n = 13**	**n = 17**	**n = 16**

†Since behavioural assessment for this study used a cross-over design, behaviours were not rated/scored in the PS-CG and SS-CG groups. GDS, Geriatric Depression Scale; PS, physical therapy subjects; PS-CG, physical therapy control group; SS, socialization subjects; SS-CG, socialization control group.

At socialization sessions, two visiting dogs, two dog handlers and two nurses were always present. Socialization consisted of 60 min of group interaction with a visiting dog. During each session, socialization subjects (SS) sat in a circle in a dedicated room, and the dog was moved about the room by the handler to interact with the patients at regular turns. Each patient was allowed to interact with the dog (e.g. playing with, feeding or brushing it). Nine patients, who met the inclusion criteria, attended the socialization sessions (Table 1).

Physiotherapists and nurses who took part in the study had been involved in AAI since 2009, and the staff of the Associazione Nazionale Uso del Cane per Scopi Sociali provided the dogs and the dog handlers. Preliminary meetings to define the methodological details and schedule the AAI were organized with dog handlers, researchers and physicians. Physiotherapists and nurses were never directly involved in the patient-dog interactions; these were always mediated by the dog handler. Physiotherapists were in charge of supervising physiotherapy exercises while nurses managed patients' daily routines.

Behavioural assessment

PS and SS were video-recorded using a digital video camera connected to a professional Sony videocassette recorder V0-5800PS (Model TR 7000E, Sony, Tokyo, Japan). The behavioural analysis was conducted based on the videotapes, which were ~~viewed~~, using commercial software (The Observer 3.0, Noldus, Wageningen, The Netherlands). Data were collected using focal sampling, in which all occurrences of behaviours (listed in Table 2) for each patient were recorded during each physical therapy and socialization session. [24] Once chosen, a focal individual was followed to the extent possible during each session.

Table 2 Social interactions observed during animal-assisted interventions activities

(a) Activities	
Rehabilitative treatment	Taking the dog with a lead during physical therapy
Play	Throwing-retrieving a ball
Food/water	Feeding the dog
Brush	Brushing the dog
Contact	Interacting with, talking to, grooming and petting the dog; did not involve any other activities (e.g. playing, brushing or feeding)
(b) Social interactions	
Patient-dog (spontaneous)	The patient spontaneously initiated social interaction with the dog by looking at, talking to or touching it.
Patient-dog (mediated)	The handler encouraged the patient to look at, talk to, or touch the dog.
Patient-human	The patient initiated social interactions with another human (i.e. handler, nurse, physiotherapist or another patient) by looking at, talking to or touching him/her.
No interaction	The patient did not look at, talk to or touch a dog or a human.

The sessions were organized according to different activities that were always presented in the same order (Table 2a). Within each activity, we recorded social interactions and coded them according to the receiver (patient-dog vs patient-human) (Table 2b). Patient-dog interactions were also subdivided into spontaneous (i.e. self-initiated) or mediated (i.e. encouraged by the dog handler). In addition, frequency of smile episodes was recorded and their co-occurrence with social interactions analyzed.

Given the high behavioural variability between the different subjects, we used a crossover design, where each participant acted as his/her own control.

Physiological assessment

To assess cortisol levels, saliva samples were collected by means of specific cotton swabs (Salivette, Sarsted, Nümbrecht, Germany). Patients were not

Table 3 Changes in social interactions during each activity performed in socialization and physical therapy sessions

(a) Socialization sessions

	Play	Contact	Food/water	Brush	–
Social interactions (SI)	$F_{(3,24)}$ = **32.13,** **P = 0.0001**	$F_{(3,24)}$ = **12.59,** **P = 0.0000**	$F_{(3,12)}$ = 3.37, P = 0.0546	$F_{(3,21)}$ = 2.84, P = 0.0628	–
Time	$F_{(1,5)}$ = 1.40, P = 0.2893	$F_{(1,8)}$ = 1.49, P = 0.2574	$F_{(1,1)}$ = 0.10, P = 0.8041	$F_{(1,3)}$ = 5.44, P = 0.1018	–
SI × Time	$F_{(3,15)}$ = **15.95,** **P = 0.0001**	$F_{(3,24)}$ = 0.15, P = 0.9278	$F_{(3,3)}$ = 1.18, P = 0.4479	$F_{(3,9)}$ = 0.76, P = 0.5447	–

(b) Physical therapy sessions

	Play	Contact	Food/water	Brush	Rehabilitative treatment
Social interactions (SI)	$F_{(3,9)}$ = **61.56,** **P = 0.0000**	$F_{(3,9)}$ = **28.25,** **P = 0.0001**	$F_{(3,9)}$ = **21.01,** **P = 0.0002**	$F_{(3,9)}$ = **81.63,** **P = 0.0000**	$F_{(3,6)}$ = **17.63,** **P = 0.0022**
Time	$F_{(1,3)}$ = 0.35, P = 0.5935	$F_{(1,3)}$ = 0.03, P = 0.8640	$F_{(1,2)}$ = 16.93, P = 0.0543	$F_{(1,2)}$ = 0.81, P = 0.4636	$F_{(1,2)}$ = 3.71, P = 0.1941
SI × Time	$F_{(3,9)}$ = 2.45, P = 0.1300	$F_{(3,9)}$ = 0.46, P = 0.7160	$F_{(3,6)}$ = 1.29, P = 0.3595	$F_{(3,6)}$ = **5.37,** **P = 0.0391**	$F_{(3,6)}$ = 0.72, P = 0.5762

Bold font indicates $P \leq 0.05$.

allowed to smoke, eat or drink beverages containing caffeine, sugar or fruit juices within the 30 min preceding saliva sampling or during saliva collection. Each subject was asked to chew the Salivette cotton swab for 120 s.

Sampling took place at least 30 min before the session and 30 min after the session.[25] Since we aimed to assess both the short- and long-term effects of the AAI program, saliva samples were collected at the beginning of the study (February, before and after the first session) and at the end of the study (June, before and after the last session). All samples were kept on ice and later centrifuged at 503 *g* for 10 min at 4°C. Cortisol measurement was performed using a commercially available radioimmunoassay kit (CORT-CT2, CIS-Bio International, Gif-sur-Yvette, France), the manufacturer's instructions. The saliva samples of two patients were insufficient and discarded. Control subjects were recruited for physiological assessments (Table 1).

Psychological assessment

To assess psychological effects of dog-assisted interventions, each participant was administered the GDS, a screening tool to evaluate elderly patients for symptoms of depression.[26] The short form of the GDS with 15 questions was administered at the beginning (February) and end of the AAI program (June). A score >5 on the GDS-15 indicates clinically important depressive symptoms.[27] All experimental subjects, with the exception of three, agreed to complete the questionnaire. Control subjects were recruited for psychological assessments (Table 1).

Statistical analyses

Statistical analyses were carried out using Statview II (Abacus Concepts, Piscataway, NJ, USA) and Stata 8.0 Software (StataCorp, College Station, Texas, USA). Data were analyzed using ANOVA with repeated measures.

We used a within-subjects design to assess behavioural data. Frequency and duration of behaviours (mean) were scored during the first (February) and last (June) months of the study to evaluate possible long-term behavioural effects of the AAI program (time as repeated factor). For the physiological and psychological assessments, we compared cortisol levels and GDS scores between experimental and control subjects (CG) (PS vs PS-CG; SS vs SS-CG) with time as a repeated measure, within-subject factor (February vs June).

A P-value ≤ 0.05 was accepted as statistically significant. When significant differences were found, multiple comparisons were performed using the post-hoc Tukey–Kramer test.

RESULTS

Behavioural assessment

In socialization sessions (Table 3a), a great number of interactions occurred overall during contact activity; patients interacted for the same amount of time with

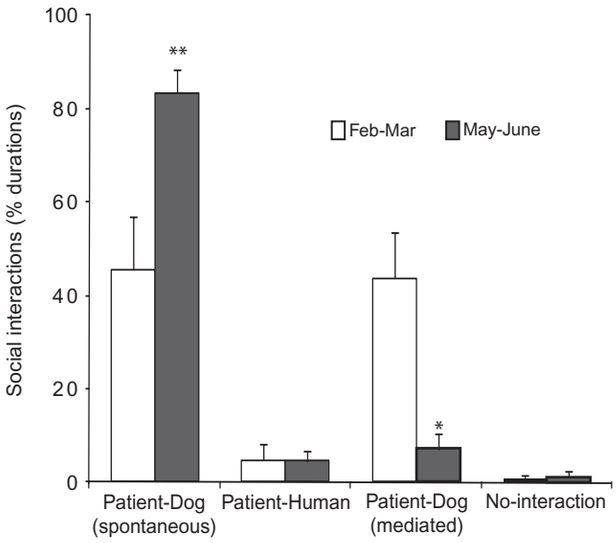

Figure 1 Social interactions during play activity (socialization sessions). Spontaneous patient-dog interactions increased in duration from February to June, while mediated interactions decreased. *P < 0.05; **P < 0.01. Data represent means + SEM of percent durations; there were nine subjects.

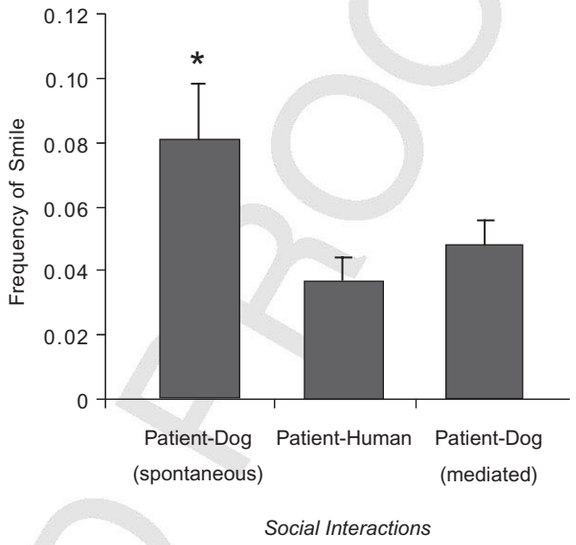

Figure 2 Frequency of smile episodes and their co-occurrence with different social interactions during play activity (socialization sessions). Patients were observed smiling more often during spontaneous interaction with the dog than during other social interactions; *P < 0.05. Data represent means + SEM; there were nine subjects.

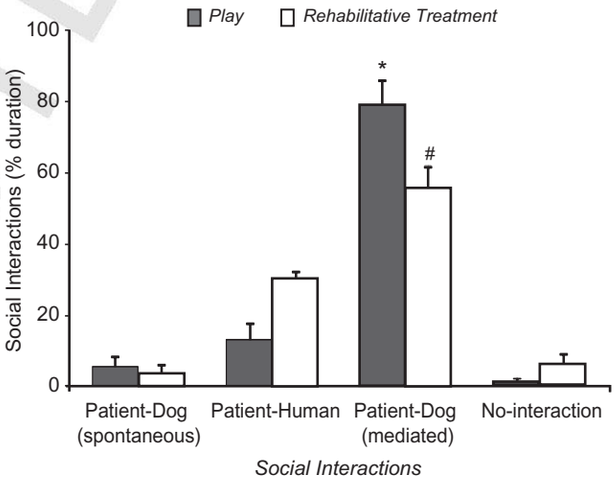

Figure 3 Social interactions during the activities play and rehabilitative treatment (physical therapy sessions). During both activities, patients spent more time in mediated interactions with the dogs than in spontaneous interactions both with dogs and humans; Post-hoc comparisons: *P < 0.05 patient-dog (mediated) during play activity compared to all other interactions; #P < 0.05 patient-dog (mediated) during rehabilitative treatment compared to all other interactions; Data represent means + SEM of percent durations; there were four subjects.

dogs and humans. However, during play activity, patients spent significantly more time interacting spontaneously with the dog than with humans. Over time, interactions with the dogs changed. In particular, the amount of time spent interacting spontaneously with the dog increased from February to June while mediated interactions decreased over the same period (Fig. 1).

The occurrence of smile episodes was recorded during the different activities within the different social interactions. Results indicate that, during contact activities ($F_{(2,16)} = 12.53$, $P = 0.0005$) and play activities ($F_{(2,2)} = 8.42$, $P = 0.0052$, Fig. 2), patients were observed smiling more often while spontaneously interacting with dogs than while interacting with humans or during mediated interactions with the dogs. The frequency of smile episodes did not change during the course of the therapy (February vs June) ($F_{(1,8)} = 0.01$; $P = 0.9202$).

In physical therapy, during all activities performed ~~(Table 3b)~~, patients engaged mostly in mediated interactions with the dog. (Results for play and rehabilitative treatment are shown in Fig. 3).

Results indicate that, during the PS, smiles occurred more often during the activity play than during all the other activities ($F_{(5,14)} = 12.44$; $P = 0.0001$). The frequency of smile episodes did not change during the course of the therapy (February vs June) ($F_{(1,3)} = 0.23$; $P = 0.6641$).

Physiological assessment

A significant interaction between time (pre-intervention and post-intervention) and session (with and without the dogs) was found when socialization groups were compared ($F_{(1,14)} = 5.816$, $P = 0.0302$). In particular, while the control group (SS-CG) showed a significant circadian rhythm-based decrease in salivary cortisol, this decrease was not observed in the SS group (Fig. 4a). The physical therapy groups (PS, PS-CG) both failed to show the physiological circadian decrease in cortisol levels, possibly as a result of the physical activity, an effect not dependent on dog contact ($F_{(1,5)} = 0.953$, $P = 0.3739$) (Fig. 4b). No statistically significant difference was found in cortisol levels collected at the beginning (February) and end (June) of the study, and thus, data were collapsed (Fig. 4).

Psychological assessment

ANOVA revealed a main effect of AAI: all SS and PS interacting with dogs were characterized by a lower depressive state compared to controls ($F_{(1,14)} = 6.731$, $P = 0.0212$), but no effect of time was found ($F_{(1,14)} = 0.835$, $P = 0.3764$).

DISCUSSION

Aim of our study was to evaluate the effects of dogs in reducing the everyday apathetic state and depressive symptoms in an institutionalized population of geriatric patients.

From a behavioural point of view, a spontaneous increase in patients' willingness to participate in the activities involving dogs was observed, as evidenced by an increase in spontaneous interactions towards the animals. This is a major achievement, especially when considered in the context of the everyday apathetic state of these patients as reported by the nursing staff and family members. The scoring based on the videotapes further supports this change. Indeed, facial expressions, such as a still face, were rarely observed during the interventions, even when no specific activity was scheduled for a patient.

Based on the literature, we defined apathy as behaviour characterized by a lack of interest or an absence of emotional responsiveness to a stimulus, as evidenced by diminished initiative and excitement and a quantitative reduction of self-initiated and/or environmentally stimulated behaviours.[28,29] Although

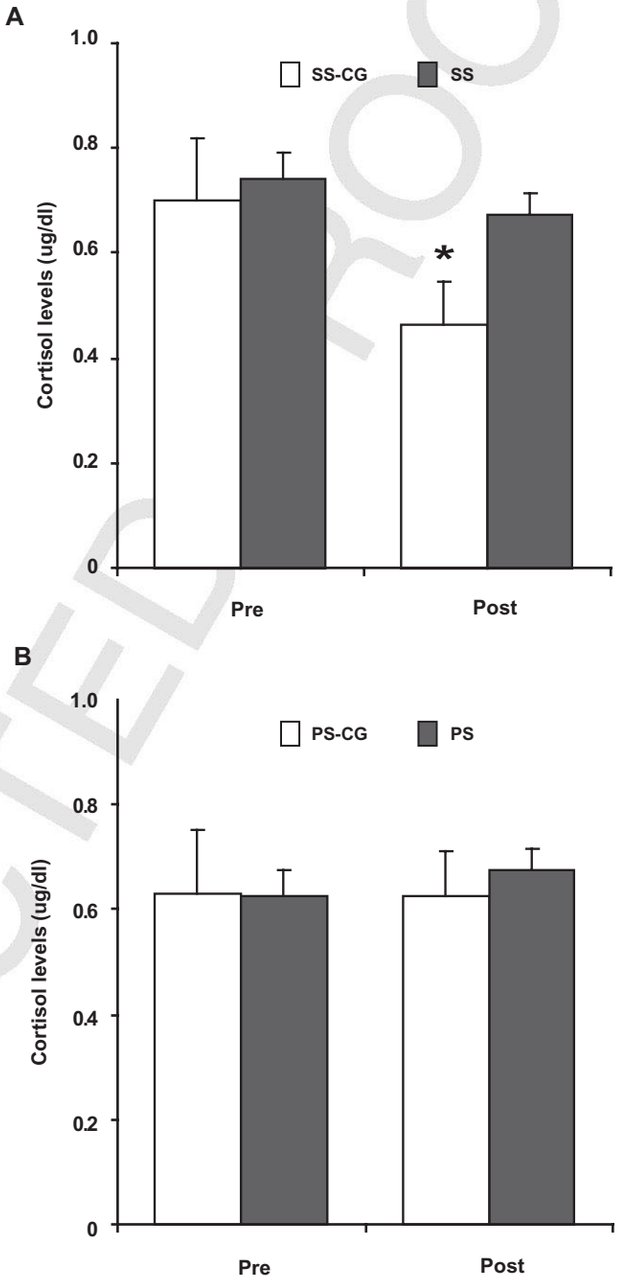

Figure 4 Salivary cortisol levels (μg/dL) in patients before and after physical therapy and socialization sessions with dog and without the dog (control). (a) Socialization sessions: SS-CG showed a significant decrease in salivary cortisol from the first to the second sample, but this decrease was not observed in the SS group. (b) Physical therapy sessions: both groups failed to show the physiological circadian decrease in cortisol, *$P < 0.05$. Data represent means + SEM of data (transformed as square root of the original value). Pre and Post values represent the average of February and June for a total of 17 subjects. PS, physical therapy subjects; PS-CG, physical therapy control group; SS, socialization subjects; SS-CG, socialization control group.

subjects very rarely smiled, as is common in geriatric patients, the activity that most effectively elicited this behaviour was throwing and retrieving a ball during play activities. In addition, during socialization sessions, the time spent interacting spontaneously with the dog increased from February to June, suggesting that ludic-recreational activities, particularly play, are the most effective at decreasing the apathetic state and promoting the interaction between the patient and dog. Over time, this interaction became increasingly independent from external mediation by the handlers. In contrast, during physical therapy sessions, dog handlers encouraged patients to interact with dogs (e.g. insisting on activities that require the use of hands and arms, such as stroking and brushing the dogs, as well as motions of stretching and turning); this resulted in an obvious increase in patient-dog mediated interactions. It is worth noting that PS were always willing to interact with dogs.

Previous studies involving children and healthy adult subjects have shown a decrease in cortisol levels after interactions with dogs, which was ascribed to a general dearousal effect of affiliative animal-human interactions.[30–33] The present study is one of the first to assess changes in cortisol levels in elderly patients in an AAI program. Our results indicate that both in the physical therapy and socialization sessions, interactions with the dogs counteracted the circadian decrease in cortisol levels.[25] They also call for further research to disentangle the relationship between stress mediators and activities involving dogs and to substantiate the possible role of such interventions in motivating patients and stimulating psychomotor activation.

Despite the visible changes in the apathetic state, this study found no difference in the GDS scale as a result of the AAI. Depression and apathy are almost ubiquitous features in nursing home patients,[5] and apathy appears as a prominent feature of depression in subjects over 80 years old.[8] However, the correlation between these symptoms is still controversial.[6,7] In this context, our results point to apathy and depression as two distinct behavioural dimensions that might react differently to AAI interventions. While apathy might be considered a symptom that can be effectively targeted by ludic-recreational activities, such as those involving dogs, depression is a complex syndrome that needs a multidimensional approach and individual therapeutic interventions.

Conclusions and future directions

Although the results of this study cannot be generalized because of the small sample size, the findings are promising. Interventions involving visiting dogs have the potential to ameliorate living conditions in nursing homes and overcome the general state of inactivity characterizing the institutionalized elderly. Most of the previous studies failed to discriminate between mediated and non-mediated human-dog interactions. Activities that create more individualized interaction between the elderly and the animals, such as play, should be encouraged. Temporal analysis of the behavioural changes observed suggests that relationships need time to develop, and thus, benefits of visiting dogs become detectable after some time. Future studies will need to test whether the behavioural changes here are long lasting or whether they are strictly related to continuous exposure to the dog.

In this study, the purpose of AAI was to provide a distraction from the patient's health status. As such, we avoided too many physiological assessments. Nonetheless, future studies should address issues such as changes in heart rate as a consequence of dog exposure. Moreover, since data on long-term effects of visiting dogs on depressive symptoms are controversial, future research should address this issue.

ACKNOWLEDGMENTS

Data presented in this paper have been collected as part of the project 'Effects of dog-assisted therapies on physical and psychological well-being in the institutionalized elderly' funded by the Istituto Superiore di Sanità and Nando Peretti Foundation, in collaboration with the Associazione Nazionale Uso del Cane per Scopi Sociali.

We are grateful for the invaluable help of all the personnel at the Istituto Romano San Michele, in particular Dr C. Fiore, Dr V. Grotti for allowing the project to take place, and Dr B. Lunerti and Dr F. Tofani who assisted the Associazione Nazionale Uso del Cane per Scopi Sociali team during the socialization and physical therapy sessions. In addition, we would like to thank C. Delise, D. Pellegrini, A. Gatta, D. Cavinato and D. Carlomusto for their help. We also thank N. Francia, L.T. Bonsignore and I. Cogliati-Dezza for helping in preparing this manuscript and M. V. Tolazzi for supervising the AAI in the nursing home.

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