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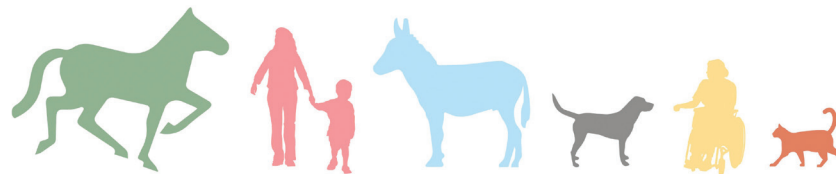
Can the Visits of Dogs (*Canis lupus familiaris*) Influence the Mental Health (Anxiety and Depression) of Male Aging Patients Institutionalized with Dementia in Health Care Units? A Pilot Study of Madeira Island, Portugal

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Abstract: Despite the fact that in the last decades, several mental health studies have shown that companion animals contribute to psychological and social well-being in humans (e.g., positive impacts have been observed in the elderly medicated for chronic diseases such as anxiety, dementia, and depression), bonds between humans and other animals continue to be underestimated. The aim of this study is to assess the impact of an animal's visits (twice a week, *N* = 30) in depression and anxiety levels of an institutionalized male population diagnosed with dementia. While some of these patients are being partially medicated with antidepressants and/or anxiolytics, others are not subject to any medication (control group). The GAI and GDS measuring instruments were used and there were differences in anxiety and depression levels between the first and last dog visit, statistically significant in depression levels of nonmedicated patients. Such findings allow us to conclude that the effects of the visits of an animal near nonmedicated patients are greater than near medicated ones. The complementary role of animals in mental health institutions where patients are being treated for psychiatric disorders (in the particular case of dementia) should be considered.

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Introduction

The aim of this study is to assess how twice weekly interactions with a companion animal (*Canis lupus familiaris*) may influence anxiety and depression levels in a group of dementia-diagnosed patients. This is the first study conducted in Madeira Island, Portugal, regarding the possible benefits of the visits of companion animals in the only existing health care unit for adult males suffering from dementia.

In the last three decades, numerous studies have shown that sharing our daily life with other animals may positively influence human health (Pierce, 2016). This positive influence can be seen via the improvement of physical and psychological health (Walsh, 2009).

Nondrug interventions can be seen as complementary and effective therapeutic strategies to reduce anxiety and depression and delay the deterioration of cognitive functions (Ambrosi et al., 2018). In the specific case of animal-assisted activity, improvements have been identified in the social interactions of institutionalized patients with dementia, through the activation of cognitive circuits and communication channels (Ambrosi et al., 2018), including in the last stage of the life cycle of these patients (Swall et al., 2019).

It was at the end of the 18th century that theories on the influence of animals in human health started being applied in the mental illness scientific field (Berget & Ihlebaek, 2011) and as a complement to conventional treatments. Since then these complementary interventions have been used in health care units to improve the social (Allen, 2003; Grigg & Hart, 2019; Swall et al., 2019; Wesenberg et al., 2019) and psychological (Wesenberg et al., 2019) well-being of emotionally unstable individuals like war veterans with post-traumatic stress disorder or aging people with dementia (Filan & Llewellyn-Jones, 2006; Grigg & Hart2019; Wesenberg et al., 2019; Yakimicki et al., 2019).

Dementia is mainly observed among aging people (WHO, 2017) since only 9% of cases are reported in individuals under 65 years old. Dementia is as a set of several mental diseases with a neurodegenerative origin (Acarín et al., 2018); these are progressive and irreversible and affect not only memory but also behavior, interfering in the daily lives of those affected (WHO, 2017b). Smid (2008) argues that cognitive and behavioral impairment affects memory, executive functions, visual/spatial skills, language, and personality or behaviour. Alzheimer is the most frequent dementia, representing between 60% to 70% of all diagnosed dementia cases (Acarín & Malagelada, 2018; WHO, 2017b;). Alzheimer is exhibited in more than 80% of the diagnosed dementia cases in individuals who are more than 65 years old. According to the *Global Action Plan for Dementia 2015–2017* (WHO, 2017a), the number of individuals with dementia will tend to triple by 2025, with more than 58% of the individuals living in developed countries (especially after the age of 60 or more years old) and with the disease prevalence doubling every 5 years. In Portugal, the incidence and prevalence of dementia follows the global growth trend (Sequeira, 2018). Dementias have socioeconomic consequences (Smid, 2008), and so it is important to prioritize the implementation of plans and programs so that the quality of life of both patients and caregivers may be improved. Nonhuman animals can give an important contribution to such protocols.

Bonds and interactions established between people and companion animals are important (Kruger & Serpell, 2006) because they are responsible for the increase in the production of endogenous neurochemical substances associated with relaxation in the involved species (Wells, 2009). Such bonds and interactions are very successful in the treatment (and evolution) of chronic diseases (Geisler, 2004; Kruger & Serpell, 2006; Walsh, 2009) such as anxiety, depression, and dementia (Berget & Ihlebaek, 2011; Walsh, 2009). A simple caress or touch between some companion animals and human beings triggers a complex mechanism—at the chemical level—that produces endorphins. These contribute to decreased levels of depression (Perkins et al., 2008), agitation, or neurosis (Cherniack & Ariella, 2014), which relieve symptoms of anxiety and stress

and generate comfort (Walsh, 2009). For those who suffer from dementia (McNicholas et al., 2005), the interaction with companion animals has potential benefits regarding affection and mobility (FEDIAF, 2017). Beneficial effects consist of positive emotions of pleasure and well-being (Swall et al., 2016) as well as greater social interactions expressed via touch, body movements, and richer verbal communication (Wesenberg et al., 2019).

Activities assisted by companion animals can be beneficial to patients with dementia, especially in the later stages of the disease's evolution (Olsen et al., 2016). Even if effects are not immediately seen, these effects do improve the quality of life of the patients. Such results transform interactions and bonds between humans living in dementia care units and companion animals in a promising therapeutic strategy (Kårefjärd & Nordgren, 2019; Nordegren & Engström, 2014; Wood et al., 2017) that can also slow down the progression of neuropsychiatric symptoms (Majic et al., 2013).

For these reasons, we decided to assess the impact of a dog's regular visits to a health care unit and assess the possible benefits of this activity for institutionalized patients with dementia, as described below.

Materials and Methods

Methodology

Data collection was conducted between November 2018 and February 2019. Two male samples were followed: (1) one group was medicated with antidepressants and/or anxiolytics (control group with 6 patients), and (2) another group was nonmedicated (composed of 9 patients), to assess whether the animal's visits would make any significant difference in both these two groups. The decision of drug therapy was the exclusive responsibility of the psychiatrist at the health unit according to the clinical condition of the patients and depending on the degree of anxiety or depression diagnosed in patients.

All the patients of the only male health care unit in Madeira Island ($n = 24$) were institutionalized with

dementia. This population was reduced ($n = 15$) for the purpose of this study since some patients did not meet the study inclusion criteria, which are as follows:

1. Institutionalized patients diagnosed with some dementia type or patients still under initial observation;
2. Voluntary participation and willingness to interact with a dog.

Also, some patients were automatically excluded due to other exclusion criteria:

3. Aggressive behavior;
4. Phobia and/or dog allergy.

An informed consent form was signed by the patients' closest family members.

Sample

While studied patients were diagnosed with some dementia type, in others the dementia type was yet to be diagnosed (40%). About 47% of the patients were diagnosed with alcoholic dementia while 13% were diagnosed with Alzheimer disease. Most patients (60%) did not take any antidepressant or anxiolytic medication ($N = 9$). Among those medicated ($N = 6$), 33% took antidepressants and 7% took anxiolytics.

The patients' age ranged from 54 to 87 years old ($\bar{X} = 73$ years old). Most patients (60%) had low education levels (4 to 6 years of formal education) and 20% did not attend any level of education. Only 13% completed compulsory formal education (12 years), and only 7% of the participants had a university degree. Regarding marital status, 40% were married, 27% were divorced, 20% widowed, and 13% single. Most patients (73%) had already had dogs in their previous homes.

Protocol of Visits and Interactions with the Companion Animal

The following protocol of visits with the animal was established between the investigator and the head

of the health unit: Twice a week visits and interaction ($N = 30$) of the health care unit patients with the dog were conducted every Monday and Friday after lunchtime. Each visit took approximately 45 minutes. All participants gathered in the resting room and all had the possibility of interacting with the dog, if they wanted (Figure 1). Patients interacted with the dog in turns. Most patients, medicated or nonmedicated, played with the dog, caressed it (Figures 3 and 4), and called it by its name so that the dog would approach them (most patients memorized the dog's name and would remember it in the following sessions). While some patients would even feed the dog with small snacks provided by the researcher (Figure 1), others did occasionally walk the dog (Figure 2). Within this time period, patients were also encouraged by the researcher to remember their own past experiences with previous companion animals.

When caressed by the patients, the dog exhibited friendly behavior and would approach the patients. The dog would sit on the patients' lap, would lick their hands, and would ask for food.

The animal chosen to participate in this study was a small size female dog (3 kilograms), exhibiting friendly and sociable behavior (Figure 5).

In this study, the choice of the dog was based on familiarity and proximity previously established between the researcher and the animal and its sociable and friendly character, since in Portugal animal-assisted activities or therapies are not yet legally accepted and regulated. On the other hand, the well-being of the dog was ensured by the first author of this research article (with training in veterinary medicine) in order to mainly avoid any stressful situations. The researcher has been close to the dog since 2015. This proximity with the researcher relaxed the dog and allowed for the transmission of trust and reliability of the patients toward the dog. No episode of fear, panic, repulsion, or rejection between dog and participants occurred. In fact, empathy among all "actors" (medical personnel, dog, and patients) was immediate. Additionally, the dog complied with all hygienic and sanitary requirements (IAHAIO, 2018), also controlled by the first author of this research.

Figures 1 and 2. Twice a week interaction between patients and the dog (feeding and promenade, respectively) in the health care institution.

Figures 3 and 4. Interaction between some patients and the dog in the health care unit.

Figure 5. Dog used in the study.

Instruments Used in the Research

We used anxiety and depression psychometric scales available and conducted surveys. We compared baseline scale values with data collected throughout the study. The surveys (Geriatric Anxiety Inventory/ GAI and Geriatric Depression Scale/GDS) were applied to all patients by the team of resident psychiatrists and psychologists.

GAI (Geriatric Anxiety Inventory)

The psychometric scale used in this work aims to evaluate anxiety symptoms, specifically in aging populations, through the assessment of 20 items coded in the same direction and whose responses indicate nonsomatic features (Daniel et al., 2015). It is a short questionnaire with dichotomous responses ("I Agree"/"I Disagree") where 1 point is attributed to "I Agree" answers. Results are expressed as NAS (*No anxiety symptoms*) or MA (*Manifestation of anxiety*). This scale was developed by Pachana and co-workers (2007) and has been adapted in several countries (in Portugal, it was adapted by Ribeiro and co-workers, 2011).

GDS (Geriatric Depression Scale)

In many contexts, depression is associated with dementia, which is very common in the early stages of the disease, making it difficult for the differential diagnosis of both. At an early stage it is important to use a measurement instrument to decide on the diagnosis (Sequeira, 2018). The GDS scale or depression scale allows for the identification of depression symptoms (Sequeira, 2018), differentiating depressed from nondepressed patients. The scale provides 30 items

to measure depressive symptoms with two options of psychometric properties ("Yes"/"No") (Daniel et al., 2015). Results are presented as "DA" (Depression Absence), "MD" (Mild Depression), or "SD" (Severe Depression).

Statistical Analysis

Data was analyzed using the statistical software JMP 14, 0 (2018, SAS Institute, Inc.). To determine data normality, a Shapiro-Wilk test was computed (results supported via graphical analysis). Variance analyses (ANOVA) were computed to evaluate the effect of the animal in the studied variables (anxiety via GAI and depression via GDS), assuming that the null hypothesis was true: that there was no statistically significant difference in the anxiety and depression levels exhibited by the patients.

We assumed an expected prevalence of 50%, a 5% error, an IC of 95%, and established a probability less than $p \leq 0,05$ as the level for significant statistical differences among the scores of both means results of GAI and GDS, taking into consideration the p value, in all patients during the research.

Results

In Table 1 we can see the variation in the $\bar{X}$ levels of depression and anxiety in both medicated and nonmedicated patients during the study (GDS and GAI first and last assessment).

When comparing the averages of both groups (medicated patients and nonmedicated patients), in the nonmedicated group, both levels of depression and levels of anxiety decreased in the presence of the dog (see Graphics 1 and 2).

The final means differences results of both variables (GDS/depression and GAI/anxiety) and respective variation between the nonmedicated group and the medicated group are presented in Table 2.
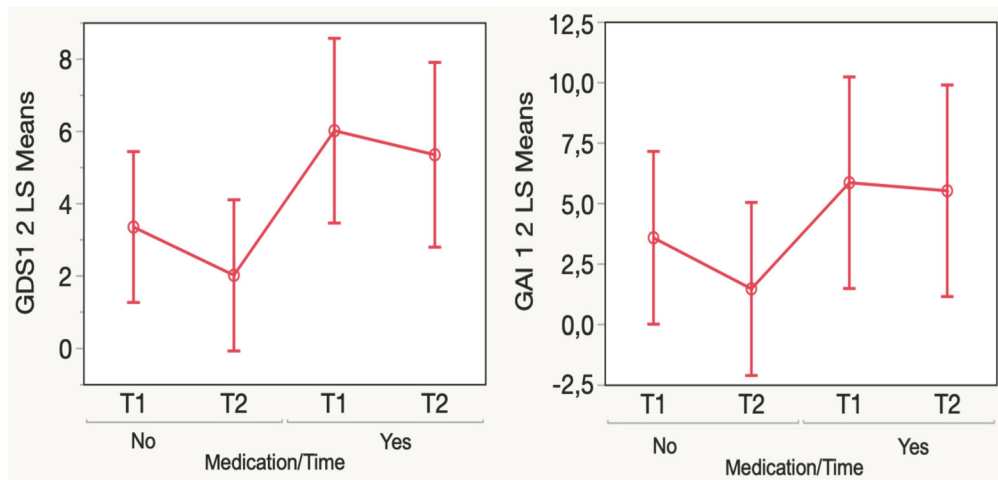
The variation in the $\bar{X}$ levels of depression in the nonmedicated patients is significantly different (**).

Regarding anxiety, it appears that although the average mean levels in medicated patients is higher than that observed in unmedicated patients, this variation is not statistically significant.

In addition to the aforementioned results, it was also possible to observe, subjectively, an increase in nonverbal communication between patients, and between patients and the dog and the researcher. Some participants engaged with the dog through laughter, gaze, and petting. There was also an increase in verbal communication by the patients, through vocalizations or by talking to the dog and chatting with the researcher, issuing comments or questions, in addition to a greater involvement with the environment that surrounded them throughout the study (Figures 3 and 4). Such signs were exhibited as soon as the dog entered the resting room. All participants played

Table 1   Results in GDS and GAI Variables Throughout Time (T1 and T2) in Medicated (*N* = 6) and Nonmedicated Patients (*N* = 9)

GDS	LSMeans Differences Student's t	
	T1	T2
Medicated patients	6,0	5,3
Nonmedicated patients	3,3	2,0
GAI	**LSMeans Differences Student's t**	
	T1	T2
Medicated patients	5,8	5,5
Nonmedicated patients	3,5	1,4

Graphics 1 and 2. Variation in the depression (GDS) and anxiety (GAI) levels throughout the study in patients under (N = 6) and without medication (N = 9).

Table 2   Final Results of Variables GDS and GAI in Patients with or without Medication

	GDS		GAI	
	With medication (N = 6)	Without medication (N = 9)	With medication (N = 6)	Without medication (N = 9)
LS Means Differences Student's t	5,6	2,6	5,6	2,5
p-value	0,0690	0,0138 **	0,3532	0,1152

with the dog (even nurses). We were told that on the days when there was no dog visit, participants stated they wanted to see the dog and that they missed it. Also, one specific nonmedicated patient, who at the beginning of the experiment refused to feed or caress the dog, later started calling it, caressed it, and fed it.

Discussion and Final Remarks

We aimed to evaluate over the study period (15 weeks, twice a week) the existence of possible changes in the anxiety and depression levels among medicated and nonmedicated patients living in a health care institution for dementia cases.

Depression and anxiety levels tended to diminish throughout the time of the study, both in medicated and nonmedicated patients. In this sample there was a behavioral response by both groups when interacting with the dog. In the group of medicated patients, a reduction in the anxiety and depression levels throughout the entire study period was visible whenever dog visits occurred (even if these differences were not statistically significant and cause-effect cannot be established). In the case of nonmedicated patients, the reduction of depression levels was statistically significant (**). This means that the effect of the companion animal on unmedicated patients was greater compared to the effect in medicated patients. This may be due to a lower predisposition of medicated users to interact with the animal, due to their higher levels of depression and anxiety compared to nonmedicated patients, making them more numb and apathetic toward the environment. Such

results may show the importance of a complementary therapeutic approach (a nonmedicated one) in patients institutionalized with dementia.

Such findings allow us to suggest that during the study period when regular visits to the health care clinic by the dog (30 visits in total) occurred, anxiety and depression levels tended to decrease, especially in nonmedicated patients. In medicated patients this decrease was also visible although not statistically significant. Such results confirm studies by Ambrosi and co-authors (2018), or Nordgren and Engström (2014): Companion animals can help in the treatment of psychiatric and psychologic diseases since they act as facilitators of communication and social interaction. Companion animals also contributed to distraction from the focus on feelings of anguish or sadness of the patients involved.

Over time, a growing desire by the patients to interact with the dog was observed, namely via caressing the animal, "talking" to it, and strolling with it. When making their subjective and qualitative remarks regarding this experiment, resident psychologists and psychiatrists mentioned an improvement in the social interactions of the patients, alleviating some boredom. Testimonies of these professionals admitted that patients who rarely interacted socially increased their interactions in the presence of the dog, which was manifested in several ways of linguistic or body communication that included laughter, touch, and change in posture.

Our results, similar to those described by Ambrosi and co-authors (2018), Wesenberg and collaborators (2019), and also Swall and co-authors (2019), suggest that the presence of an animal can effectively stimulate people with dementia and allow them to overcome the usual difficulties of expression and communication, in addition to reducing levels of anxiety and depression, which may suggest the use of nonhumans as a good support for therapy, as advocated by Briones and co-authors (2019), according to the conclusions of Yakimicki and co-workers (2019), even in a small sample like this one.

In the last four decades there have been studies that focused on the relationship between companion animals and humans to determine whether or not there is an influence of the former on the physical and psychological health of the latter. Results vary from positive to neutral, depending on the methodology used. Animal-assisted activities have become more and more widespread as a tool to humanize health institutions, providing patients, companion animals, and health professionals a positive and different experience from the routine of the current environment in such facilities. Despite many of the studies comprising small samples (see Zafra-Tanaka and co-workers, 2019) and uncontrolled methodological procedures, both ownership and therapeutic complements with animal-assisted activities confirms positive impacts—even in the face of subjective and positive feelings—in the decrease of anxiety and depression in institutionalized patients with dementia (Berget et al., 2011; Walsh, 2009).

We conclude in our pilot study that regular interaction (in our case twice a week for about three months) with a dog contributes to the reduction of the levels of anxiety and depression in the studied population (an all-male population institutionalized in the health care unit for dementia in Madeira). This effect is greater and statistically significant in levels of depression exhibited by nonmedicated patients.

Although our sample is small ($N = 15$), the study was conducted among aging patients, an increasing sociodemographic population age group. As the numbers of aging people rise and epidemiological forecasts suggest an increase in the prevalence of dementias, these results are important. The possibility that the health care unit visited may adopt such procedures represents an improvement in the quality of life, specifically for these patients. Nevertheless, long-term research and in-depth evaluations are needed as well as studies with larger samples and in different contexts. Dogs can be health promoters not only for institutionalized patients, medicated or not, but also for therapists, nurses, and caregivers, and therefore animal-assisted interventions should be considered to improve the quality of life of people suffering from dementia. Interventions assisted by dogs can constitute a relevant alternative or supplement to

pharmacologic medications. Such interventions may reduce levels of depression or anxiety, as it was verified in this work, and may allow for an improvement in quality of life of institutionalized patients.

Ethical Concerns

Patients, their families, and health professionals in the health care unit were informed about the aims of this study and only those who provided their written informed consent were participants in this study. All participants were informed of the possibility of abandoning the study at any stage of the research and of confidentiality and anonymity regarding data collected and the privacy of the behaviors involved. All these ethical considerations were ensured by responsible professionals of the health unit and by the researchers.

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