

BIOPHILIA: THE THERAPEUTIC VALUE OF ANIMALS IN THE
TREATMENT OF DEPRESSION

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by

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To my Family

Whatever befalls the earth,

Befalls the children of the earth.

We did not weave the web of life,

We are merely a strand in it.

Whatever we do to the web, we do to ourselves.

Chief Seattle

ABSTRACT

BIOPHILIA: THE THERAPEUTIC VALUE OF ANIMALS IN THE TREATMENT OF DEPRESSION

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Background To date there has been limited evidence on the efficacy of complementary and alternative medicine (CAM). This thesis comprises two studies: A randomized, single blind, controlled trial to evaluate the efficacy of animal facilitated therapy (AFT) in the treatment of depression (study 1), and a questionnaire survey of general practitioners to establish their attitudes towards and experiences of CAM, with a particular focus on AFT (study 2).

STUDY 1

Aim To evaluate the short-term efficacy of AFT.

Methods Thirty adults with a mild or moderate depressive episode were randomly assigned to a two-week animal care program (ACP) with bottlenose dolphins *Tursiops truncatus* or a control outdoor nature program (ONP). The Hamilton Rating Scale for Depression (HRSD), Beck Depression Inventory (BDI-IA) and Zung Self Rating Anxiety Scale (SAS) were completed at baseline and after the intervention.

Results Subjects in the experimental group had significantly greater reduction in the mean severity of depressive symptoms than the control group (HRSD $p= 0.002$) (BDI-IA $p= 0.006$). The mean difference for the HRSD and BDI-IA between the two groups was highly significant (HRSD $p= 0.007$) (BDI-IA $p= 0.012$).

STUDY 2

Aim To investigate physicians' views of CAM and AFT.

Methods Fifty randomly selected general practitioners participated in a questionnaire survey.

Results Overall, 75.6% of the general practitioners were in favour of the utilization of CAM, only 6.7% were openly against its use, and 55.6% were influenced by the results of the AFT study.

Conclusions The AFT trial supported its efficacy in the treatment of minor / moderate depression. These findings had a positive impact on practitioners' perceptions of this treatment. Animal facilitated therapy has a potentially valuable role in the treatment of less complex mental health conditions, as an alternative of or complementary to existing types of treatment.

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INTRODUCTION: STRUCTURE OF THE THESIS

This thesis is structured in three major sections. The first section comprises chapters 1-3. The concept of biophilia, i.e. the human innate tendency to affiliate with nature and other living organisms, is critically discussed in the first chapter, correlating and highlighting the potential restoring capacity of nature with the vitality of the human-animal bond, and the existing research evidence. In the second chapter, the literature on animal facilitated therapy models is reviewed, and various aspects of the human-animal interactions are examined, underlining the importance and influence of the setting where the interaction takes place. The third chapter briefly covers the epidemiology and characteristics of depression, in particular of mild to moderate severity. The aetiology of depression is examined, focusing on the theories and evidence (e.g. environmental and interpersonal deficits) that support the need for the animal therapy model. The influence of urbanisation on the development of the pathology of depression is also considered. Finally, the evidence on the effectiveness of interventions for minor and moderate depression utilising CBT, interpersonal, social skills and social therapies, and evaluating the similarities and differences with animal facilitated therapy, conclude the chapter.

The second section outlines the methods, results and discussion of the findings of the main study on animal facilitated therapy with dolphins in the treatment of depression, which was conducted in Honduras. This section comprises chapters 4-6. An overview of the logistic, time frame and setting up of the trial is included. Chapter six covers the discussion of the findings of the animal care program trial, and the related conclusions.

The third section of the thesis comprises chapters seven and eight. Chapter seven briefly reviews the literature on complementary and alternative medicine and describes the

methods and results of the second study, which explored practitioners' perceptions, attitudes, use and practice of complementary and alternative medicine, with a particular focus on animal facilitated therapy. The second study was developed in Italy. A cross sectional questionnaire survey of general practitioners, was carried out in the city of Torino. The presentation of the findings is followed by discussion of their implications. Finally, chapter eight concludes the thesis with an overarching discussion and conclusions.

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CHAPTER 1

CHAPTER 1

THE HISTORICAL AND RESEARCH CONTEXT OF BIOPHILIA

1.1. Evolution of the concept of biophilia

Etymologically, the term biophilia derives from the Greek words *bios*, life, and *philia*, affiliation, thus the literal meaning is love of life. The concept of biophilia can be explained as the human biologically based attraction for nature and life. Although the holistic approach to human health and the notion that nature can have restorative and healing properties derives from the ancient healing tradition of Oriental Medicine, academic research only began in recent years. During the fifth millennium BC, philosophers of India expressed the principles of Ayurveda, Sanskrit for the science of life, in the Vedic texts. The ancient philosophers believed that a state of good health was characterized by the complete integration of mind, body and spirit. Such wholeness was possible only when man lived in harmony with the natural environment. Illness was viewed as a sign that the body had strayed in some way from a state of balance. In Ayurveda, the state of mind is of central importance, since wellness and good health arise from happiness and serenity (Cochrane et al., 1992).

The same principles are found in the ancient Chinese philosophy of Taoism. The thoughts of the Emperor Huang Di are described in the Nei Ching (Upton, 2003), one of the oldest known medical books (third millennium BC). These ideas were further developed by philosophers Lao Tsu (sixth century BC), and Chuang Tsu (fourth century BC). Taoists view the universe as a living organism permeated with energy, which they refer to as the

life force or 'Qi'. Taoism underlines the importance of living in harmony with the law of nature. In this condition, the human whole system will be balanced physically, mentally, emotionally and spiritually, and the 'Qi' will be able to flow through the body; passing along invisible energy channels known as meridians; but living apart and separate from nature lead to emotional disturbances, inducing the blockage of 'Qi', thus causing disorders such as anxiety, irritability, anger, frustration, fear and depression. These in turn disrupt the healthy functioning of the physical body, giving rise to discomfort and disease (Arena, 2001).

In Chinese medicine (Howson, 1990), healing is aimed at restoring the free flow of 'Qi' through the body in order to redress physical, mental and spiritual imbalances. An example is given by the technique of acupuncture, which employs needles inserted at key points on the meridians to release blockages (Leung et al., 2003). Taoism is also a philosophy for living, which promotes and restores serenity and wellness. According to Lao Tsu (sixth century BC), the ideal state of mind corresponds to those of newborn babies who are completely flexible and open to new experiences. In this state, every aspect of the self is in harmony, nevertheless life's events and pressures modify human attitudes, which become more rigid and unnaturally sophisticated, thus creating emotional tension.

Returning to a state of balance and harmony requires changing mind and attitudes towards life. Chuang Tsu (fourth century BC) observed that yearnings for wealth and materialistic gain, striving for riches, honours and security, inevitably bring disappointment and induce emotional tension. According to the philosopher, when we are born, we have few basic and essential needs, such as eating, drinking, sleeping, playing, and satisfying our natural curiosity. In contrast, society and culture induce to develop further desires and, while some may be fulfilled, others remain unsatisfied and become a source of worry and confusion.

This leads to negative emotions which undermine our health. Establishing a state of wellness thus requires changing attitudes towards life (Cochrane et al., 1992).

The ancient Greeks also had a great reverence for the natural world. Hippocrates (460 BC), who is regarded as the father of medicine, recognised the healing properties of nature and advocated that the tendency to natural cure should be fostered. He believed in the body's ability to heal itself given a conducive environment. Also, the ancient Romans recognised the healing potential of nature, identifying it as the *vis medicatrix naturae*.

The term biophilia was first used by the psychologist Erich Fromm to underline "the need for cultivating the capacity for love as a basis for our mental health and emotional well-being" (Kellert, 1997:2). Fromm defined biophilia as a "passionate love of life and of all that is alive; it is the wish to further growth, whether in a person, a plant, an idea, or social group" (Fromm, 1973:366). From a general perspective, biophilia can be described as the human innate tendency to manifest emotions and affiliate with the natural diversity. The concept of biophilia was developed by the sociobiologist Edward O. Wilson (1984). He postulated that, during the course of evolution, humans developed a biologically based attraction for nature and life. While Fromm refers almost exclusively to human interactions, Wilson's emphasis is on the general human propensity to connect with the whole realm of living diversity.

Studies by Kellert (1997) showed that Fromm's view of biophilia is just one among several expressions of the human tendency to affiliate with nature. People connect with the living diversity through fear, exploitation, curiosity, dominance, aesthetics, attraction and other affinities. The several aspects of biophilia are the results of biocultural evolution, innate tendencies modelled through the influence of learning, culture and experience (Lumsden

and Wilson, 1981). In particular, the full expression of biophilia shows how human health and well-being are dependent upon our relationships with the natural environment. The aesthetic response to nature can induce a deep healing effect. Emotions raised by animal interactions (e.g. excitement) and more generally by natural settings can be so pervasive as to induce behavioural and physiological changes in the human mind and body, resulting at times in inexplicable healing phenomena.

Although Ulrich (1984), Beck and Katcher (1983), Hartig (2003), Laumann (2003), Sempik (2005), MIND (2007) and other researchers have presented evidence demonstrating nature's therapeutic value for the sick and disabled, more robust evidence is needed. Most of the studies were descriptive, and not focused on a specific type of pathology. A study conducted by Ulrich (1984), compared the postoperative recovery rates of patients who had undergone cholecystectomy (a common type of gall bladder surgery) and exposed to natural scenes, with a control group who had not received such contact. Although the results highlighted a significant improvement and faster recovery rates from illness among patients exposed to the natural setting, the sample of 46 patients overall was small, and the findings may not be generalisable. Furthermore, the group of patients in the control group were exposed to a brown brick wall, hence the conclusions can not be extended to all built views, nor to other groups such as long-term patients, who may suffer from boredom rather than from anxiety disorders. Nevertheless, it must be highlighted that patients with the natural view had shorter postoperative stays, and tended to have lower scores for minor post surgical complications such as persistent headaches or nausea that required medication, when compared to the wall group who required more injections of potent painkillers.

Among the several expressions of biophilia, we will focus our attention on the aesthetic attraction people have for the natural world. In particular, we will consider kinship and affection as a basis for people's emotional well-being. We have evolved and developed for thousands of years, in the company of a myriad of distinctive life forms and associated landscapes. Our existence depends on an impressive array of connections with other life forms. We are allured by natural sceneries and open landscapes, and charmed by brightly coloured flowers and birds. The fascination we derive from the natural world reflects our affinities for nature and life. These human responses reflect our emotional and psychological ties to the natural world. Von Frish (1963) also described the function of nature and wildlife as a "magic well" of human emotional experience.

Modern life is often characterized by a lack of connection with nature, but the desire to affiliate with nature and life can never be erased by a degraded environment. Nevertheless, a degraded environment "can diminish our appreciation of the role of natural diversity in healthy human development" (Kellert, 1997:7). The recognition of the importance to maintain rich and healthy ties with natural diversity is often underestimated by contemporary society, which gives the illusion that humans can live apart from nature, somehow overcoming the psychological and physical need to experience natural diversity.

1.2. Kinship and affection for nature and animals

The aesthetic response to nature seems deeply rooted in the human psyche (Kellert and Wilson, 1993). Its consistency is supported by our inclination to prefer natural over artificial sceneries. Studies by Ulrich (1983) showed that this preference has been revealed across different cultures. The consistent tendency to prefer natural scenes over built views, especially when the latter lack vegetation or water features, is one of the most evident findings. Not surprisingly, even unspectacular natural views can elicit higher aesthetic

preferences than artificial sceneries. Studies conducted in Nigeria by Chokor and Mene (1992), reached similar conclusions. A strong preference for natural landscapes was exhibited by all groups of respondents, whether poor, rich, educated or uneducated, urban or rural. Indeed, urban scenes lacking natural features were viewed by urbanites as ugly and disgusting. Nevertheless, it is important to highlight that antique urban frames can be attractive and fascinating as well. Some Italian and other European urban spots are an obvious example (Kellert, 2005).

A strong attraction prevails for certain animals, plants, and landscapes. The affection and attachment towards nature is particularly focused on the opportunities for emotional bonding and companionship. Although a degree of emotional connection can occur with several aspects of nature, pet animals represent the most common focus of bonding to the nonhuman world (Fine, 2006). Deep affection, personal responsibility and feelings of kinship, often derive from pet animals. Indeed, these emotional states can also be evoked by landscapes and the wild. Forests, rivers and even inanimate canyons, can become the source of affection as well. Humans crave for intimacy and affiliation. With rare exceptions, we strive for connection and kinship. Bonding and companionship constitute essential qualities of the human experience, and the source of these affections can be either human or nonhuman. The companionship of other creatures and even landscapes can represent an invaluable source of friendship, relationship and a mean for expressing and receiving affection (Burls and Caan, 2005). In particular, the companion animal can serve as an antidote to isolation and loneliness.

Paradoxically, isolation and loneliness in our days are mainly found in urban or congested areas, where the population is so dense to cause environmental deterioration and an impaired quality of life. The higher the number of residents, the less is the opportunity to

establish social ties. The typical attitude of urban dwellers is not to get emotionally involved (Lorenz, 1969). Aggression is another dysfunctional behaviour generated by overpopulation, and is also primarily found in urban areas. Several studies have shown that aggression is incremented when animals are confined in excessive numbers, in the same cage (Lorenz, 1965). Impoliteness is, therefore, proportional to the density of people living in the same area. Humans strive for attention, love and consideration, but such attributes are increasingly difficult to receive in our society. New technologies also tend to diminish interpersonal relationships, even within the family setting.

The loss of contact between parents and children begins in the first stages of human development, since the mother can not spend all her time in the care of the baby (Lorenz, 1973). As a consequence, the 'hospitalisation syndrome' (Spitz, 1965) may occur. The most severe symptom of this syndrome is the inability to establish human and social contact (Lorenz, 1973). All these elements help to explain why the companion animal has become a feature of modern life. During the past five decades, pet ownership has increased dramatically in much of the industrial world, despite the burdens of keeping animals in an increasingly urban and mobile society (Kellert, 1997). The decline in traditional communities, a shift from the extended to the nuclear family, and the increasing mobility and impermanence, have contributed to feelings of separation and diminished social ties. In this social context, the companion animal fills a growing need for relationships, familiarity and affection.

1.3. The resulting benefits

Studies by Kellert (1997) provided evidence on four possible benefits resulting from the bond that humans can have with other animals and nature: these include emotional sustenance and security; sociability and affiliation; self-confidence and self-esteem;

physical and mental healing. This evidence and its underpinning mechanisms are being discussed in detail.

1.3.1. Emotional sustenance and security

Several studies by Levinson (1968), Corson (1978), Berger (2003), Maller et al. (2002), Sempik (2003), Fine (2006), and Chandler (2005) elucidate how close relationships with other animals and landscapes can foster the well-being of people. The emotional sustenance of companion animals derives from their capacity to give and receive affection, to form close ties of attachment, and to bond with people. Not only pets compensate for human relationships, but they also complement and augment them, adding a new and unique dimension to human social life. We all need to feel liked, respected and admired. Being valued and needed by others is a sensation which people enjoy. Our confidence, self-esteem, ability to cope with stressful life events and, ultimately, our physical health depend on this sense of belonging. We all need intimacy and emotional sustenance, which are often achieved through kinship and companionship. Isolation and loneliness for prolonged periods of time, may lead to mental and sometimes physical deterioration.

Feelings of separation and loneliness can be alleviated by intimate and secure relationships with other creatures. Companion animals represent an unconditional support system that can particularly be drawn on at times of emotional discomfort, when parents or friends may be unreachable. The uncritical attention and devotion of a pet can offer assurance and can instil a feeling of being wanted. Indeed, during times of emotional and physical insecurity, this nurturing relationship can have an important protective role. Companion animals can provide reliable means for achieving intimacy and bonding, but analogous feelings of emotional connection can also be derived from attachment to other aspects of nature. A potted plant, a garden shrub, a backyard tree, a nearby river or a landscape,

experienced with intimacy and consciousness, can become subjects of fondness and regard. A critical basis for a reassuring sense of place may thus emerge from their health and seeming permanence, while injury to them can provoke feelings of loss and even despair. Nature gives people the emotional strength to confront life's vicissitudes in many ways. For instance, the growing child can be sustained by learning to receive and extend affection through developing close ties with nature and life. Moreover, humans can find a source of consolation in companion animals and natural features, when confronting death and disease, especially of family and friends. "As a species, we developed our inclination to seek out and bond with other life in the pursuit of emotional sustenance and security" (Kellert, 1997:110).

1.3.2. Sociability and affiliation

The human interaction with living diversity and nature fosters people's potential for relationships and connectiveness. Social affiliation is critical for human achievement. Humans possess highly developed social capacities which stem from many sources, including the advantages that individuals derive and the ability to receive and give affection. The primary source of affection is obviously represented by our family and friends, but caring for animals and nature remains another highly effective way of expressing and receiving affection, intimacy and companionship. The inclination to form close ties with nature has been developed by humans, in part because of the benefits of increased sociability, cooperation and affiliation. An early example was provided by the first ethological relationship established with the wolf. Mutual benefits derived from this nurturing tie, as the wolf facilitated human hunters to capture their prey, receiving shelter in return (Lorenz, 1973).

1.3.3. Self-confidence and self-esteem

Self-confidence and self-esteem can be enhanced by the acquisition of outdoor nature skills and by the affection of pet animals. Wilderness experiences lead to a greater ability to focus on self and freedom from social forces (Schreyer, in Easley et al., 1990). “Caring for animals and other aspects of nature may provide opportunities for feeling wanted, valued, necessary and special” (Kellert, 1997:113). Animal facilitated therapy has been developed to promote self-esteem and self-respect in patients with emotional disorders. The companion animal enables the emotionally disturbed and disabled to relate to others, thus giving a reassuring sense of worth and goodness. Pets and other animals have helped transform mentally ill people, from dependent and malfunctioning into self-respecting, responsible individuals (Serpell, 1986). Intimate familiarity with wild animals and nature can also enhance feelings of self-confidence, autonomy and competence (Chandler, 2005). The human biophilic disposition to affiliate closely with nature can consequently facilitate the capacity for coping with life’s trials and challenges.

1.3.4. Physical and mental healing

Humans require activity and arousal as a condition of physical and mental health. Physical fitness and mental restoration are benefits that can be particularly derived from immersion in nature. The experience of natural beauty and living diversity can be restorative and revitalising. Studies by Hartig (1991), Ulrich (1991), Fine (2006), MIND (2007) and other researchers have demonstrated nature’s therapeutic value and the healing effect of horses, dogs, cats, birds, plants, water and certain landscapes on conditions such as anxiety, affective, social phobic and attention deficit disorders. Nevertheless, research and clinical trials need to be extended to provide more robust evidence. Katcher and Beck especially underline the healing impact of the companion animals: “If the loving devotion, the soft touch, the constant companionship, the attentive eye and the uncritical ear of the pet are so

attractive to so many of us, they should be even more important to those who have been wounded by other people, or deprived of the comfort that friends, family and children bring” (Katcher and Beck, 1983:159).

Katcher et al. (1984) discovered that patients undergoing dental treatment, including oral surgery, reported significantly less pain and discomfort when observing aquarium fish, than those who looked at the hospital walls. Burls and Caan (2005) highlighted the correlation between human health and nature conservation, while describing the potential benefits of ecotherapy. In their observations of wild life projects, they even evaluated possible negative effects, by noticing few risks to health and reporting minor injuries such as superficial animal bites. Facing and overcoming situations which implicate an intrinsic danger, such as storms or a shark encounter for instance, can in some circumstances enhance self-confidence and self-esteem. Studies on the negative impact of animals and nature facilitated therapy on human health are, however, lacking, and should be encouraged in order to plan better and safer ecoprojects.

A survey of 108 people was carried out by MIND (2007) to evaluate the impact of green exercise on health and well-being. Ninety per cent of participants involved in the activities reported that the combination of nature and exercise is most important in determining how they feel. Although 94% of the participants commented that the green exercise activities had benefited their mental health, the study was not focused on a specific type of pathology. Therefore, it is only plausible to speculate on its effectiveness based on the positive perception people had of their general wellness. Pretty et al. (2007) subsequently measured the effects of green exercise activities on 263 healthy participants, and found that they were significantly less tense and angry after the sessions. As the findings were based

on a pre-post design, it was not possible to draw generalisable conclusions on the potential healing effects of the intervention.

Supervised outdoor nature programs can be as effective as antidepressants in treating mild to moderate depression (Halliwell, 2005; Richardson et al., 2005). A small randomised controlled trial (MIND, 2007) explored the role of the environment through exercise on mental well-being. Twenty participants took part in two walks in contrasting environments to test out its impact on self-esteem, mood and enjoyment. Significantly higher improvement on depression and tension scores was established in the green walk group compared with the urban control group. Horticulture has also been utilised as an effective tool in physical and mental rehabilitation (Sempik, 2005). Nevertheless, further trials of animal and nature facilitated therapy are necessary before definitive evidence is established on its effectiveness in the treatment of mental health problems and disorders.

1.4. Conclusions

The concept of biophilia, the human innate tendency to affiliate with nature and other living organisms, has been addressed in the first chapter, highlighting and correlating the potential restoring capacity of nature with the vitality of the human-animal bond. In the second chapter, evidence on the animal facilitated therapy models will be considered, and various aspects of human-animal interactions will be examined, underlining the particular importance and influence of the settings where such interactions take place.

CHAPTER 2

CHAPTER 2

ANIMAL FACILITATED THERAPY

2.1. Definitions

Although pet-facilitated psychotherapy, pet-facilitated therapy, animal assisted therapy and pet therapy are all terms used to describe the use of animals in therapy, animal facilitated therapy (AFT) is the most accurate. As stated by McCulloch (1983), the previous terms suggest a restricted use and do not encompass the full range of therapeutic potential. The term pet, for instance, does not include farm animals, and farm animals may be part of a residential treatment facility. Even though the term animal assisted therapy is also often used, it is not appropriate either. Animals and generally nature do not assist, but rather facilitate the healing process. Nevertheless, animals can assist handicapped people in several activities. The blind, the elderly and the physically handicapped can be guided and sustained by dogs, for instance. In these circumstances companion animals do not facilitate a healing process, instead they simply sustain and guide people with disability, consequently they improve their quality of life. Therefore, a distinction between animal assisted activities and animal facilitated therapy is necessary.

2.2. Historical context and early research findings

Throughout history, animals have been utilised and sometime even exploited to improve the well-being of people. They have served to provide work, food, protection, companionship, sport and other benefits. In recent years, the interest in the ways animals can be therapeutically used to improve the physical and emotional health of people, has

raised considerably. Several intervention programs have been developed for people requiring rehabilitation for specific health problems such as sensory impairments, physical or learning disability, and different types of physical or mental illness. Some of these programs began over a century ago; however, academic research started only in the 1960's. Sigmund Freud was aware of the value of animals in improving social interaction, and used to have a dog present during consultations, who acted as a catalyst (Ockleford and Berryman, 2001). Nevertheless, to date there has been limited evidence on the biopsychological effects of animals, and randomised control clinical trials are lacking.

The first reported therapeutic use of pets can be traced back to the 9th century in Gheel, Belgium, where the handicapped were allowed to care for animals “as it was thought that this would re-establish the harmony of soul and body” (Ockleford and Berryman, 2001:75). The therapeutic use of animals in England was introduced in 1792 at the Quaker Retreat, York. The Retreat was provided with gardens and small animals such as rabbits and poultry. Patients in the retreat were encouraged to work in the garden and care for the animals (Bustad, 1980). Another residential treatment center, Bethel in Bielefeld, West Germany, was established in 1867. Animals were an integral part of the center. Therapy with animals was later expanded to include farm animals; however, no attempt was made to quantify or record observations of the effects of animals on patients (McCulloch, 1983). The program at Bethel continues to date. This now includes patients with multiple physical and mental disabilities, and incorporates several species of animals in the therapeutic program.

In 1942, the Pawling Army Air Force Convalescent Hospital at Pawling, New York, organized the first animal-facilitated therapy activities in the USA. The area used to assist veterans convalescing from emotional trauma or battle injuries, and included extensive

park land where patients could encounter animals in a natural setting (Chandler, 2005).

However, no studies were conducted and the program was later abolished. Beitostolen, a rehabilitation center for the handicapped located in Norway, was established in 1966 by a blind musician, Erling Stordahl. The program was sports oriented, with an emphasis on physical therapy. Dogs and horses were an active part of the program and blind persons were taught to ski and to ride horses. This program was not evaluated either (McCulloch, 1983).

The therapeutic benefits of contact with pets in both inpatient and outpatient settings were first reported by the psychologist Boris Levinson (Levinson, 1961, 1965, 1968, 1969 and 1972). He studied and described extensively the use of pets for children with emotional problems in residential treatment centers, hospitals for somatic disorders, and training schools for the physically and mentally handicapped, deaf, and blind. Levinson postulated the transitional object theory, so that the patient can first form a relationship with the pet, then with the therapist and finally with other people. He underlined the importance of providing a non-threatening setting for the child, as pet therapy was considered to be most effective for vulnerable young groups such as children with autism, limited communication, social deficits, and those who are socioculturally marginalised. Controlled studies were strongly advocated by Levinson, who also emphasized the need for strict criteria for the selection, training and therapeutic use of pets. Basic principles have been derived from his work, however, early research largely consisted of detailed case studies.

Samuel and Elizabeth Corson (1975), influenced by Levinson's work, evaluated the feasibility of pet therapy in a psychiatric hospital setting. Non response to other forms of treatment was the primary indication for using pet therapy. Pet-animals were introduced on the psychiatric ward to thirty patients who were withdrawn, self-centered and

uncommunicative. Pets were accepted by twenty-eight patients. Observation indicated positive reactions of patients to pets, which included improved relationships with therapists, other staff on the ward, and other patients. The Corsons concluded that the animals served as a catalyst to social interactions. They stated that the essence of pet-facilitated psychotherapy is to introduce a non-threatening pet with the function of a catalytic vehicle in forming adaptive and satisfying social interactions. The patient often reacts positively to the pet, relating with nonverbal and tactile interactions. Gradually the interaction widens to include, first, the therapist who introduced the pet, subsequently other patients and medical personnel, finally generating positive social interactions outside the hospital setting. The initial nonverbal forms of interaction are eventually enriched and strengthened with verbal communication and emotional expressions of warmth (Corson et al., 1975). As the Corsons noted, the animals instilled a sense of responsibility and a feeling of being needed in patients. Dogs were effective in this role because of “their ability to offer love and tactile reassurance without criticism, and their maintenance of a sort of perpetual infantile dependence, which may stimulate our natural tendency to offer support and protection” (Corson et al., 1975:277).

2.3. Animal-facilitated therapy model

Programs in animal facilitated therapy are varied and the types of animals available in treating several disorders are numerous, as well as the locations and methods of interaction (Hooker, 2002). To study the way animals affect people’s health through animal-facilitated therapy, requires to understand the system and the style of interaction between human and pets, the setting where the interaction takes place, and the outcomes arising from this interaction.

The animal-facilitated therapy model also includes family studies, because pets can serve an important role in family life, even though their exact role in human and child

development, is not well understood (McCulloch, 1983; Fine, 2000). The different types of animals used in therapy vary according to age, size and temperament. They include dogs, cats, caged birds, fish, rodents, horses, farm animals and many others (Fine, 2006). The nature of the human problem and the setting into which the animal is to be placed, influence the choice of pet, however, species should be selected with caution. The choice of aggressive dogs like pitbulls, for instance, should be avoided, to prevent tension and anxiety.

Four types of interaction between people and animals can be described (McCulloch, 1983; Fine, 2000). The first kind of interaction is when a pet is placed with an individual on a full-time basis. Examples include programs for the deaf or blind, the elderly or those with chronic illnesses living in their own homes, and those in prison or hospital settings.

In the second type of interaction, animals are left for a certain period of time with a person, but generally the responsibility lies with someone else, usually a volunteer group. For example, an elderly person at home or at a nursing home, who is visited by a pet brought by volunteers, several time per week. Horses used for therapeutic riding also fall in the second type of interaction, since they are used for brief periods each week.

In the third type of interaction, the animal resides in a therapeutic setting like a psychiatric ward, nursing home, halfway house, or prison, and becomes the mascot or group pet of the institution (McCulloch, 1983; Dosa, 2007). These pets are available to everyone and provide companionship to all residents, patients and staff (Yates, 1973).

The fourth type of interaction is represented by the ecotherapy programs, which usually last for two or more weeks. In such circumstances, the interaction takes place in non urban settings, usually natural parks or in the wild. Animals such as dolphins are typical species

for ecoprograms. In recent years, bird watching and whale watching programs have been developed as well (Burls and Caan, 2005).

2.4. Effects of animal facilitated therapy on physical and mental health

Animal facilitated therapy can be defined as a treatment involving the use of a pet or animal by a trained professional, as a tool to facilitate a healing process. Hence, it should be distinguished from pet ownership, and from animal assisted activities, where the animal simply assists and helps disabled people to cope with their deficit. Indeed, animals can have both positive and negative impact on some aspect of health, which involves the integration of psychological, physical, social, environmental and spiritual factors (Friedmann, 2000).

2.4.1. Potential positive effects of animal facilitated therapy

The potential benefits to individuals derived from AFT can be psychological, social and physical (Fine, 2006). Psychological benefits include positive affective state (elation), reduction of anxiety, affiliation, humour, play, self-esteem, need to be wanted, independence, increased motivation, education, sense of achievement, and stimulus to be active (Chandler, 2005). The positive affective state that people derive from pet interaction has been highlighted by Corson and other investigators (Corson et al., 1975; Fine, 2000). Affiliation and the need to be in close physical proximity to pets and nature, has been described by several researchers (Katcher, 1980; Kellert, 2005; MIND, 2007). Animals also promote and instill humour and a sense of play. They can help to improve a person's independence and self-esteem, for example increasing motivation of disabled persons to struggle against their impairments, as seen in therapeutic horseback riding (McCulloch, 1983).

Animals can provide companionship and support to ill people and their relatives in hospitals. An evident example is given by a cat named Oscar (Dosa, 2007). Although just based on observations, since he was adopted by staff members at Rhode Island Hospital (USA), the cat had the ability to predict when residents were about to die, by remaining close to them. He presided over the deaths of 25 residents, allowing staff members to adequately notify families. Animals can also serve as educational tools. The entire life cycle, activities and habits of animals are readily observable. Children thus frequently learn about life, death, reproduction and biological processes by first observing them (Kellert, 1997). Furthermore, pets stimulate the individual to be active and busy through feeding, grooming and walking (Katcher, 1981).

Social benefits include the catalyst effect, also described as ‘social lubricant’ or ‘widening circle of warmth’ (Corson et al., 1975). Indeed, pets may facilitate social interaction and social cohesion, thus providing an indirect effect on well-being (McNicholas et al., 2005). Social contact is beneficial, since it alleviates feelings of loneliness. These factors may be particularly important for the elderly and people with physical disability, who are at risk of social isolation. Among the social benefits derived from pet therapy, increased cooperation with the caregivers is particularly important (Fine, 2000).

Physical benefits include recovery from illness, coping with illness, neuromuscular rehabilitation, and cardiovascular health (Friedmann, 2000). The most evident physical benefits include improving the rate of recovery and ability to cope with illness (McCulloch, 1981). Neuromuscular rehabilitation is especially evident in therapeutic riding (Rosin, 1980). Cardiovascular health is improved by physical activity, which derives indirectly from the stimulus to be active, instilled and promoted by animals (Antonioli and

Cristina, 2006). Moreover, physical activity facilitates the elimination of toxins from the human organism, through sweat.

The positive effects of AFT on human health are also supported by neurobiochemical studies (Pert, 1999; Odeendal et al., 2000). In particular, the concentration of neurochemicals such as beta-endorphins, oxytocin, prolactin, beta-phenylethylamine and dopamine has been found to be higher after positive interspecies interaction, while that of cortisol has been found to be lower, although only in humans (Odeendal, 2003). Indeed, beta-endorphins and other neurochemicals are correlated to a condition of pleasure and wellness, while cortisol to a state of stress.

2.4.2. The biophilic method of intervention: a proposed mechanism

The positive effects of animal facilitated therapy on health can be enhanced when a natural setting is provided (Burls and Caan, 2005; Halliwell, 2005; Richardson et al., 2005; MIND, 2007; Pretty et al., 2007). The biophilic method of intervention is based on a holistic approach through the interaction with animals in nature, and represents the mechanism which might explain the benefit of AFT. Particularly “psychiatric rehabilitation occurs by operating on the emotional, holistic and psychophysical aspects of participants through the interaction with animals in nature, and the stimulation of the nervous system through the senses” (Antonioli and Reveley, 2005). Indeed, biophilia shows how human health and well-being are strictly dependent on our relationships with the natural environment (Fromm, 1973; Kellert, 1997). In the biophilic vision, the manifestation of emotions and the affiliation with nature are an innate human tendency, hence disrupting the affiliation with nature, and losing the biophilic equilibrium means to alter and damage our psychophysical health (Lorenz, 1973; Gelder et al., 1996).

Some evidence has been established by studies conducted by Flisher et al. (2001), Peen et al. (2003) and Sundsquit et al. (2004). In particular, Sundsquit et al.(2004) elucidated how urbanisation may worsen the incidence of psychosis and depression through a large scale follow-up study of 4.4 million Swedish men and women, aged between 25 and 64 years, with respect to first hospital admission. Level of urbanisation was defined by population density. They found that, with increasing level of urbanisation, the incidence rates of psychosis and depression rose. Those living in the most densely populated areas had 68-77 % more risk of developing psychosis and 12-20 % more risk of developing depression than the control group.

The loss of social contact is found paradoxically in urban areas, where the population is so dense to cause an impaired quality of life, as well as environmental deterioration (Lorenz, 1969; Gelder et al., 1996). Also new technologies tend to diminish interpersonal relationships. The use of human senses (sight, taste, hearing, olfaction and touch) might have diminished considerably as a consequence of urbanisation, though the number of studies to support this hypothesis are limited (Lorenz, 1973; Pert, 1999). To conclude, since the human nervous system can be stimulated through the senses by the interaction with animals in nature, the factors involved in the healing process are multiple (e.g. water, sound, light, touch, interpersonal relationships). For this reason, some of these specific effects are considered in more detail.

2.4.3. The healing effects of water and sound

As previously stated, when considering the potential healing effect of animal facilitated therapy, we can not overlook the influence of the environment itself, for example in the case of dolphins, the medium involved, i.e. water. The healing effect of water (Levin, 1984; Solimene, 2003) has been found to have similar restorative effect to that of

landscapes and natural settings (Hartig et al., 1991; MIND, 2007) on disorders such as anxiety and depression.

Human life begins in water, where we spend the first nine months of our existence in the womb, floating in a safe and controlled environment. The physiological benefits of being in water derive in part by the absence of gravity. The freedom from gravity in water produces physiological changes within the body. Flotation in water reduces the effect of muscular tension, allowing blood to flow and circulate more freely, and blood pressure and pulse rate to drop. Hydrotherapy is also used in neuromuscular rehabilitation to help those with fractures, torn tendons and ligaments, spinal injuries, as well as people with severe physical handicaps. Moreover, hydrotherapy is beneficial for those with illnesses such as arthritis and bursitis, because it reduces the physical stress on the body structure (Emoto, 2007). Studies by Turner and Fine (1989) have shown that floating in water lowers the levels of norepinephrine (noradrenalin), cortisol and ACTH, chemicals which are linked to high levels of stress-related illnesses.

Sound also has an important role that must be considered in the healing process. Indeed, dolphins have a peculiar feature which is represented by the echolocation system. This system is their primary sense. They are able to scan their habitat through a biological system of sound emission and reception. The variety of clicks and whistles sounds that the dolphin emits may contribute to the healing process, by virtue of their influence on our emotions and physiology (Manoukian et al., 2001; Brensing et al., 2003).

Sound is a form of energy vibration that can affect both our physical and mental well-being. It travels through space in the form of waves, and the speed at which the wave completes a cycle is known as the frequency, expressed as cycles per seconds, or Hertz

(Hz). The range of human hearing extends from 20 Hertz to 20.000 Hz, or cycles per second, while those of dolphins covers from 100 to 150.000 Hz. Below the level of 20 Hz, sounds are inaudible to human, and beyond 20.000 Hz the vibrations are known as ultrasound. The sounds that dolphins emit are in the region of 1.000 Hz to 80.000 Hz, whereas human communication range is lower and narrower, between 300 Hz and 3.000 Hz (Cochrane and Callen, 1992).

While some sounds and rhythms have a positive and uplifting effect, others can induce melancholy and sadness (Dunn, 2004; Sendelbach et al., 2006). The theory that sound in the form of music or tone could have a healing effect was first developed by the ancient Greeks. Indeed, Aristotle (350 AC) reported that flute music could stimulate our emotions and release tension. Clynes (1986) showed that emotions exist as potential patterns in the nervous system, and can be generated by sound and music independently of associations with people or events. Certain melodies, depending on the musical structure, can generate responses such as joy, sadness, love or reverence, and can have therapeutic applications (Clynes, 1986). Owing caged birds, could be potentially therapeutic, by the virtue of their sound emission, however, no evidence has been provided, so far.

2.5. Effects of pet ownership on health

Owning a pet has been shown to influence health as well. Among physical benefits, cardiovascular health has been highlighted (Dembicki et al., 1996). A possible explanation could be that pet owners are more likely to exercise than non-owners, thus reducing plasma levels of cholesterol, triglycerides and systolic blood pressure, which are risk factors for coronary heart diseases. Nevertheless, recent research has failed to support previous findings (Parslow et al., 2003). Pet ownership also seems associated with a reduced use of

general practitioner services (Headey, 1998), though contradictory results have been provided by other studies (Parslow et al., 2003).

Three potential mechanisms have been proposed to explain the correlation between pet ownership and human health (Mc Nicholas et al, 2005). The first considers the possibility of no real association, but only an apparent link between pets and health that would be produced by confounders such as personality traits, age, economic and health status, which would impact on the decision to own a pet. The second hypothesis is that pets may enhance social interactions, hence providing an indirect effect on wellness. The last mechanism considers a direct effect on human health through the nature of the relationship, which provides emotional support. Pets may reduce perceptions of stressful events, thus protecting against anxiety related illness. Moreover, they may enhance recovery from illness such as stroke, myocardial infarction and cancer (Mc Nicholas et al, 2005). Negative effects on human health, may also arise from pet ownership, and animal facilitated therapy.

2.6. Potential negative effects of animal-facilitated therapy and pet ownership

Sometimes, examination of the research literature on AFT, appears to be biased towards an advocacy position, with negative effects consequently being minimized (McCulloch, 1983). This is important, as lessons can be learned from the negative effects of pet therapy. Research in this field has shown that, if animal selection is inappropriate and animals are mismatched with patient needs, problems may occur (Bustad, 1979; Arkow, 1980; Ockleford et al., 2001). An animal might be given to a person at a wrong time, worsening his condition, for example, when he is too physically ill to maintain or appreciate it properly. An elderly person might not have the necessary capacity required to maintain an animal on a full-time basis. Problems may also arise from pet ownership. The loss of a pet

may cause great distress to owners, especially if it was linked with a deceased spouse or former life style, such as provided companionship (McNicholas et al., 2005).

In group situations, patients can become possessive and try to adopt the ward mascot for themselves. In such cases, pets can be a source of rivalry and competition. Inappropriate handling by patients, poor animal selection, or inadequate staff supervision can lead to injury in the form of bites or scratches (Chandler, 2005). Some patients with brain injury, learning disability, senility or other problems may not fully recognize how they might be provoking or injuring an animal. If the patient gives excessive attention to the pet or has unrealistic expectations, the animal can appear to reject him. Since allergies to feathers and to animal dander, including dog, cat and horse, may occur, patients' history of allergy should be obtained before proceeding to the introduction of pets (Ohman, 1978).

The importance of monitoring patients with open wounds or low resistance to disease must be underlined, because certain diseases are transmissible from animals to humans. Proper veterinary examination and adequate sanitation facilities are, therefore, essential (Bustad, 1980; Mayon-White, 2005). Problems may also arise from the caregivers, as some personnel do not like animals, and view AFT as burdensome. Therefore, proper selection of staff is essential. Caregivers can be subject to similar problems with allergies and injuries.

Negative effects on the animals should also be taken into consideration. Patients can injure them as a result of rough or inappropriate handling. Fights with other animals sometimes take place. Breeding represents a problem, however, this can be handled with adequate spaying and neutering programs. "Basic animal welfare issues need to be respected, including adequate food, shelter, grooming and access to veterinary services" (McCulloch,

1983:423). Despite such potential negative effects, these can be minimized or avoided in most cases with appropriate experience, selection and training.

2.7. Conclusions

Although several studies (Colombo et al., 2006; Cole et al., 2007; Iwahashi et al., 2007; Kawamura et al., 2007; Orlandi, 2007; Banks et al., 2008) have highlighted the potential benefits of animal facilitated therapy, more robust evidence is necessary. In particular, there has been a lack of randomised controlled clinical trials, as well as comparative studies between different programs.

The biophilic method of intervention may help to improve mental health problems and disorders. Psychiatric rehabilitation can operate successfully on the emotional, holistic, and psychophysical functioning of individuals through their interaction with animals in nature, and stimulation of the nervous system through their senses. This innovative method of intervention has the potential to bring alternative therapeutic strategies to the treatment of emotional disorders. This could be particularly relevant to disorders such as depression, which are commonly prevalent in the general population, often with adverse and long-term impact on several aspects of psychosocial functioning. The emerging evidence on the potential use of animal facilitated therapy will be discussed in the next chapter in the context of the characteristics, aetiology and associated theories, and existing treatment modalities for this condition.

CHAPTER 3

CHAPTER 3

EVIDENCE BASED INTERVENTIONS FOR DEPRESSION

3.1. Definitions

Affective or emotional disorders are also called mood disorders because their main feature is abnormality of mood. The most extreme forms of elation (mania) and depression (melancholia) have been recognised since the time of Hippocrates in ancient Greece (Goodwin, 1998). The term mood disorders is usually restricted to conditions in which the mood is depression or elation, but in the past some authors have also included states of anxiety (Lewis, 1956). Sadness is part of normal experience at times of adversity. The symptom of depressed mood is a component of several psychiatric disorders and can also be found in physical diseases such as cancer. The main features of depressive disorders are depressed mood, negative cognitions, lack of enjoyment, irritability, changes in sleep and appetite, reduced energy and slowness (Gelder et al., 2006). Depressed mood is usually the most prominent symptom.

Similar considerations apply to states of elated mood. A degree of elation is part of normal experience at times of good fortune. Elation can also occur as a symptom in several psychiatric syndromes, though it is less common than depressed mood. In the syndrome of mania, the main features are overactivity, elated mood, irritability, and self-important ideas (Gelder et al., 2000).

3.2. Classification and epidemiology

Although several methods of classifying depressive disorders have been developed, there has not been consensus on their criteria. According to the classification of mental and behavioural disorders (ICD-10-WHO, 1992), depressive episodes are classified on the basis of symptom severity as mild, moderate or severe (Table 3.1). The depressive episode should have a duration of at least two weeks. Mild depressive episodes are usually brief, however, in some cases these can persist for longer periods, even though the symptoms do not increase. These chronic depressive states are often defined as dysthymia, while persistent mood instability, consisting of intermittent periods of mild elation or mild depression, are referred to as cyclothymia (Griez et al., 2005).

The ICD-10 classifies manic episodes as hypomania, mania, and mania with psychosis. The main clinical features of mania are elevation of mood, increased activity and self-important ideas. In hypomania, the mood is abnormally elevated and sustained for at least four consecutive days, whereas in mania for at least one week. In mania, delusions and hallucinations are present. Sometimes, depressive and manic symptoms occur at the same time. Overactivity and over-talkativeness may be accompanied by profoundly depressive thoughts. Mania and depression can also follow each other in a sequence of rapid changes. Patients who experience both depressive and manic episodes fulfill diagnostic criteria for a bipolar disorder (Hales et al., 1999). Some individuals repeatedly develop a depressive disorder at the same time of the year. The timing may reflect extra demands placed on the person in a certain period of the year, either in his work or other aspects of his life, or be related to changes in the seasons, for example to the length of daylight (Ghaemi, 2008). In such seasonal affective disorders, hypersomnia and increased appetite with craving for carbohydrates are peculiar symptoms. Onset in the autumn or winter, and recovery in the spring or summer constitute a common pattern.

The term masked depression is used for cases where depressive mood is not evident. This usually occurs with mild or moderate, and occasionally with severe disorders. Atypical depression includes features of variably depressed mood, pronounced phobic anxiety and reversed biological symptoms such as overeating and oversleeping. The essential feature of atypical depression is mood reactivity, as shown by the capacity to be significantly cheered by positive interpersonal events (Kaplan et al., 2007).

Table 3.1. Classification of affective disorders

ICD – 10

Depressive episode

Mild
 Moderate
 Severe
 Severe with psychosis

Manic episode

Hypomania
 Mania
 Mania with psychosis

Other depressive episodes

Masked and atypical depression
 Seasonal affective disorders

Bipolar affective disorders

Persistent mood disorders

Cyclothymia
 Dysthymia

Difficulties are encountered in epidemiological studies of depressive disorders, because different definitions and screening instruments have been used by different investigators. Depressive episodes are more common in females, the lower socioeconomic groups and the divorced or separated, with the point prevalence in western countries being 1.8 – 3.2 % for men and 2.0 – 9.3 % for women (Puri et al., 2004; Gelder et al., 2006). The sex ratio for bipolar mood disorders is equal. Their point prevalence is 0.4 – 1.2 % in the adult population (Puri et al., 2004).

3.3. Clinical features of depressive disorders

The main clinical features of depressive disorders are low mood, lack of enjoyment, negative thinking and reduced energy, all of which lead to impaired functioning. Other common symptoms are reduced concentration and attention, low self-esteem and self-confidence, ideas of guilt and unworthiness, disturbed sleep and diminished appetite (ICD-10 - WHO, 1993). In moderate depressive disorders, the symptoms are similar to those of mild depression, but with greater intensity. The individual's appearance is characteristic, as their dressing and grooming may be neglected. Gestural movements are reduced. The facial expression can be peculiar, with the corners of the mouth turned downwards and the centre of the brow furrowed vertically. The head can be inclined forwards and the direction of gaze downwards, while the shoulders are bent (Ghaemi, 2008). Despite deep feelings of depression, some patients maintain a smiling exterior. Depressed mood does not improve substantially in circumstances where ordinary feelings of sadness would be alleviated by positive events, for example after hearing good news. Furthermore, the mood may be experienced as different from ordinary sadness, and patients sometimes speak of a black cloud pervading all their mental activities (Griez, 2005). This low mood can be concealed from other people, at least for short periods of time. Detecting depressed mood during

clinical interviews can be more difficult when patients are in denial of their condition (Kaplan et al., 1998).

Pessimistic thoughts, also named depressive cognitions, are symptoms which can be divided into three groups. The first group is related to the past. These thoughts are often concerned with unreasonable guilt and self-blame about minor matters; for example, a patient may feel guilty about past trivial acts of dishonesty or feel responsible for having let someone down. Usually these events have not been in the patient's thoughts for years but, when a depressive episode occurs, they flood back into his memory, followed by intense feelings of guilt. Some patients have similar thoughts of guilt, but these are not related to any particular event. Other memories are focused on unhappy events and the patient remembers occasions when he had bad luck, when he was sad or when he failed. These negative memories increase as the depression deepens (Ghaemi, 2008).

The second group of cognitions is related to the present. The patient perceives the dark side of every event and thinks that he is failing in everything that he does, and that other people see him as a failure. Consequently, he gradually loses confidence across a range of life activities. The third group of cognitions is related to the future. The patient expects the worst, for example, he foresees failure in his work, collapse of his finances, misfortune for his family, and an unavoidable deterioration in his health. These pessimistic ideas and hopelessness are often accompanied by thoughts that life is no longer worth living. Such dark preoccupations may progress to thoughts of, and plans for suicide (Hales et al., 1999).

Another frequent clinical feature found in depressive disorders is the lack of interest and enjoyment, which is not always acknowledged spontaneously (Kaplan et al., 1998). The patient has no enthusiasm for activities and hobbies that he would normally enjoy, and no

pleasure in everyday things. He often withdraws from social encounters and generally feels no zest for living. Reduced energy is characteristic and many patients attribute this to physical illness.

Psychomotor retardation is another frequent clinical feature of depression, even if some patients are agitated rather than slowed up. In psychomotor retardation, movements are retarded and the patient walks and acts slowly. The thinking process is also slowed up, and this is reflected in the patient's speech: there is a long delay before questions are answered, and pauses in conversation are long (Paykel, 1992). Comorbid anxiety is frequent but variable in moderate depressive episodes. Another common symptom is irritability, with a tendency to respond with undue annoyance and frustration to minor demands (Murray et al., 1986). Agitation can be experienced as inability to relax, and is perceived by an observer as restless activity.

Biological symptoms include sleep disturbance, diurnal variation of mood, loss or increase of appetite, loss of weight, constipation, loss of libido and, among women, amenorrhoea. These symptoms are frequent but variable in moderate depressive disorders and less usual in mild depressive disorders, but particularly common in severe presentations (Kaplan et al., 2007). Physical symptoms like constipation, fatigue, aching discomfort in different part of the body, and hypochondriacal preoccupations are common in depressive disorders.

Complaints about any pre-existing physical disorder usually increase. Comorbid psychiatric symptoms include depersonalisation (disturbed or altered perception), obsessive-compulsive symptoms, phobias, and dissociative symptoms (hysteria) such as fugue (in a dissociative fugue, patients not only lose their memory, but also wander away from their usual surroundings), or loss of function of a limb (Murray et al., 1986).

Depressed patients may have poor memory and commonly show deficits on a wide range

of neuropsychological tasks, of which impairments in the retrieval and recognition of recently learned material may be prominent (Austin et al., 1992; Robbins et al., 1992).

In mild depressive disorders, comorbid anxiety is particularly common. Mild depressive disorders are characterized by low mood, lack of energy and interest, poor concentration and irritability. The patient may not be obviously sad in his appearance or slowed in his movement. Sleep disturbance is present, but not the early morning waking that is typical of more severe depressive disorders. Instead, patients often experience difficulties in falling asleep and periods of waking during the night, usually followed by a period of sleep (Stern et al., 2008). In severe depressive disorders, all the features previously described occur with greater intensity. In addition, certain distinctive symptoms may be experienced in the form of delusions and hallucinations, and this condition is sometimes defined as psychotic depression (Gelder et al., 2006).

An overview of the main clinical features of depressive disorders has been presented so far. In the next sections, the aetiology of depressive disorders will be examined, with a particular focus on the theories and evidence (e.g. environmental and interpersonal deficits) that may be linked to the animal facilitated therapy model. An overview of the evidence for conventional interventions in the treatment of depression will be then presented. A section on evidence for treatment in minor / moderate depression, evaluating similarities and differences between cognitive behavioural therapy, psychotherapy, social skills, drugs, animal facilitated therapy, and alternatives will conclude the chapter.

3.4. Aetiology of depressive disorders

The aetiology of affective disorders includes genetic, biochemical, psychological, sociological and environmental factors (Hales et al., 1999; Kaplan et al., 2007).

Genetic factors involved in depressive disorders have been studied mainly in moderate to severe presentations. Most family studies have shown that parents, siblings and children of patients with severe depression, have a morbid risk of about 20 percent for mood disorders, contrasted with about 7 percent in the relatives of controls (Nurnberger and Gershon, 1992). Twin studies strongly suggest that these high rates of morbidity within families are largely due to genetic factors (Rush, 1991). Studies of adoptees also indicate a genetic aetiology (Gelder et al., 2006). The predisposition to develop moderate to severe depressive disorders has, therefore, important genetic determinants. The mode of inheritance of major depressive disorders is not known.

The clinical manifestations of depressive disorders is mediated through changes in brain neurochemistry. Biochemical studies in depression have focused on the monoamine neurotransmitters, particularly serotonin or hydroxytryptamine (5-HT), noradrenaline and dopamine (Griez et al., 2005; Stern et al., 2008). Although the monoamine hypothesis suggests that depressive disorders are due to an abnormality in the monoamine neurotransmitter system at one or more sites in the brain, further research needs to be undertaken.

Depressive disorders often follow stressful life events. Some life events are more likely to provoke a depressive disorder than others. For instance, the loss by separation or death might be particularly important. However, not all people with depressive symptoms report losses. Also, physical illnesses and their treatment can act as non specific stressors, leading to mood disorders in predisposed individuals. Overall, the strongest relationship between life events and depression is with threatening or undesirable events (Gelder et al., 2000). Adversity and stress also activate dysfunctional beliefs (Ghaemi, 2008). Indeed, negative cognitions are common in depressive patients. These consist of automatic thoughts that

reveal negative views of the self, the world, and the future, and appear to be sustained by cognitive distortions (Beck, 1967). Such cognitions are regarded by Beck as manifestations of long-standing dysfunctional beliefs, which are activated by adversity and stress. An example of a dysfunctional belief is: “If I am not successful, then I am nobody”. A person with this belief may develop depressive cognitions and low mood after a failure at work. Therefore, latent dysfunctional beliefs may lead to both depressive cognitions and depressed mood (Haaga and Beck, 1992).

3.5. Environmental factors and interpersonal deficits

The loss of contact with nature and the lack of interpersonal relationships seem to be the main factors involved for the increased rates of depression in industrialized countries. Indeed, rates of depressive disorder seem to be higher in these countries, and rates of bipolar disorder are significantly higher in urban areas (Gelder et al., 1996). People born in industrialized countries since 1945 seem to have both a higher lifetime risk of major depression and an earlier age of onset. “These phenomena do not appear to be artefacts of data collection or of a tendency for older people to forget earlier depressive episodes” (Gelder et al., 1996:212). It seems plausible that the increased risk of depressive disorders in younger people is environmentally mediated (Klerman and Weissman, 1989).

Konrad Lorenz (1973) considered the environmental deterioration and loss of contact with nature, overpopulation, extreme competitiveness, softening and conditioning of urban people, diminishment of feelings and interpersonal relationships, artefacts of industrialized societies, dysfunctional behaviours and pathological elements, which undermine human health. Some evidence has been established by Flisher et al. (2001), Peen et al. (2003) and Sundsquit et al. (2004). As described earlier, Sundsquit et al. (2004) elucidated how urbanization may worsen the incidence of psychosis and depression. The higher rates of

depression and psychosis in urban areas, were not found to be due to migration. In urbanization, the major factor for population increases is not migration but natural increase (Harpham, 1993). The urban population growth in developing countries is due to natural increase for an average of 61%, compared to 39% from rural migration (United Nations, 1980).

Also, several studies (Paykel and Cooper, 1992; Griez et al., 2005) showed that poor social support, measured as a lack of intimacy or social integration, is associated with an increased risk of depression. Paradoxically, isolation and loneliness are mainly found in urban areas, where the population is so dense that it leads to environmental deterioration and an impaired quality of life. Although humans strive for attention, love and consideration, they are increasingly difficult to receive in our society. The decline in traditional communities, a shift from the extended to the nuclear family, and the increasing mobility and impermanence, have contributed to feelings of separation and diminished social ties. New technologies tend to diminish interpersonal relationships, even within the family setting. As previously highlighted, deficiencies in parental caring style, are relevant factors in determining depression.

To conclude, environmental deterioration and interpersonal deficits seem to be associated with an increased risk of depression. All these elements help to explain why pet therapy has become a new method of intervention in the treatment of affective disorders. Indeed, the companion animal, and more generally the contact with the natural environment fills a growing need for relationships, familiarity and affection. Before evaluating similarities and differences between conventional and complementary therapies in the treatment of depressive disorders, an overview of the evidence for cognitive-behavioural, psychodynamic, interpersonal, and pharmacological interventions will be presented.

3.6. Evidence for conventional interventions in the treatment of depression

This section is concerned with the effectiveness of the main conventional treatment modalities in the management of depression. Antidepressant drugs are considered first. The action of antidepressants may not reverse the cause of depression, nevertheless it may change its symptomatology (Ghaemi, 2008). Biochemical studies have shown that the monoamine neurotransmitters implicated in depression seem to be serotonin or hydroxytryptamine (5-HT), noradrenaline and dopamine (Stern et al., 2008).

Antidepressant drugs can be divided into three main classes (Gelder et al., 2006). The first class includes tricyclic antidepressants and SSRIs (selective serotonin reuptake inhibitors). These consist of compounds that inhibit the reuptake of noradrenaline and serotonin (tricyclic) or exclusively serotonin (SSRIs). The second class consists of drugs that inhibit monoamine oxidase (MAOIs), and the third class consists of drugs with complex effects on monoamine mechanisms. They are of equivalent efficacy but they differ in their side-effects, toxicity and cost (Silva de Lima et al., 2005). The main effect of reuptake inhibitors and of MAOIs is to enhance the functional activity of noradrenaline and / or serotonin (Stern et al., 2008).

Supportive and dynamic psychotherapy, interpersonal psychotherapy, cognitive-behavioural therapy and counselling are the main psychological treatments used for depressive disorders. Supportive psychotherapy provides education, reassurance and encouragement, while focusing on the identification and resolution of current life difficulties, by using the patient's strengths and available coping resources (Griez et al., 2005). An application of this approach is problem solving, which identifies the patient's main matters of concern and devises feasible ways of resolving them. The aim of dynamic or psychoanalytic psychotherapy is to address underlying personal conflicts that are believed to cause or maintain the depressive disorder. Although the evidence is

inconclusive, there is some indication that it may be less effective than other psychological treatments such as cognitive-behavioural therapy (Depression Guidelines Panel, 2000; Whitty et al., 2005).

Interpersonal psychotherapy is a systematic treatment approach to enhancing relationships and addressing life problems. Several studies (Weissman et al., 1979; Elkin et al., 1989) reported that its effects on the symptoms of depression are comparable to those of drug treatments, however recent reviews are less conclusive (Dennis and Hodnett, 2007; Henken et al., 2007). The essential aim of cognitive-behavioural therapy is to help patients to modify their ways of thinking and their behaviours in life situations (Gelder et al., 2006). For depressive disorders of moderate severity, clinical trials indicate that the effects of cognitive-behavioural therapy are comparable to those of antidepressant drug treatment (Blackburn et al., 1981; NICE, 2005; Weisz et al., 2006). The term 'counselling' was first used by Frank Parsons (1908), to indicate an activity related to social or psychological problems. Carl Rogers (1951) developed the concept of counselling, and utilised the term to indicate a relationship in which the client is assisted in his difficulties, without renouncing his freedom of choice and his responsibilities. Although counselling has been found to be associated with modest short-term improvement compared to usual care, it provides no additional advantages in the long-term (Di Fabio et al., 2005; Bower et al., 2006; Edelstein, 2007).

The main conventional forms of treatment in the management of depression have been overviewed so far. The next section will focus on the use of complementary therapies in the treatment of depressive disorders, evaluating similarities and differences with conventional interventions.

3.7. Complementary and alternative therapies in the treatment of depressive disorders

Although drug treatment remains the most prescribed remedy for depression, several complementary and alternative therapies have been developed and utilised in recent years, due to the increasing public demand (Owen et al., 2001). Indeed, many people prefer not to take drugs, because of their potential side-effects (Glenmullen, 2005). However, since very few have been subjected to rigorous controlled trials, it is difficult to substantiate or reject their claims of efficacy. Among the many complementary treatments utilised for mood disorders, relaxation techniques, massage and aromatherapy, acupuncture, and animal facilitated therapy have gained widespread popularity, nevertheless their related scientific evidence is still limited.

A variety of relaxation techniques have been developed in recent years, however, some, such as yoga, have been known for centuries. Relaxation training may reduce heart-rate, hypertension, muscular tension, anxiety and depression (Jorm et al., 2008; Manzoni et al., 2008). Most relaxation methods rely on respiration exercises, posture, muscular tension, and mental imagery, in which patients are instructed to imagine themselves in a place associated with pleasant relaxed memories (Kaplan et al., 2007). Further research is required to investigate the possibility of relaxation being used as a first line treatment in a stepped care approach to managing depression.

Massage and aromatherapy are two of the fastest growing complementary treatments utilised in Europe and the USA (Lee-Treweek et al., 2005). Massage is an ancient form of therapy that involves manipulation of the surfaces of the body, and it is often practiced with the hands and fingers. It was prescribed by Chinese physicians over 3.000 years ago and was applied in ancient Greece as a method of maintaining health (Leung et al., 2003).

Aromatherapy is the therapeutic use of plants oils. The essential oils of plants are organic compounds that are benzene derivatives, and they are inhaled or absorbed through the skin. They may have several therapeutic effects such as analgesic, antimicrobial, and olfactory stimulation, which may elicit feeling tones, memories, and emotions. However, side effects such as skin irritation or allergic reaction may occur (Kaplan et al., 1998). Massage may affect the body, by increasing blood circulation and improving the tone of the musculoskeletal system, and may have a tranquilising effect on the mind (Field, 1995). Single applications of massage therapy may reduce state anxiety, blood pressure and heart-rate, but not negative mood, acute pain and cortisol levels (Moyer et al., 2004; Coelho et al., 2008). Multiple applications may reduce trait anxiety and delayed or chronic pain, with a course of treatment providing benefits similar in magnitude to those of psychotherapy (Moyer et al., 2004; Underdown et al., 2006). There have been no studies on the potential negative effects of massage therapy, therefore further investigations are necessary.

Acupuncture and acupressure are Chinese medical techniques often prescribed in the West. According to Traditional Chinese Medicine, the chi or vital energy, flows along specific pathways, named meridians, which have almost 350 points (acupoints), whose manipulation corrects imbalances by stimulating or removing blockages to energy flow (Ping-Chung et al., 2003). Another basic concept in Traditional Chinese Medicine is the idea of two opposing energy fields, the yin and the yang, which must be in balance to maintain a healthy condition (Chan, 1995). While in acupuncture the acupoints are stimulated by sterilised silver or gold needles, which are inserted into the skin to varying depths (0.5 mm to 1.5 cm) and are rotated or left in place for varying periods, to correct any imbalance of chi, in acupressure the acupoints are manipulated by the fingers (Ping-Chung et al., 2003). In allopathic medicine, acupressure and acupuncture are explained on the basis of nerve stimulation, which may induce the release of endogenous

neurotransmitters such as endorphins. Although these techniques are widely applied for several conditions, among which insomnia, anxiety and depression (Anderson et al., 1995), further research is required.

Since animal facilitated therapy has been described in detail in the previous chapter, similarities and differences with conventional therapies, particularly psychotherapy and cognitive-behavioural therapy, will be examined in this section. Animal facilitated therapy can be defined as the psychotherapeutic use of animals to facilitate a healing process, furthering the emotional and physical wellbeing of the individual (Chandler, 2005). While clinical psychotherapy relies on the relationship between therapist and client, employing verbal communication to treat a broad spectrum of mental disorders, dysfunction and distress, animal facilitated therapy is characterised by the unique relationship between animals and individuals (Fine, 2006). This interaction is mediated by the therapist, and non-verbal communication is predominant. Like psychotherapy, animal facilitated therapy takes place through individual, family and group modalities, depending on clients' needs. Most types of psychotherapy derive from the psychoanalytic and social learning theoretical models, and the two approaches are often integrated (Kaplan et al., 2007). While psychoanalytic psychotherapy emphasizes interpreting unconscious conflict, gaining insight, restoring and strengthening patients' defenses, and directing them toward adaptive ways of problem solving, animal facilitated therapy operates on the emotional, holistic, and psychophysical aspects of individuals, without theorising about their inner conflicts (Fine, 2006).

The therapeutic action of animal facilitated therapy is probably due to the stimulation of the nervous system through the senses, and by a cathartic release of restrained emotions. It can improve mood and sociability, lower anxiety, strengthen self-esteem and enhance

physical exercise, thus stimulate the cardiovascular system, tone up muscles, facilitate the elimination of toxins through sweating, and enhance the production of endorphins and pleasure inducing molecules (Antonioli and Cristina, 2007). Although psychotherapies have been shown to be effective (Dennis and Hodnett, 2007; Henken et al., 2007), these may require months or even years before achieving the expected outcomes. In contrast, animal facilitated therapy may be effective in a shorter period, although little evidence exists to support it. Psychotherapy sessions are usually held once a week, while some animal facilitated therapy programs may be delivered over one or two weeks.

The role of the therapist is primarily facilitative in both interventions, with the therapist's personality acting as a potent agent of change. Indeed, the therapist exerts a personal influence that taps into variables such as empathy, warmth, and respect (Horvath, 1993; Corey, 2008). Like cognitive-behavioural therapy, animal facilitated therapy focuses on ameliorating people's maladaptive behaviours without theorising about the underlying reasons (Gelder et al., 2000). Cognitive-behaviourists look for observable factors that have been learned or conditioned, can thus be unlearned or unconditioned, and replaced by new adaptive behaviours or thoughts. This technique could be integrated and utilised in animal facilitated programmes, enhancing the therapeutic potential of both approaches.

Ultimately, animal facilitated therapy can be utilised to implement social skills training, since it facilitates sociability (Chandler, 2005). Assertiveness and social skills training teach how to respond appropriately in social situations, how to express opinions in acceptable ways, and how to achieve targets (Trower, 1987; Kopelowicz et al., 2006). Like animal facilitated therapy, social skills training deals with assertiveness and attends to a variety of life tasks, such as overcoming shyness and interacting with other people.

To conclude, despite the limited scientific evidence, animal facilitated therapy has been adopted as an intervention to treat a variety of psychopathology. To validate its efficacy, particularly in the treatment of depression, a controlled clinical trial has been conducted. The methods and experiments will be described in the next chapter.

CHAPTER 4

CHAPTER 4

METHODS

4.1. Research aims

- To evaluate the short-term effectiveness of ACP (animal care program) and the therapeutic use of animals (*Tursiops truncatus*), controlling for the influence of the natural setting (e.g. water and other non specific environmental factors), in the treatment of minor to moderate depression and in the context of the biophilia hypothesis.
- To evaluate the possible related psychological, biological and physiological changes.
- To begin to establish an evidence base for animal facilitated therapy in depression.

4.2. Research hypotheses

- The interaction with animals, particularly the bottlenose dolphin, *Tursiops truncatus*, has therapeutic benefit in treating mild to moderate depressive disorders.
- ACP (animal care program) is associated with significant decrease in depressive and anxiety symptoms compared to ONP (outdoor nature program).
- ACP (animal care program) is associated with significant decrease in physiological parameters (respiration rate, pulse rate and blood pressure) compared to ONP (outdoor nature program).
- ACP (animal care program) is associated with significant decrease in cortisol levels compared to ONP (outdoor nature program).

4.3. Design

Since very few clinical trials have been conducted on this research topic, a meta-analysis or overview study design was not considered. Observational study designs were excluded, because these are mainly descriptive and weaker inference can be made if compared with experimental research. Open study designs are generally avoided in clinical trials (Altman, 1999). Instead, I opted for a prospective (data collected forwards in time from the start of the study), longitudinal (the study investigated changes over time in relation to the intervention), single blind, randomized (allocation of patients to treatment at random to avoid bias), controlled clinical trial, because this represents the gold standard of evaluation of treatment effectiveness. This was single blind, as in other psychotherapy trials, where it is not possible for participants to remain unaware of the treatment.

4.4. Sample

We studied out-patients, recruited through announcements on the internet, radio, newspapers and hospitals in the United States and Honduras between November 2002 and December 2003, who had a diagnosis of a mild or moderate depressive disorder according to the criteria of the ICD-10 Classification of Mental and Behavioural Disorders (WHO, 1992). The radio and newspapers involved were from the USA and Honduras, while the hospital was Roatan General Hospital. The advertisement stated the following: “Dolphin – facilitated psychotherapy and depression. If you have a mild to moderate depression and you would like to take part to this research program, please contact us at info@tursiopssociety.org”.

For the sample to be homogeneous, eligibility criteria for the study included an age of 18 to 65 years, and a score of at least 11 on the modified 17-item Hamilton Rating Scale for Depression (Ham-D) (Hamilton, 1976) at base line, after a four-week drug-free period. On

this scale, higher scores indicate more severe depression. Patients were required to discontinue taking any kind of antidepressant drugs or psychotherapy for at least four weeks before study entry, to avoid bias with prescribed therapy. For safety precaution and for the sample to be homogeneous, patients with psychotic features, major depressive disorders, cyclothymia or bipolar disorders were excluded. Patients were advised not to take antidepressant or anxiolytic drugs during the study. In such cases, they would also be excluded.

It was hypothesized that a significant reduction in depressive symptoms would be approximately 80% in the ACP and 30% in the control group (Dobbs, 2000). Based on 0.8 power to detect a significant difference ($P= 0.05$; two sided), 30 patients were required in total. To compensate for non-evaluable patients, we planned to enroll 50 patients in total. This was calculated on reduction of depressive continuous scores on the Beck Depression Inventory (Beck et al., 1961).

4.5. Procedure

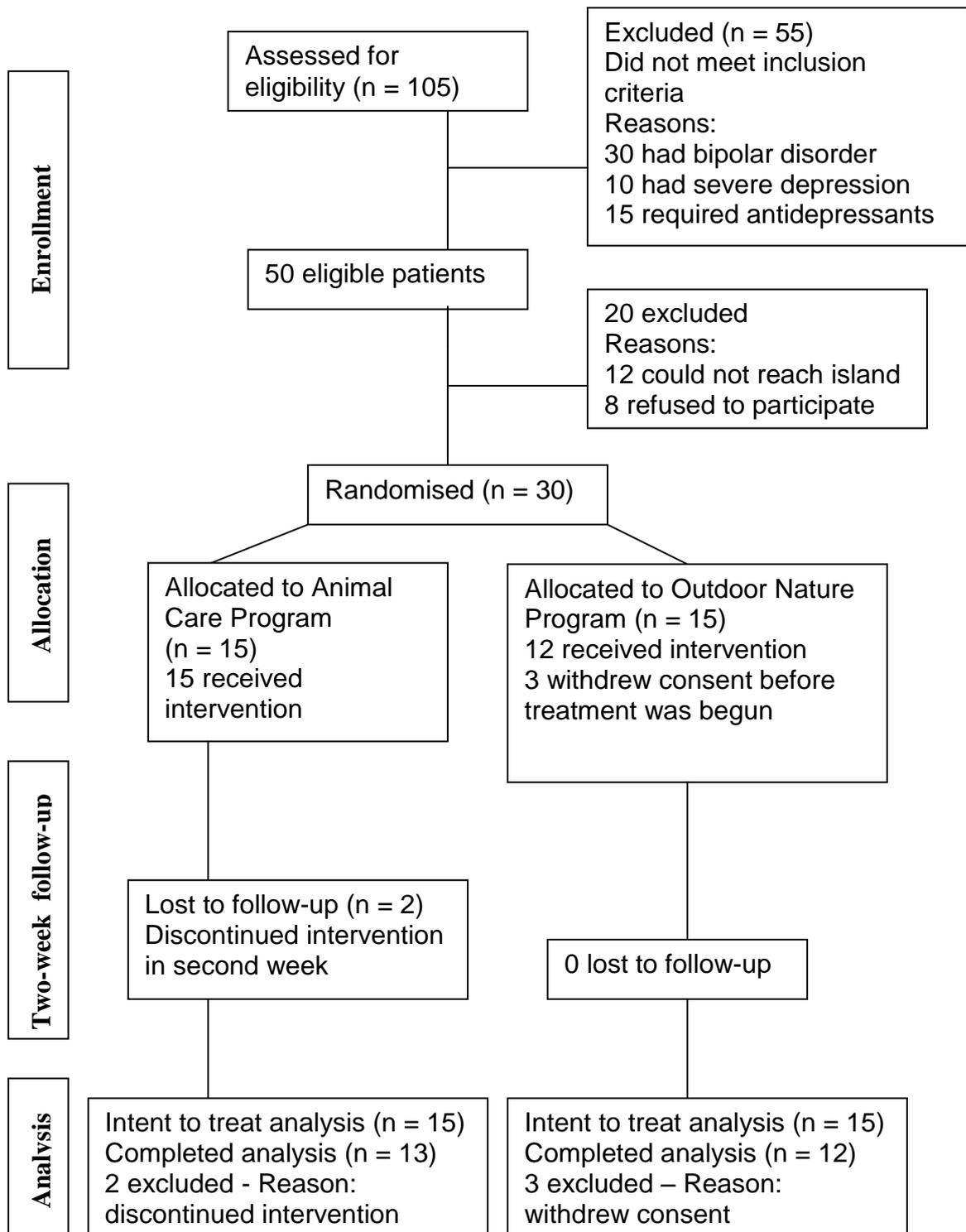
The research protocol was developed between 1999 - 2002, and the field research site was selected after evaluation of several locations in Europe and America. Funding was sought between 2000 - 2002, and logistical and financial support was provided by several private sponsors, who are mentioned in the acknowledgements. The ethical permission for the study was obtained in May 2002 from the Bioethical Committee of the Scientific Research Unit of the Universidad Nacional Autonoma de Honduras, Faculty of Medical Sciences. Logistical preparation for the study in locus (e.g. to contact physicians and volunteers, pilot the intervention, find accommodation for participants, and advertise) was carried out mainly between July 2002 and November 2002, while data collection took place at the Roatan Institute of Marine Sciences (Roatan, Bay Islands, Honduras) between November

2002 and December 2003. All patients provided written informed consent to participate. Travel expenses were not covered, but accommodation was provided. After reading the information form, patients were asked for medical certification by their treating therapist, stating a diagnosis of mild or moderate depression without psychotic features. Once selected by the psychiatrists and clinical psychologists involved in the study, and upon their arrival at the Roatan Institute for Marine Sciences, they were asked to sign the patient consent form.

A psychological and medical examination was then completed by the physicians and clinical psychologists involved in the study, and an induction to the Institute facilities and the island was provided. Patients were randomized to treatment, after screening and at the time of arrival to Roatan. The two groups of subjects mixed outside the treatment sessions. The Hamilton Rating Scale for Depression was administered at base line and at the end of the treatment by experienced clinical raters who were blind to treatment assignments, to the hypotheses being tested, and to the fact that block randomization was being used. Patients were assisted during their stay at the Institute by professional and voluntary services.

The protocol was followed throughout the study. The subjects were randomly assigned to one of two groups of treatment. Block randomization was used. The block allocation sequence was generated by a research assistant using a random-number table. The block lengths were 2, 4, 6 and varied randomly. The allocation sequence was concealed until treatments were assigned. The randomization sequence was kept hidden from the investigators delivering the treatments, using a set of opaque numbered sealed envelopes, each containing the allocation for one patient. The appropriate envelope was then given to an external medical officer.

FIGURE 4.1. FLOW CHART OF THE STUDY DESIGN



Administered measures: At baseline, after first week (self-rating) and at the end of treatment.

4.6. Model of the intervention

Among the types of interaction between people and animals (Fine, 2000), previously described in the second chapter, the model of intervention chosen for the study is represented by the ecotherapy programs, which usually last for two or more weeks. In such circumstances, the interaction takes place in non urban settings, usually natural parks or in the wild. Animals such as dolphins are typical species for ecoprograms. In recent years, bird watching and whale watching programs have been developed as well (Burls and Caan, 2005). Such a model was chosen because of the potentially greater emotional impact that it may exert on people (Kellert, 2005).

4.6.1. Setting

Data collection took place at the Roatan Institute for Marine Sciences (Anthonys Key Resort, Roatan, Bay Islands, Honduras - Figures 4.2 – 4.5), where at the time of research, 16 dolphins were kept in semi-captive condition. This is a unique situation, since the dolphins were living in their natural habitat, preserving their ability to prey and having the possibility to leave at any time, as they were taken out to the open ocean on regular basis.

4.6.2. Dolphins

The species chosen for the animal care program (ACP) was the bottlenose dolphin, *Tursiops truncatus*: 16 semicaptive dolphins, 7 males and 9 females (Table 4.1).

The choice of dolphins in animal-facilitated therapy is not common if compared with the use of others animals, such as cats, dogs and horses. Since they are marine mammals, their use is restricted to a marine environment or oceanarium. Currently, there are two main schools of thought with regard to their utilization. The National Marine Fisheries Service

Figure 4.2. Anthony's key resort map



- | | |
|--|---|
| 1. Changing rooms/showers/restrooms | 11. Sunset viewing deck |
| 2. Shore dive facilities | 12. Land taxi stand |
| 3. Key Pavillion, kayak and canoe launch | 13. Water taxi stop |
| 4. Dolphin Cafe | 14. Guest gear storage |
| 5. Roatan Institute for Marine Sciences, Roatan Museum | 15. Dive Shop |
| 6. Gift Shop | 16. Snack shop |
| 7. Business Office | 17. Photo Roatan |
| 8. Reception/lobby | 18. Recompression Chamber/Doctor's Office |
| 9. Dining rooms | 19. Changing rooms/restroom |
| 10. Frangipani bar | 20. SCUBA school |
| | 21. Hitching post |

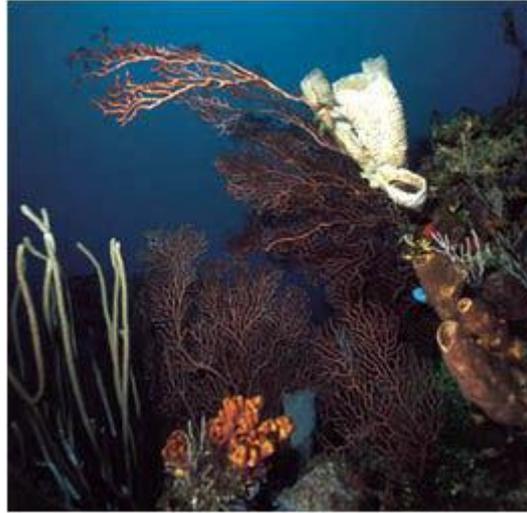
Figure 4.3. Anthony's key resort



Figure 4.4. Dolphins at Anthony's key resort



Figure 4.5. Barrier coral reef, Roatan



**TABLE 4.1. CHARACTERISTICS OF THE BOTTLENOSE DOLPHINS
UTILISED IN THE ANIMAL CARE PROGRAMME (ACP)**

Name	Sex	Age (years)	Weight (pounds)
Bill	male	2	150
Buster	male	7	350
Cy	male	6	300
Esteban	male	16	375
Mateo	male	4	250
Paya	male	18	400
Ronnie	male	1	125
Alita	female	10	325
Beasly	female	25	450
Cedena	female	18	400
Gee Gee	female	14	350
Gracie	female	12	350
Maury	female	2	150
Mika	female	2	200
Rita	female	20	500
Tela	female	3	250

in the USA, sustaining the protection of the wild population, is usually against the interaction with people in the wild, even when controlled. In contrast, other organizations, are not in favour of the utilization of these animals in captivity, despite the availability of many aquariums and oceanariums. Unfortunately, many anecdotal reports have

contributed to the increased popularity of dolphins, while a lack of adequate scientific research has led to considerable speculation. The few studies conducted with dolphins (Smith, 1983; Nathanson, 1989, 1997, 1998) mainly focused on autism, and the findings were not conclusive. Subsequent studies (Lukina, 2001, 2002; Humphries, 2003) highlighted the positive effects that the interaction with dolphins may have on children with phobias, neuroasthenia and depression, however, no standardized methods of evaluation were used. Moreover, it was not clear whether randomization had been applied, though a sea bathing control group without animals was adopted. Among the benefits reported, were sleep normalization, increased appetite, emotional calmness and improved behaviour controllability, however, more robust evidence is necessary.

The hypothesis that dolphins have healing effects was first formulated in the mid 1970's by Horace Dobbs, a Fellow of the Royal Society of Medicine, who was involved in biological research. The distinctive features of these marine mammals, the echolocation system, the aesthetic value and the presence of water, may help to explain the emotional impact they exert on people. Kiev (1992) later suggested that "swimming with dolphins facilitates the reduction of psychological defences and negative self-concepts, and creates an experimental domain in which people can move beyond their ego, and identify with a collective consciousness characterized by energy, love, compassion, reverence and awe". Evans (1992) believes that encounters with dolphins can have a therapeutic value because of their positive effect on human emotions.

Dolphins tend to elicit emotional reactions in humans by triggering the release of restrained emotions. Siegel (1989) refers to the concept of unconditional love. He suggests that all healing is related to the ability to give and accept this form of affection. He believes that diseases are ultimately related to a lack of love, or to experiencing only love that is

conditional. Dolphins and other animals might promote healing through unconditional love and acceptance that can be perceived by people. This perception is often followed by a cathartic release of trapped tension and emotions (Llyod-Hoare, 1994).

Rogers (1951) wrote of unconditional positive regard in the relationship between client and counsellor. He suggested that this relationship created a container for change. In other words, Rogers suggested that the client can gain the insight necessary to resolve difficulties and to restructure his life, establishing a relationship with an understanding and accepting therapist. In an analogous way, the animal could be perceived as genuine, transparent, and warmly accepting. When this experience is created within a therapeutic relationship between client and therapist, it can be accompanied by a catharsis of deeply held emotions. The same cathartic response can be observed in the human-animal relationship.

4.6.3. Description of the intervention

The intervention was piloted with a simulation, and two persons participated in an animal care program (experimental group) and an outdoor nature program (control group), to detect any difficulties, and to revise the intervention towards the clinical trial. The intervention, which had initially been planned to last four consecutive weeks, was reduced to two weeks for logistical, feasibility and financial purposes. The two programs were thus run contemporaneously, and lasted for a period of two weeks for each group of subjects. The treatments were conducted daily, Monday to Friday, one hour per day, for a total of ten sessions for each group of subjects. The animal care program (ACP) was exactly the same as the outdoor nature program (ONP), except for the presence of dolphins in the ACP. To ensure treatment fidelity (that treatment was applied as planned), sessions were video-recorded and checked by an independent therapist. A file of records with behavioural observations and weather conditions was kept as well. Taking care of the

animals (e.g. feeding) and the barrier coral reef (e.g. to observe and avoid damaging the reef by swimming too close) were two of the main tasks given to the participants. The facilitator's (myself) role was particularly important in explaining about the biology of dolphins and the barrier coral reef, highlighting the link between health and environment. Patients were instructed to observe the animals or the coral reef, to pay attention to the colours, to the sounds and smells and to self-report their feelings, which often occurred spontaneously.

In the experimental group, all subjects were assigned to the ACP and all sessions were conducted in the presence of dolphins. Patients were asked to play, swim and take care of the animals. An introductory session was delivered to the patients, in order to explain about dolphin behaviours and water safety. Thereafter, the first part of each session was structured, while patients became familiar with the animal. In the first part (half an hour duration), patients stood in the water close to the trainer. The dolphins were following the trainer's signals, thus performing trained behaviours (e.g. a jump or a swim). The patients were able to touch the dolphins when close to the trainer. The second part of each session (also half an hour duration) was unstructured, where free and spontaneous interactions occurred. The patients were snorkelling in the water with the dolphins. In this second part of each session, my role was mainly to record behavioural observations and to supervise them while they were swimming.

4.6.4. Control group

Among the options considered for a control modality, a waiting list was excluded for logistical and ethical reasons, as the wait may have been detrimental by triggering anxiety or worsening the illness (Elliott et al., 2002). Instead, it was decided to select an outdoor nature program (ONP), involving the same water activities as the ACP but in the absence

of dolphins, in order to control for the influence of water and other non-specific environmental factors. In the ONP, patients were informed of the marine ecosystem and the barrier coral reef (the second largest in the world after the great barrier coral reef of Australia). Water safety was explained as well. Patients in the control group had to swim and snorkel in the Barrier Coral Reef, one hour per day, Monday to Friday, for a total of ten sessions, and had a similar degree of individualised human contact as the ACP. My role was to explain about the ecology of the reef and the importance of the link between health and environment, to record behavioural observations, and to supervise them while they were swimming. In order to avoid disappointment for participants in the control group, which could also potentially affect the results of the study, at the end of the treatment and after the final evaluation, they were offered one day session with the dolphins. Therefore, subjects in the ONP were not excluded from having an encounter with the dolphins.

4.7. Measures

In order to measure the effectiveness of human-animal interaction on human health, and particularly on depressive disorders, psychological, physiological and biological parameters were assessed.

4.7.1. Psychological measures

Psychological measures were conducted at base line and at the end of treatment, using the modified 17-item Hamilton Rating Scale for Depression (Ham-D), the Beck Depression Inventory (BDI-IA) and the Zung Self Rating Anxiety Scale (SAS). The self-rating scales BDI-IA and SAS were also administered after the first week of treatment. A significant and important clinically improvement was defined a priori as an Ham-D score of no more than 7 at the end of treatment, and a satisfactory therapeutic response was defined as a

reduction in the Ham-D by at least 50 percent from base line to the end of treatment (Keller et al., 2000).

4.7.2. Hamilton Rating Scale for Depression (Ham-D)

The Hamilton Rating Scale for Depression (Hamilton, 1960) was developed to measure the severity of depressive symptoms in people with primary depressive illness (unipolar depression). This is generally used to estimate symptom severity before treatment, to gauge the effect of treatment on symptoms and to detect a relapse (return of symptoms) or recurrence. It was designed to be administered by physicians, psychologists, social workers who have experience with psychiatric patients, and by non clinicians trained in its use. It takes about 20 minutes to administer the Ham-D. Although the original scale had 21 items, the last four original items were not considered because they describe aspects of the illness rather than its severity (e.g. diurnal variation). The Ham-D is a list of items that are ranked on a scale of 0-4 or 0-2, where 4 indicates the greatest severity. Some symptoms are more difficult to quantify reliably (Hamilton, 1960), and these items have a range of 0-2.

In an early study (Kearns et al., 1982), scores on the Ham-D were compared with a global measure of depression severity. The resulted thresholds are reported in Table 4.2. These thresholds have been utilised in this research. The reliability of the Ham-D is generally acceptable and its validity has been evaluated by several groups (Maier et al., 1988; Cole et al., 2004). The Ham-D has correlations with global measures of depressive severity that range between 0.65 and 0.90 (APA, 2000).

TABLE 4.2. THRESHOLDS OF Ham-D SCORES

Very severe	> 23
Severe	19 - 22
Moderate	14 - 18
Mild	8 - 13
Not present	0 - 7

4.7.3. Beck Depression Inventory (BDI-IA)

The Beck Depression Inventory (BDI) (Beck et al., 1961) was designed to measure the behavioural manifestation of depression in adolescent and adults, and to standardize the assessment of depression severity, in order to monitor change over time. The items of the BDI were derived from observations of patients with depression. The original form contained 21 items, with each one represented by four or five statements describing symptom severity, from low to high. Subjects were asked to select the statement that best described their feelings “right now”. The scale was revised in 1978 (BDI-IA) to eliminate duplicate severity descriptors and to reword certain items. Furthermore, the time frame for assessment was changed to “last week, including today”. The BDI-IA has been used primarily as a self-report questionnaire. It takes about 15 minutes to complete. The interpretation of severity scores (APA, 2000) is reported in Table 4.3.

TABLE 4.3. THRESHOLDS OF BDI-IA SCORES

Severe	30 – 63
Moderate	17 – 29
Mild	10 – 16
Not present	0 – 9

With regard to its reliability, the BDI-IA shows high internal consistency (Beck et al., 1988) (internal consistency, or Cronbach alpha of an instrument measures whether several items that propose to evaluate the same general construct, produce similar scores). With regard to its validity, correlations between the BDI-IA and other standard measures of depressive symptom severity show high, but not complete concordance, across measures. Correlations between clinical ratings of depression and the BDI-IA for psychiatric patients range from 0.55 to 0.73 (APA, 2000).

4.7.4. Zung Self Rating Anxiety Scale (SAS)

The Zung Self Rating Anxiety Scale (Zung, 1971) is a 20 item self-report measure developed to assess clinical symptoms of anxiety in the adult population. Items are scored on a 4-point scale ranging from 1 (none or a little of the time) through 4 (most or all of the time), with some reverse scoring (statements number 5, 9, 13, 17, 19). Cumulative data on the SAS from several studies of psychiatric and normal subjects indicate that a morbidity cut-off score on this scale would be at 45 (maximum possible score is 80) (Zung, 1971). Patients with scores of 45 and above would be considered by clinicians to have anxiety symptoms of significant severity. The administration time of the SAS is approximately 10 minutes. With regard to its reliability and validity, the SAS has been used in a variety of

psychological and pharmacological treatment studies as an outcome measure (Lam et al., 2005).

4.7.5. Physiological and biological measures

Physiological parameters such as heart rate, blood pressure and respiratory rate were examined before and after the intervention with a digital sphygmomanometer.

Measurements of cortisol and immunoglobulins (IgA) were also completed. The rationale for including these measurements is briefly presented below.

The neuropeptides and their receptors are in communication with the immune system and “they might be plausible candidates for the locus of the emotions” (Pert, 1999:133). Recent observations have shown, that lymphocytes and monocytes both secrete and respond to neuropeptides (Pert, 2007). Endorphins and enkephalins are neuropeptides which modulate pain, reduce stress and promote calm. Endorphins and enkephalins, referred to as the body’s natural opiates, act in the brain as neurotransmitters in pathways that control pain, thus decrease painful sensation; in people suffering of depression, the level of endorphins in blood, as well as the number of circulating white blood cells, should be significantly lower than those in good health condition. Several studies indicate a decrease in certain immunobiological parameters such as the number of circulating white blood cells and natural killer cell activity (NKCA), as a consequence of long-term stress (Herbert and Cohen, 1993; Breznitz et al, 1998; Segerstrom et al, 2004).

The cortical portion of the adrenal gland produces several hormones, mostly cortisol. Stress and other stimuli induce cortisol secretion. The function of cortisol is to increase the glycemia (the level of glucose in blood), and to induce the cells synthesis of glycogen. Cortisol is, therefore, a stress indicator. As reported by Gelder et al. (1996), in about half

of patients with a diagnosis of at least a moderate depressive disorder, the cortisol level measured in plasma is increased throughout the 24-hour cycle. The cause of hypersecretion in depressed patients is not well known.

Antibodies or immunoglobulins are proteins produced by the immune system in response to the presence of an antigen or foreign substance (Male, 2003). Immunoglobulins recognize and bind to the antigens in order to remove them from the body (Delves et al, 2006). Antibodies are produced by specialized leucocytes (white blood cells) called B-lymphocytes or B-cells (Sell, 2001). The binding of an antigen to the B-lymphocyte stimulates the B-cell to divide and mature into a group of cells called plasma cells (Sell, 2001). The mature B-cells or plasma cells, produce and secrete millions of antibodies into the bloodstream and lymphatic system (Male, 2003). The antibodies attack and neutralize antigens identical to those that trigger the immune response. All antibodies are formed by three structural units: two of the units are identical and involved in binding to the antigen, while the third unit is involved in binding molecules related to antigen elimination (e.g. receptors on cells such as macrophages or white blood cells) (Burton et al., 1986). There are five classes of antibodies that differ structurally, mostly in the third unit: Immunoglobulin-G (IgG), IgM, IgD, IgE and IgA (Delves et al, 2006). The IgA is the predominant antibody in seromucous secretions such as saliva, tracheo-bronchial secretions, genito-urinary secretions and milk. Receptors for IgA have been reported on monocytes and neutrophils (white blood cells) (Burton et al, 1986).

Since endorphins and enkephalins reduce stress and promote calm, it was hypothesized that cortisol levels in saliva would be significantly reduced after interaction with dolphins. As a result of stress reduction, the number of antibodies in saliva was expected to be significantly higher after the experience. In order to avoid blood withdrawal, which would

have induced stress to the patients, determining an increment of cortisol, therefore changing the physiological indicator, immunoglobulins (IgA) and cortisol levels were measured from saliva. A saliva sample was taken from patients before and after the treatment and immediately after the first session, in order to measure the cortisol levels and the number of antibodies (IgA).

4.7.6. Cortisol and immunoglobulins analysis

The clinical analysis of the saliva sample to determine the levels of cortisol and IgA (immunoglobulins A) was carried out by the Fleming Research Institute, Novara, Italy. The levels of cortisol in saliva were detected with the method of radioimmunoassay, while for IgA levels, Beckman's test was applied (Beckman, 2009). A saliva sample was collected in a tube, coded and kept frozen in a polystyrol container at a temperature below zero Celsius. The containers were then sent to the Fleming Research Institute by airmail. Permission for the transportation was obtained from the Italian Ministry of Public Health (Permission n. 8442, Public Health, Milano Malpensa Airport).

4.8. Ethical considerations

Ethical approval for the study was obtained from the Bioethical Committee of the Scientific Research Unit of the Universidad Nacional Autonoma de Honduras, Faculty of Medical Sciences. Before entering the study, participants were informed about the intervention and they had to read and sign the patient information and consent forms. In order to avoid social desirability bias in response to assessment, it was emphasised that people were only taking part in a research study and were told not to expect any improvement. It was explained that the interaction with dolphins, may or may not have additional benefit to participating in routine water activities. Non-invasive techniques were employed and no risks or side-effects other than accidental injuries in the water were

involved. With regard to the saliva sample collection, the study subjects had just to provide it in a tube. Therefore, there were no risk factors involved. With regard to animal ethics, the dolphins were kept in their natural environment, rather than in tanks, and they were regularly taken out to the open ocean. In this way, they had the opportunity to leave at any time. With regard to the confidentiality of information, no patients could be identified in any documents relating to the study. No names were collected, instead each patient was given a code number, which was used for all data collection and analysis purposes.

4.9. Statistical analysis

Statistical analysis was applied using the SPSS version 11 software. Preliminary t-tests for equality of means for two independent groups of observations were conducted for the Ham-D, BDI-IA and SAS scores, to evaluate the significance of changes in the scores from base line to the end of treatment. The primary analysis was a modified intention to treat, last observation carried forward analysis. The general linear model (GLM) repeated measures procedure was applied. This procedure provides analysis of variance (Manova) when the same measurement was made more than once on each subject. We have examined the Ham-D, BDI-IA and SAS scores in intent to treat, last observation carried forward, obtaining a balanced design (each cell in the model contained the same number of cases).

Using this GLM procedure, the effects of both between-subjects and within-subjects factors were investigated. The Ham-D, the BDI-IA and the SAS scores at base line and after two weeks of treatment were the within-subjects factors considered, while the experimental group (ACP) and the control group (ONP) were the between-subjects factors specified.

Statistical analysis was not applicable to the biological variables (cortisol and IgA levels), due to insufficient recorded data. This, because the exact concentration could not be determined. With regard to the physiological data (pulse rate, respiration rate and blood pressure), the t-test for equality of means for two independent groups of observations was applied.

CHAPTER 5

CHAPTER 5

RESULTS OF ANIMAL CARE PROGRAM TRIAL

5.1. Base-line clinical and demographic characteristics

A total of 105 patients were screened for the study. Fifty patients fulfilled selection criteria, 20 of whom were excluded for non-compliance or other reasons (e.g., could not reach the island). The remaining 55 patients did not meet the selection criteria. A total of 30 patients thus underwent block randomization: 15 were assigned to the experimental group (animal care program, ACP), and 15 to the control group (outdoor nature program, ONP) (Table 5.1). In the control group (ONP), three subjects withdrew their consent before the treatment began, while in the experimental group (ACP) two subjects dropped out after the first week of treatment.

TABLE 5.1. BASE-LINE CHARACTERISTICS OF THE RANDOMIZED PATIENTS*

CHARACTERISTIC	ALL PATIENTS	ACP	ONP	DIFFERENCE	
	(N=30)	(N=15)	(N=15)	χ^2 (t)	p
Female sex (%)	90	93.3	86.7	0.370	0.543
White race (%)	73.3	80	66.7	0.682	0.409
Age (yrs)	40.2± 11.5	41.0 ± 12.5	39.5 ± 10.8	(0.359)	0.722
Marital status (%)				0.286	0.867
Married or cohabiting	23.3	20	26.7		
Single	53.3	53.3	53.3		
Divorced or separated	23.3	26.7	20		
Depression diagnosis (%)				0.136	0.713
Mild depression	43.3	40	46.7		
Moderate depression	56.7	60	53.3		
Anxiety symptoms (%)	40	33.3	46.7	0.556	0.456
Prior treatment (%)				0.691	0.875
No prior treatment for depression	36.7	40	33.3		
Prior treatment with psychotherapy	13.3	13.3	13.3		
Prior treatment with antidepressants	33.3	26.7	40		
Prior treatment with both antidepressants and psychotherapy	16.7	20	13.3		

* Plus-minus values are means ± SD.

ACP: Animal care program; experimental group.

ONP: Outdoor nature program; control group.

DIFFERENCE: Difference at base-line between the groups. There was no statistically significant difference between the groups on demographic or clinical factors. T-test for continuous variable and chisquare χ^2 (crosstab) for categorical variables were applied.

5.2. Treatment and efficacy

The preliminary two-tailed t-test for equality of means for two independent groups of observations for the Ham-D and BDI-IA scores from base-line to the end of treatment was highly significant in the patients who completed treatment (Table 5.2). For the Ham-D ($p=0.002$) (95 percent confidence interval, 1.66 to 6.11 percent; equal variances not assumed). For the BDI-IA ($p=0.006$) (95 percent confidence interval, 2.43 to 13.3 percent; equal variances assumed). Therefore, the ACP had a significantly higher effect in decreasing depressive symptoms, compared to the ONP.

TABLE 5.2. MEAN OF THE DIFFERENCE IN SCORES FROM BASE-LINE TO END OF STUDY ON THE Ham-D, BDI-IA AND SAS*

Variable	Number of patients who completed the study		Reduction in mean scores
Ham-D			
ACP	13		8.38 ± 1.98
ONP	12		4.50 ± 3.15
†p value	0.002	t=3.658	
BDI-IA			
ACP	13		15.46 ± 5.69
ONP	12		7.58 ± 7.42
†p value	0.006	t=2.993	
SAS			
ACP	13		11.46 ± 6.32
ONP	12		7.17 ± 5.57
†p value	0.086	N.S. t=1.796	

*Plus-minus values are means ±SD. Scores represent the amount of reduction from base-line to end of treatment.

ACP: Animal care program; experimental group.

ONP: Outdoor nature program; control group.

† t-test for independent groups of observations.

For the modified intention to treat, last observation carried forward analysis, the general linear model repeated measure confirmed the significant differences for the Ham-D and BDI-IA scores (Table 5.3). The GLM multivariate test showed that the interaction between time and group for the Ham-D and BDI-IA were both significant (Ham-D: p= 0.007) (BDI-IA: p= 0.012). There was a change in time for both treatment groups, but the change in the ACP was significantly higher compared to the ONP. The animal care program (experimental group) had a higher significant effect in decreasing depressive symptoms, compared to the outdoor nature program (control group).

TABLE 5.3. MEAN SCORES ON THE Ham-D, BDI-IA AND SAS AT BASE-LINE AND END OF TREATMENT IN THE MODIFIED INTENTION TO TREAT SAMPLE*

Variable	N. of patients	BASE-LINE	END OF TREATMENT
Ham-D score			
ACP	15	14.53 ± 2.59	7.27 ± 2.52
ONP	15	14.47 ± 2.20	10.87 ± 3.38
p value (Multivariate test)			0.007 F=8.646
BDI-IA score			
ACP	15	20.27 ± 6.65	6.87 ± 5.60
ONP	15	18.80 ± 6.91	12.73 ± 7.64
p value (Multivariate test)			0.012 F=7.302
SAS score			
ACP	15	42.87 ± 8.37	33.07 ± 6.01
ONP	15	43.20 ± 7.62	37.47 ± 9.18
p value (Multivariate test)			0.102 F=2.858

*In the modified intention to treat sample, last observation carried forward, we applied the general linear model repeated measures, multivariate test. The p value represents the interaction of group (ACP or ONP) by treatment time (baseline or end of treatment).

Plus-minus values are means ±SD. Higher scores on the scales, indicate more severe depression or anxiety.

ACP: Animal care program; experimental group.

ONP: Outdoor nature program; control group.

The test of within-subjects effects for the Ham-D group factor was significant at 1 percent level. $F(1; 28) = 8.65$; $p = 0.007$; while the test of within-subjects effects for the BDI-IA group factor was significant at 5 percent level $F(1; 28) = 7.30$; $p = 0.012$. The GLM showed a significant main effect of the within-subjects factors. Both the ACP and the ONP had an effect in decreasing the subjects' depressive symptoms. However, the interaction effect shows that the ACP group improved significantly more than the ONP group for both the Ham-D and the BDI-IA. Table 5.4 describes the breakdown of the outcome on a 4 point scale.

TABLE 5.4. RATES OF RESPONSE AND REMISSION AFTER TREATMENT*

Group	ACP	ONP	χ^2	p
	Number of patients (%)			
Patients who completed the study			10.532	0.001
Number of patients	13	12		
Response	13 (100)	5 (41.7)		
Satisfactory response	1 (7.7)	0		
Remission	10 (76.9)	3 (25)		
Partial response	2 (15.4)	2 (16.7)		
No response	0	7 (58.3)		
Modified intention to treat, last observation carried forward, sample			8.889	0.003
Number of patients	15	15		
Response	13 (86.7)	5 (33.3)		
Satisfactory response	1 (6.7)	0		
Remission	10 (66.7)	3 (20)		
Partial response	2 (13.3)	2 (13.3)		
No response	2 (13.3)	10 (66.7)		

*Remission was defined as a score no more than 7 on the HRSD at the end of treatment. A satisfactory response was defined as a reduction in the score by at least 50 percent from base line to the end of treatment. A partial response was defined as a reduction in the score by at least 30 percent from base-line to the end of treatment.

ACP: Animal care program; experimental group.

ONP: Outdoor nature program; control group.

Chi square (crosstab) has been utilized to compare groups. Categorical variables analysed: response; no response.

Despite the overall reduction of the anxiety mean scores in both treatment groups, the t-test for the SAS scores was not significant ($P=0.086$) (95 percent confidence interval, -0.65 to 9.24 percent; equal variance assumed). The ACP did not have a significantly greater effect in decreasing the subjects' anxiety symptoms compared to the ONP. However, only 40 percent of the sample had significant anxiety scores before the treatment (significant anxiety with SAS scores > 45). In other words, only 40 percent of the population sample under study had a mild or moderate depression with anxiety symptoms before the treatment.

The GLM repeated measures for the SAS scores were not significant. The multivariate test for the SAS by group had a p value > 0.05 (P = 0.102). The test of within-subjects effects for the SAS by group was not significant: $F(1; 28) = 2.86$; $p > 0.05$ ($p = 0.102$).

In Figures 5.1 - 5.2, bar charts represent the BDI-IA and SAS mean scores at baseline and after the first week of treatment. In Figures 5.3 - 5.4 - 5.5, bar charts represent the Ham-D, BDI-IA and SAS mean scores at baseline and after treatment. Figures 5.6 - 5.7 - 5.8, show the profile plots of the interaction between time and treatment group (ACP and ONP) for the Ham-D, BDI-IA and SAS.

Figure 5.1. BDI-IA mean scores at base-line (BDI1) and after first week of treatment (BDI2)

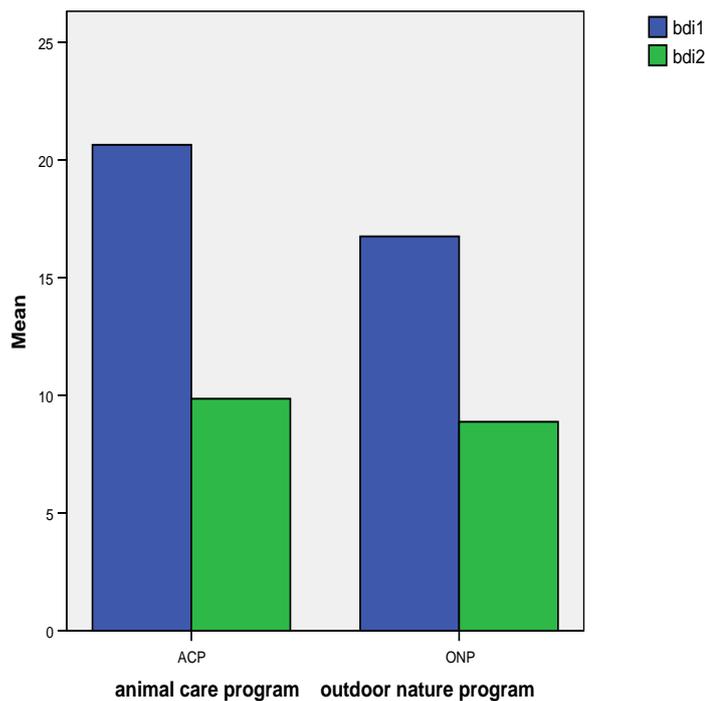


Figure 5.2. SAS mean scores at base-line (SAS1) and after first week of treatment (SAS2)

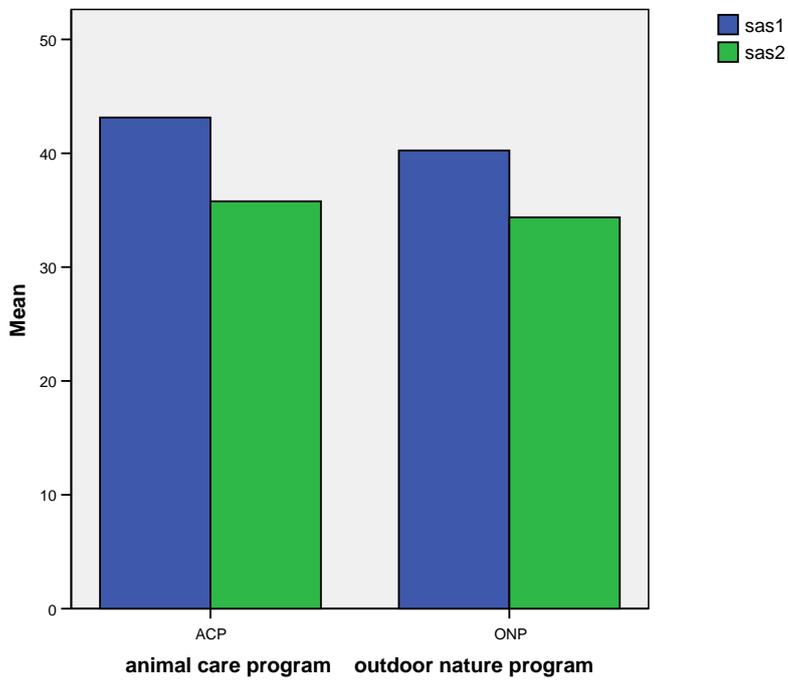


Figure 5.3. Ham-D mean scores at baseline (Ham-D1) and after treatment (Ham-D2)

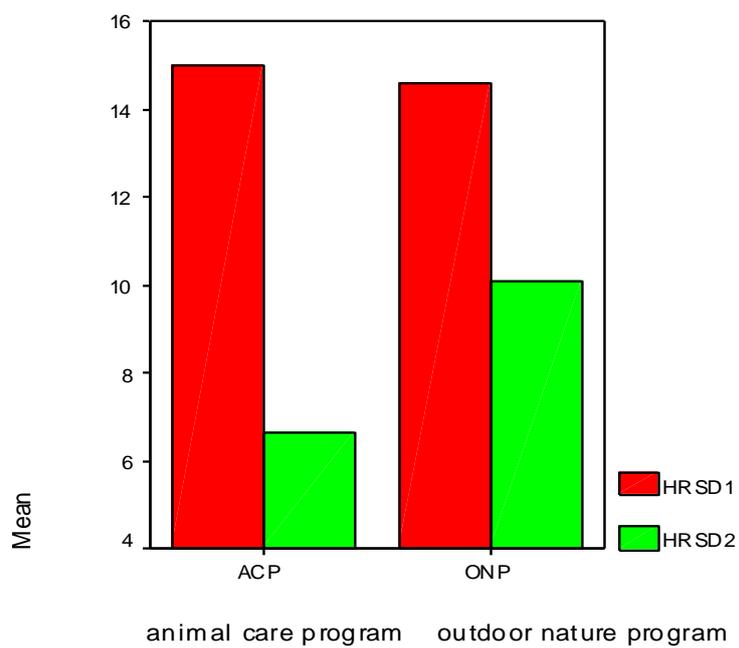


Figure 5.4. BDI-IA mean scores at base-line (BDI1) and after treatment (BDI3)

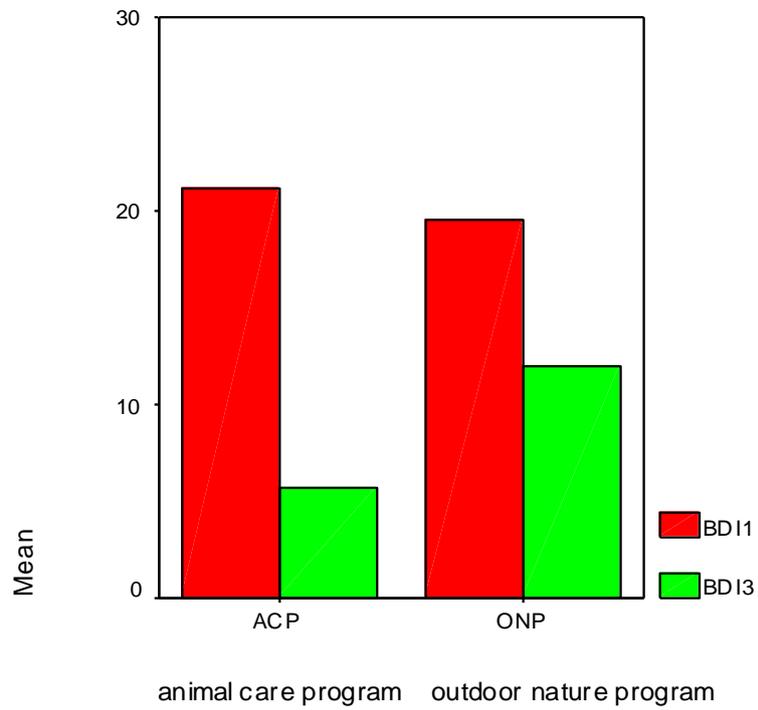


Figure 5.5. SAS mean scores at base-line (SAS1) and after treatment (SAS3)

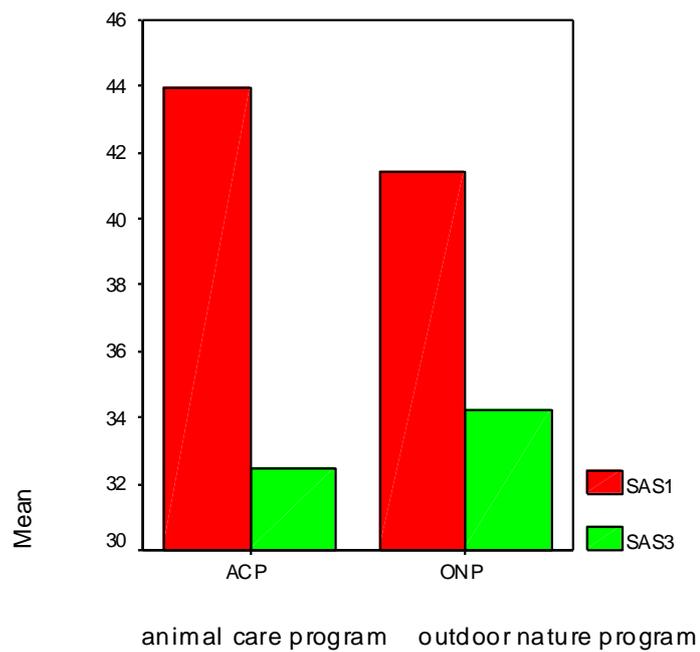


Figure 5.6. Profile plot of the interaction between time and treatment group for the Ham-D

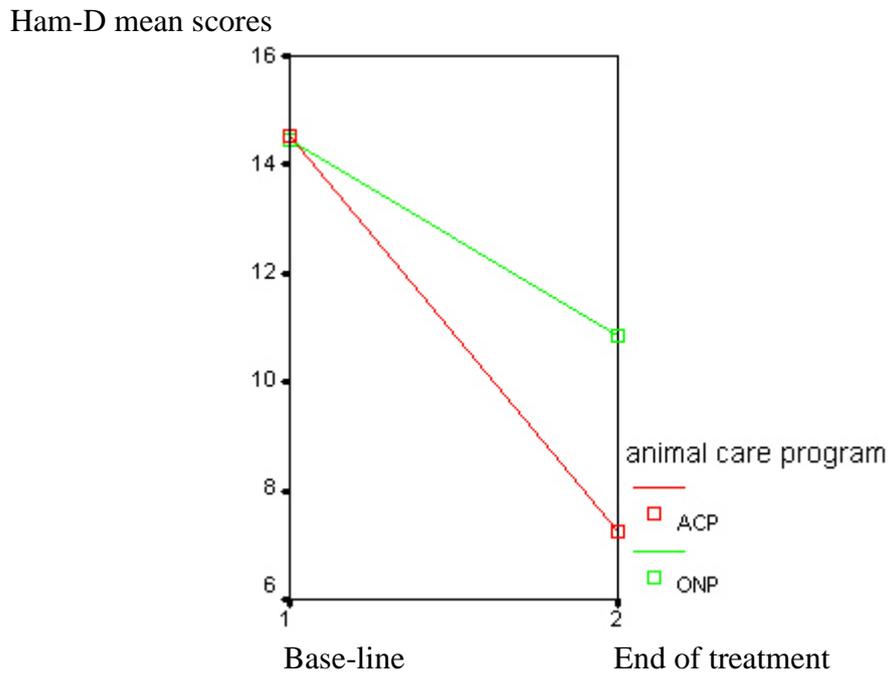


Figure 5.7. Profile plot of the interaction between time and treatment group for the BDI-IA

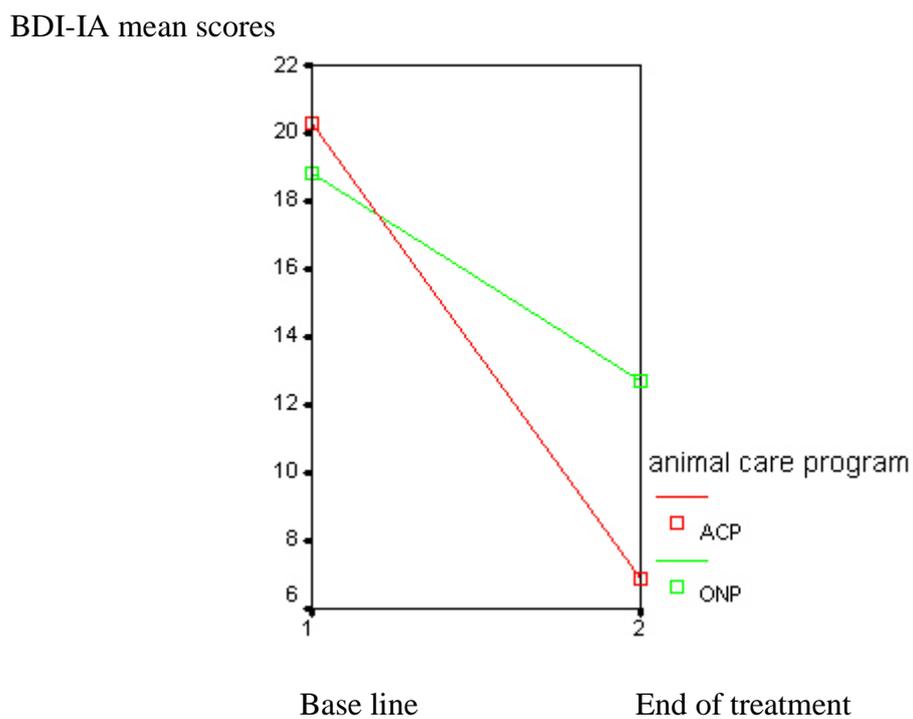
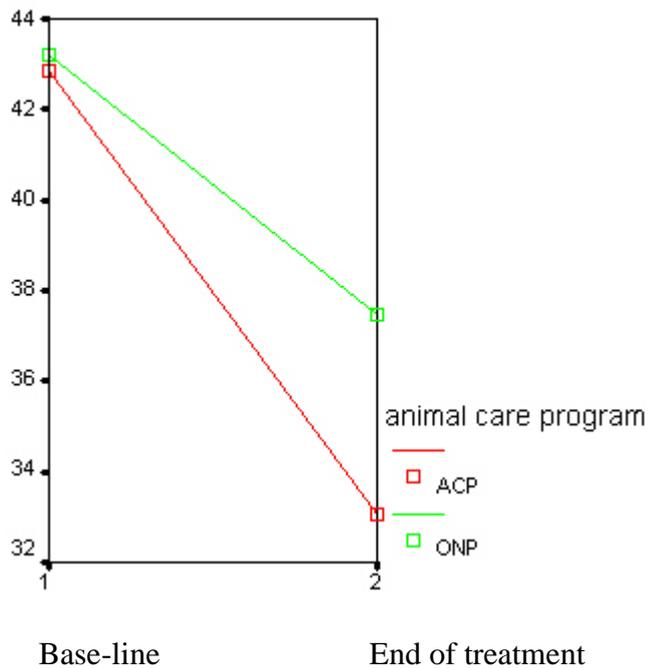


Figure 5.8. Profile plot of the interaction between time and treatment group for the SAS

SAS mean scores



5.3. Cortisol and immunoglobulins test results

Tables 5.5 and 5.6 report the overall outcome for the cortisol and immunoglobulins analysis. As previously explained, statistical analysis was not applicable to the biological data, due to several missing values. This, because either the exact concentration could not be determined or in some cases, the sample collected was not sufficient for the laboratory to run the clinical analysis. Often, the concentration of cortisol detected in the sample was below 1 nM/L, while the normal value of cortisol in saliva ranged from 1 to 15.4 nM/L. However, is not possible to draw a conclusion.

TABLE 5. 5. CORTISOL LEVELS (nM/l) DETECTED IN THE ANALYZED SAMPLE*

Subjects	Before treatment	After 1st day	After treatment
1	n.a.	n.a.	n.a.
2	<1	1.1	<1
3	1.7	<1	<1
4	<1	<1	<1
5	<1	4.4	<1
6	<1	<1	<1
7	3.2	<1	<1
8	2.2	<1	<1
9	<1	<1	n.a.
10	<1	<1	n.a.
11	4.0	<1	<1
12	<1	<1	n.a.
13	<1	<1	<1
14	<1	<1	<1
15	<1	<1	<1
16	n.a.	n.a.	n.a.
17	n.a.	n.a.	n.a.
18	n.a.	n.a.	n.a.
19	n.a.	n.a.	n.a.
20	<1	<1	<1
21	<1	<1	<1
22	n.a.	n.a.	n.a.
23	n.a.	n.a.	n.a.
24	<1	<1	<1
25	1.0	<1	<1
26	n.a.	n.a.	n.a.
27	<1	<1	<1
28	n.a.	n.a.	n.a.
29	<1	<1	<1
30	1.0	<1	<1

* Subjects 1 to 15 were in the ACP (Animal care program).
Subjects 16 to 30 were in the ONP (Outdoor nature program).
n.a. not available.
Normal value of cortisol in saliva: 1.00-15.4 nM/L

TABLE 5. 6. IgA LEVELS (mg/dl) DETECTED IN THE ANALYZED SAMPLE*

Subjects	Before treatment	After 1 st day	After treatment
1	n.a.	n.a.	n.a.
2	9.9	n.a.	14.8
3	n.a.	14.0	14.5
4	13.2	3.5	2.6
5	5.9	4.5	4.4
6	2.5	2.3	3.1
7	7.9	3.2	5.0
8	8.4	5.2	3.5
9	10.5	n.a.	n.a.
10	3.0	3.6	n.a.
11	6.8	4.7	1.6
12	15.7	7.3	n.a.
13	22.6	25.1	11.8
14	15.2	6.9	11.3
15	20.3	16.7	14.5
16	n.a.	n.a.	n.a.
17	n.a.	n.a.	n.a.
18	n.a.	n.a.	n.a.
19	n.a.	n.a.	n.a.
20	8.0	n.a.	1.8
21	n.a.	5.6	4.3
22	n.a.	n.a.	n.a.
23	n.a.	n.a.	n.a.
24	4.8	5.7	7.2
25	7.0	3.8	2.6
26	n.a.	n.a.	n.a.
27	7.2	5.4	4.3
28	n.a.	n.a.	n.a.
29	6.6	2.9	6.5
30	14.5	5.0	22.1

* Subjects 1 to 15 were in the ACP (Animal care program).
 Subjects 16 to 30 were in the ONP (Outdoor nature program).
 n.a. not available.
 Normal values of IgA in saliva: 2.8-15.00 mg/dl.

5.4. Physiological tests results

Tables 5.7 - 5.8 - 5.9, report the overall outcomes of the physiological responses. For the pulse rate, respiration rate and blood pressure, the t-test for equality of means for two independent groups of observations was applied (Table 5.10). For the pulse rate,

respiration rate, and blood pressure, the t-test for equality of means for two independent groups of observations (ACP and ONP) was not significant.

TABLE 5.7. PULSE RATE PER MINUTE*

Subjects	Before treatment	After treatment
1	76	67
2	68	68
3	74	64
4	90	73
5	73	74
6	80	73
7	71	61
8	87	74
9	n.a.	n.a.
10	n.a.	n.a.
11	69	69
12	72	63
13	94	77
14	65	59
15	67	81
16	79	79
17	83	71
18	78	69
19	72	66
20	79	74
21	57	92
22	n.a.	n.a.
23	78	69
24	76	76
25	75	75
26	n.a.	n.a.
27	72	71
28	n.a.	n.a.
29	74	74
30	68	63

* Subjects 1 to 15 were in the ACP (Animal care program).
 Subjects 16 to 30 were in the ONP (Outdoor nature program).
 n.a. not available.

TABLE 5. 8. RESPIRATORY RATE PER MINUTE*

Subjects	Before treatment	After treatment
1	28	18
2	18	16
3	16	14
4	14	14
5	16	12
6	18	14
7	18	12
8	20	16
9	n.a.	n.a.
10	n.a.	n.a.
11	16	12
12	24	18
13	18	14
14	16	12
15	16	14
16	24	15
17	25	21
18	23	19
19	19	16
20	24	16
21	18	22
22	n.a.	n.a.
23	20	16
24	18	14
25	20	16
26	n.a.	n.a.
27	18	16
28	n.a.	n.a.
29	18	16
30	16	12

* Subjects 1 to 15 were in the ACP (Animal care program).
Subjects 16 to 30 were in the ONP (Outdoor nature program).
n.a. not available.

TABLE 5. 9. BLOOD PRESSURE MEASUREMENT*

Subjects	Before treatment	After treatment
1	108/61	102/68
2	104/59	100/59
3	124/79	113/74
4	137/90	124/73
5	127/85	123/79
6	101/68	105/66
7	120/75	123/75
8	125/78	134/79
9	n.a.	n.a.
10	n.a.	n.a.
11	125/70	143/83
12	121/78	118/76
13	134/99	155/83
14	139/72	113/66
15	115/63	113/69
16	123/87	118/83
17	97/61	93/69
18	130/85	120/80
19	130/85	110/75
20	116/67	110/59
21	119/72	110/72
22	n.a.	n.a.
23	140/90	120/70
24	127/86	120/77
25	163/115	127/72
26	n.a.	n.a.
27	131/90	149/90
28	n.a.	n.a.
29	117/76	100/76
30	140/83	120/61

* Subjects 1 to 15 were in the ACP (Animal care program).
Subjects 16 to 30 were in the ONP (Outdoor nature program).
n.a. not available.
Systolic/diastolic in mm Hg.

TABLE 5. 10. MEAN DIFFERENCE FROM BASE-LINE TO END OF STUDY ON THE PHYSIOLOGICAL PARAMETERS*

Variable	Number of patients who completed the study		Reduction in mean scores
Pulse rate			
ACP	13		6.38 ± 8.47
ONP	12		1.00 ± 12.08
†P value	0.207 N.S.	t=1.299	
Respiration rate			
ACP	13		4.00 ± 2.45
ONP	12		3.67 ± 3.20
†P value	0.772 N.S.	t=0.294	
Systolic blood pressure			
ACP	13		1.08 ± 12.59
ONP	12		11.33 ± 13.05
†P value	0.058 N.S.	t=-1.999	
Diastolic blood pressure			
ACP	13		2.08 ± 8.41
ONP	12		9.42 ± 13.55
†P value	0.114 N.S.	t=-1.642	

Plus-minus values are means ± SD. Scores represent the amount of reduction from base-line to end of treatment.

ACP: Animal care program; experimental group.

ONP: Outdoor nature program; control group.

† t-test for independent groups of observations.

5.4.1. Pulse rate

For the pulse rate, the t-test for equality of means for two independent groups of observations, was not significant; p value > 0.05 (95 percent confidence interval, -3.192 to 13.961; $p=0.207$ equal variances assumed). In other words, the animal care program did not have a significantly greater effect in decreasing the pulse rate of the subjects compared to the outdoor nature program.

5.4.2. Respiration rate

For the respiration rate, the t-test for equality of means for two independent groups of observations was not significant; p value > 0.05 (95 percent confidence interval, -2.013 to 2.680; $p= 0.772$ equal variances assumed).

5.4.3. Blood pressure

For the systolic and diastolic blood pressure, the t-test for equality of means for two independent groups of observations, was not significant. For the systolic blood pressure: 95 percent confidence interval, -20.87 to 0.357; $p= 0.058$ equal variances assumed.

For the diastolic blood pressure: 95 percent confidence interval, -16.59 to 1.91; $p= 0.114$ equal variances assumed.

CHAPTER 6

CHAPTER 6

DISCUSSION OF THE FINDINGS OF THE ANIMAL CARE PROGRAM TRIAL

6.1. Overview of the findings

To the best of our knowledge, this is the first randomized, single blind, controlled trial of animal facilitated therapy with dolphins. The results of the study supported the effectiveness of the therapy, controlling for the influence of the natural setting in the treatment of minor depressive disorders. The Animal Care Program had a significantly higher effect in decreasing depressive symptoms, compared to the Outdoor Nature Program. The natural setting itself is an important factor that has to be considered in the treatment of emotional disorders. This is consistent with previous findings (Hartig et al., 1991; Hartig et al., 2003; Burls et al., 2005). The effects exerted by the animals were significantly greater compared to the natural setting. The echolocation system, the aesthetic value and the emotions raised by the interaction with dolphins may explain the healing properties of this animal. The reduction of the depressive symptoms occurred after two weeks of treatment. In conventional therapy, either psychotherapy or drug-therapy, a substantial reduction of symptoms usually becomes evident during the same period (Gelder et al., 2006). There are no side effects involved, although accidental injuries may occur.

The reduction of anxiety symptoms was not significantly different between the ACP and the ONP, however, only 40% of the sample had significant anxiety symptoms associated with depression before the treatment. The overall reduction of anxiety symptoms in both groups may be explained by the therapeutic property of water in relieving anxiety, as shown in previous studies (Levine, 1984; Solimene, 2003). Studies by Turner and Fine

(1989), and Solimene (2004) have shown that floating in water reduces muscular tension, and lowers the levels of norepinephrine (noradrenalin), cortisol and ACTH, chemicals which are linked to high levels of stress-related illnesses.

With regard to the cortisol and IgA (immunoglobulins A) analysis, it was not possible to draw definitive conclusions. This is because the exact concentration could not be determined, and it was not possible to apply any statistical analysis. There was no statistically significant difference for the physiological data between the two groups. The ACP did not have a significantly greater effect in decreasing the pulse rate, the respiration rate, or the systolic and diastolic blood pressure of the subjects, compared to the ONP. This may have been due to the effect of water in reducing the physiological parameters of participants in both groups. The freedom from gravity in water produces physiological changes within the body. Flotation thus reduces the effect of muscular tension, allowing blood to flow and circulate more freely, and blood pressure and pulse rate to drop. However, other studies (Ulrich et al., 1991; Kellert, 2005) showed that the presence of the animal and the natural setting have an effect in reducing physiological parameters such as blood pressure. Since the human nervous system can be stimulated through the senses by interaction with animals in nature, multiple factors are involved in reducing physiological parameters (e.g. water, sound, light, touch, interpersonal relationships).

Among the types of interaction between people and animals (Fine, 2000), previously described in the second chapter, the model of intervention selected was represented by the ecotherapy programs. In such circumstances, the interaction takes place in non urban settings, usually natural parks or in the wild. Such a model was chosen because of the potentially greater emotional impact that it may exert on people (Kellert, 2005).

The biophilic methodology of intervention, which is based on a holistic approach through the interaction with animals in nature and the stimulation of the nervous system via the senses, has the potential to offer alternative strategies to the treatment of emotional disorders. It can thus extend the humanisation of medicine, particularly in the field of psychiatry, and psychiatric rehabilitation, which operates on the emotional, holistic and psychophysical aspects of the subjects through the interaction with animals in nature, and the stimulation of the nervous system through the senses.

6.2. Methodological implications

An experimental research design was selected, because of its stronger inference than observational designs, which are essentially descriptive. A clinical trial, however, which is a planned experiment on human beings designed to evaluate the effectiveness of one or more forms of treatment, is constrained by methodological and logistical difficulties such as potential bias (factors that may alter the results of the study) and drop-out (loss of participants). In addition, it needs to conform with ethics standards, is resource-intensive and not easy to carry out, hence sufficient funding is necessary, and an adequate timescale to complete it. In the next sections, the limitations, design, sample, interventions and measures of the animal care program trial, will be critically discussed.

6.2.1. Limitations

Although water phobia and inability to swim represent limitations of the treatment, the presence of dolphins may help to overcome them, acting as a distraction. A limitation of the study, common to psychotherapy research, was the lack of blindness and its potential impact on outcome (Roth et al., 2005). Other limitations were the restrictive exclusion criteria (for safety reasons and for the sample to remain homogeneous, patients with psychotic, major depressive and bipolar disorders were excluded) and the small sample

size, which may have reduced the generalizability of the findings. In order to ensure treatment fidelity (that treatment was delivered as planned and consistently to all participants), all sessions were video-recorded, monitored and compared with the planned intervention by an independent therapist, to ensure that the only difference between the groups was the presence or absence of dolphins.

Because of logistical and financial reasons, a follow-up study was not carried out; however, three months after the intervention, the ten participants in the animal care program and the three participants in the outdoor nature program, who had a score of 7 or lower on the Hamilton Rating Scale for Depression at the end of treatment (significant improvement), provided a self-report about their mental health status. Nine of the ten participants in the animal care program and all three of the outdoor nature program reported that improvement had been sustained, and did not require further treatment.

6.2.2. Design

The study was prospective (the data was collected during a period of one year from its outset), longitudinal (it investigated changes over time in relation to the intervention), controlled, single blind and randomized (allocation of patients to treatment to avoid bias). This represents the gold standard of evaluation of treatment effectiveness. The design was single blind, as in other psychotherapy trials, because it was not possible for participants to remain unaware of the treatment (Roth et al., 2005). To the best of our knowledge, this is the only randomized controlled trial of animal facilitated therapy to date, using strictly defined diagnostic, and rigorous inclusion and exclusion criteria. It has demonstrated that similar trials can be delivered with other animals in the future, to establish evidence-based effectiveness, not only for depression but also for other psychiatric disorders and disabilities.

6.2.3. Sample

Participants involved in the study were out-patients, who were recruited through announcements on the internet, radio, newspapers and hospitals in the United States and Honduras. In the recruitment phase, in order to avoid social desirability bias in response to assessment, it was emphasized to patients that they were only taking part in a research study and they were told not to expect any improvement. The eligibility criteria included an age of 18 to 65 years, and a score of at least 11 on the modified 17-item Hamilton Rating Scale for Depression (Ham-D) (Hamilton, 1976) at base line, after a four-week drug-free period. As mentioned earlier, patients with psychotic, major depressive and bipolar disorders were excluded. These exclusion criteria may have consequently reduced the generalizability of the findings to other psychiatric disorders. Indeed, the animal care program could also be applied to patients with major depression and psychotic features or other illnesses such as eating disorders, eventually integrating the program with pharmacological treatment.

Women outnumber men 2:1 in the prevalence of depression. This may explain the preponderance of females in the sample. Men could be as responsive as women to the therapy, nevertheless it may be that those without close human relationships would be more responsive, hence the higher proportion of unmarried subjects in the study. The latter could also be attributed to single people being more likely to volunteer for this kind of trial. This is an issue for future research. Participants paid only for their own travel expenses and food, not for the research program. Accommodation was provided. The study was supported by private sponsors, mentioned in the acknowledgments.

6.2.4. Interventions

In the animal facilitated therapy program, patients were informed about the biology of the animal and the ecosystem where the interactions take place, highlighting the link between health and the environment (Kellert, 2005). Patients were then instructed to observe the animals or the ecosystem (in the study conducted, the coral reef), to pay attention to the colours, sounds and smells, and to self-report their feelings, which may occur spontaneously. To control for the influence of the natural setting, participants were randomly allocated to an ACP (animal care program) or an ONP (outdoor nature program). It is true that going to a pleasant location, away from the stress of one's usual environment, could reduce anxiety and improve mood, even in people with depression. This is why the study had a control group (ONP) with the same non-specific experiences as the experimental group (ACP), but in the absence of dolphins.

To prevent disappointment in the subjects that were taking part in the control group, after evaluation, they also had a day session with the dolphins. Thus, the subjects in the control group were not excluded from having an encounter with the dolphins. Participants in the control group also improved slightly during the study, which may have reflected a placebo effect of the pleasant location. The controls did not become more depressed, as might be expected if depressed people had perceived disappointment more intensely.

With regard to the specificity of the animal utilized in the study, the choice of dolphins is not common and logistically difficult to manage, if compared with the use of other animals, such as cats, dogs and horses. Nevertheless, dolphins have distinctive interactive features, such as the echolocation system, the aesthetic value and the presence of water, hence may exert a greater emotional impact on people. No comparative studies with other

animals have been carried out as yet, and this research would be important in establishing the generalizability of the findings in household or more cost-effective settings.

6.2.5. Measures

Among the scales utilized in clinical research to evaluate psychological changes and the effectiveness of the intervention, I opted for the Hamilton Rating Scale for Depression (Hamilton, 1960), the Beck Depression Inventory (BDI-IA) (Beck et al., 1961) and the Zung Self Rating Anxiety Scale (SAS) (Zung, 1971). The above scales were selected because their reliability is generally acceptable, and their validity has been established by several studies (Maier et al., 1988; APA, 2000; Cole et al., 2004; Lam et al., 2005).

Physiological parameters such as heart rate, blood pressure and respiratory rate were examined before and after the intervention with a digital sphygmomanometer. Since muscular tension in general anxiety disorders is not well understood, and experimental studies refute the often-assumed direct relationship between anxiety and muscular tension (Pluess et al., 2009), this was not examined. Measurements of cortisol and immunoglobulins (IgA) were completed by the Fleming Research Institute, Novara, Italy, but the exact concentrations could not be determined, hence it was not possible to draw firm conclusions. The levels of cortisol in saliva were detected with the method of radioimmunoassay, while for IgA levels, the Beckman's test was applied (Beckman, 2009). However, studies by Odendaal et al. (2003) showed significant changes in beta-endorphins, dopamine, oxytocin and cortisol (reduction) in both human and dogs, indicating that the physiological responses during positive human - dog interaction may be reciprocal. Measurements of beta endorphins were avoided, because blood sample are more difficult to manage and conserve.

6.2.6. Analysis

The primary analysis applied was an intent to treat, last observation carried forward analysis, which means that all 30 subjects who were randomized to enter the study, including those who dropped-out, were included in the analysis. This provided a conservative estimate, making it more difficult to demonstrate treatment effect. The results were highly significant statistically, reflecting the large differences in improvement between the groups and the small variance. The latter is an index of dispersion, which indicates the average distance or deviation of the observations from the mean. A small variance indicate little dispersion, hence the sample within each group was homogeneous, despite the modest sample size.

To calculate the sample size, it was hypothesized that a significant reduction in depressive symptoms would be approximately 80% in the ACP and 30% in the control group (Dobbs, 2000). Based on 0.8 power to detect a significant difference ($P= 0.05$; two sided), 30 patients were required in total. To compensate for non-evaluable patients, we planned to enroll 50 patients in total. This was calculated on reduction of depressive continuous scores on the Beck Depression Inventory (Beck et al., 1961). A small sample size may reduce the generalization of the findings, however, taken into consideration the nature and complexity of this study, this was considered an economical and resource-effective option. Future studies would be possible for larger numbers of participants, particularly if designed for more accessible animals and natural environments.

6.3. Clinical implications and future research

It is self evident that most people with depression will not be able to swim with dolphins. The study does not, therefore, propose that animal facilitated therapy with dolphins will be a common therapy for people with depression. The purpose of the study was to establish a

framework, rather than develop a universal therapy with dolphins for everyone. More studies with other animals are needed. If similarly successful, AFT could be incorporated in the treatment of depression even in severe cases, eventually integrating the program with pharmacological treatment. It has been shown that the biophilia principle can be used to develop effective therapies and that their validation by randomized controlled trials is feasible. Furthermore, one of the factors involved, is probably the echolocation system and the production of sounds which are specific to dolphins. Other pet-animals do not have the echolocation system and this is the fundamental difference, in association with water, thus the need to compare dolphins with other animals. Studies by Dobbs (2000) indicated that over 70 per cent of people listening to recorded dolphin sounds benefited from the experience. New research to confirm these findings is required. More controlled trials of alternative and complementary therapies are also needed, as this relatively new field evolves. Practitioners' perceptions of animal facilitated therapy as a treatment for depression and other psychiatric disorders constitute another important topic for future research, because these will influence the utilization of new interventions in real clinical settings.

6.4. Conclusions

The biophilic method of intervention represents a new emphasis in mental health care and has the potential to add alternative clinical strategies to the treatment of depressive and other emotional disorders. The animal care program was effective in alleviating symptoms of depression after two weeks of treatment. It can thus be concluded that animal facilitated therapy with dolphins is an effective treatment for mild to moderate depression, and is based on a holistic approach, through interaction with animals in nature. Participants in both groups of the study (ACP and ONP) reported lasting improvement of their symptoms. For some patients with mild or moderate depressive symptoms, using medication or

conventional psychotherapy may not be necessary when biophilic treatment with animals is used.

The findings of this animal facilitated therapy (AFT) trial with dolphins were published in the British Medical Journal (Antonioli and Reveley, 2005) and were divulged by the media (newspapers, radio, and televisions) worldwide. This resulted in considerable immediate response from the social and health community. As AFT and other complementary treatments are still relatively new and often not widely integrated in health care provision, it was important to establish whether the impact and interest from such research was sustained within the health community. For this reason, health practitioners' perceptions of complementary treatments, with a particular focus on animal facilitated therapy, will be examined in the next chapter.

CHAPTER 7

CHAPTER 7

ATTITUDES TOWARDS AND EXPERIENCES OF COMPLEMENTARY AND ALTERNATIVE MEDICINE: CROSS SECTIONAL QUESTIONNAIRE SURVEY OF GENERAL PRACTITIONERS IN A URBAN AREA OF ITALY

7.1. Introduction

As highlighted in the previous chapter, the findings of the animal facilitated therapy study were published in the British Medical Journal and were divulged intensively by the media (newspapers, radio, and televisions such as BBC, FOX USA, RAI Italy, Mediaset Italy, NewYork Times, Sidney Herald - see Appendix 7-8) worldwide. This generated immediate interest across the social and health community. As AFT and other complementary treatments are still relatively new and often not widely integrated in health care provision, it was important to establish whether the interest from such research was sustained within the health community. In particular, in this chapter, the impact of the AFT research on the Italian medical community will be evaluated, examining practitioners' perceptions of complementary and alternative medicine (CAM), with a particular focus on animal facilitated therapy as treatment of depression.

7.2. Practitioners' perceptions, attitudes, use and practice of CAM: An overview

The continuous growth in the call for complementary and alternative therapies by many patients caught the academic world unprepared, and the response to such innovation sways from interest and enthusiasm, to skepticism and aloofness (Easthope et al., 2000).

Complementary and alternative medicine incorporates several approaches and methodologies, with techniques ranging from spiritual healing to nutritional interventions for anxiety and mood disorders, acupuncture for pain relief, and manipulation for backache. Though, to be able to give informed advice to patients on such topics, physicians should, first of all, study the existing evidence and understand their potential benefits and limitations. Therefore, doctors need to be educated on the indications for CAM, and preferably trained in these modalities. Those who have received training are more likely to report benefits both for their patients and themselves (Owen et al., 2001). Patients' safety and the effective integration of complementary and alternative with conventional medicine is also influenced by the professionalism and ethics of the training available. The physician-industry relationships (funding), the lack of academic training and the limited scientific evidence on the efficacy of alternative treatments, might represent the major obstacles to their utilization (Zollman et al., 2000; Campbell et al., 2007).

Findings on AFT (animal facilitated therapy) with dolphins have been popularized extensively through the media worldwide, nevertheless no studies have been conducted to evaluate the impact of such popularization on practitioners' perceptions of the treatment. In the next section, the opinions, use, and practice of CAM will be examined through a cross-sectional questionnaire survey of general practitioners in an urban area of Italy.

7.3. Research aims

- To investigate physicians' views of CAM, with a particular focus on AFT (animal facilitated therapy), in order to evaluate the impact of previous findings on practitioners' perceptions of the treatment.
- To identify factors that affect physicians' choice of CAM and AFT interventions for depression.

7.3.1. Research hypotheses

- The limited scientific evidence on the efficacy of alternative treatments represents an obstacle to the utilization of CAM.
- AFT research findings influenced physicians' view of CAM.

7.3.2. Design

To investigate physicians' opinions, use and practice of CAM, an observational, retrospective (data refers to past events and may be acquired from existing sources or by interview), cross-sectional (individuals are observed only once) study design was selected. In observational studies, which are mainly descriptive, researchers collect information on the attributes or measurements of interest, but do not influence events. Observational studies include surveys and epidemiological investigations. Hence, I opted for a cross-sectional questionnaire survey.

7.3.3. Setting

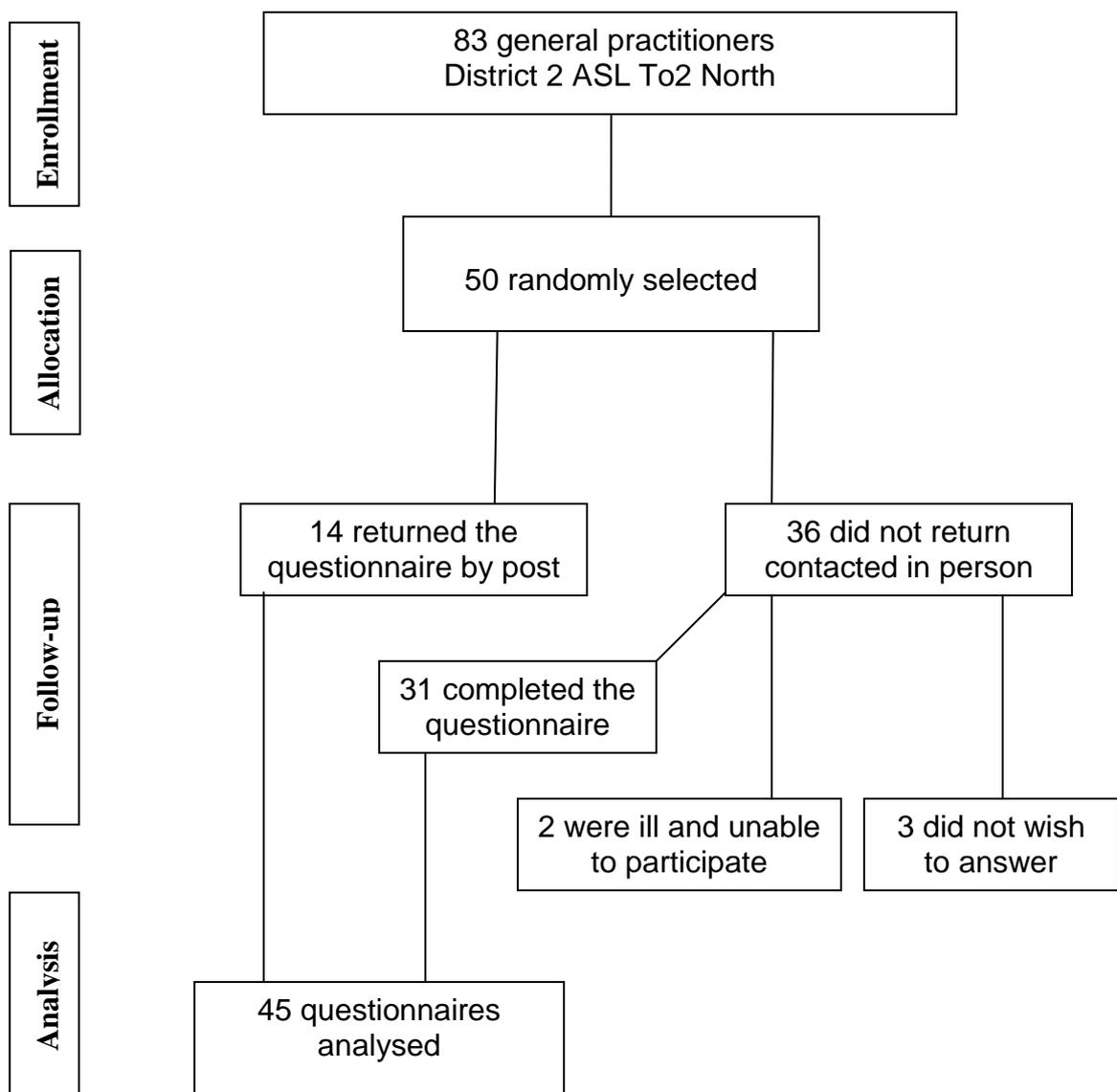
The questionnaire was delivered to general practitioners in the urban area of Turin, ASL TO 2 north, district 2 (Italy). The reason for selecting general practitioners was that they constitute the first line of medical care and often initiate treatment for depression.

7.3.4. Sample

Fifty physicians, i.e. general practitioners affiliated to the national health service, were randomly selected to participate in the study. From the 2008 physicians list of the ASL-TO 1 and 2 (National Health Service, City of Turin), all general practitioners of the City of Turin (district 2 ASL TO 2 north) working for the National Health Service were identified. The sample included general practitioners, as well as residents (licensed physicians in training) in general practice in the urban area of Turin (908.000 population), Italy.

From this list with a total number of 83 general practitioners, 50 were randomly selected. The random selection was prepared from the same list, numbered sequentially from 1 to 83, using the Excel = rnd formula. A random sequence of 50 numbers was thus generated. Of the 50 physicians in the sample, none were excluded, since nobody was on leave, had retired or deceased. The flow chart of the study design is described in Figure 7.3.1.

FIGURE 7.3.1. FLOW CHART OF THE STUDY DESIGN



7.3.5. Procedure

A questionnaire (Appendix 4) was devised, based on the research literature and the findings of the AFT trial, formulating 15 questions with multiple choice answers. In particular, question number 9, enquired which first line antidepressants doctors prescribe as treatment of choice for mild or moderate depression. Personal information regarding gender, number in years of medical practice and ethnicity were also collected. The questionnaire was posted in November 2008 for return within a month. Data collection took place between December 2008 and March 2009.

Physicians received a cover letter (Appendix 4), the questionnaire, a postcard with the subject's name on it, and a postage paid return envelope. The subjects were asked to return the completed questionnaire separately from the postcard. This system intended to preserve the anonymity of respondents, since the questionnaire had no identifying information, while this process also permitted the tracking of non respondents. Non respondents were then contacted directly in person, or by telephone, and were encouraged to participate.

7.3.6. Ethical considerations

The questionnaire had no identifying information and the adopted system (the completed questionnaires were returned separately from the postcard, with the participants' printed name) preserved the anonymity of respondents, in accordance with legislation on personal privacy.

7.3.7. Statistical analysis

Statistical analysis was applied using the statistical package for social sciences (SPSS), version 14.0 software. The analysis was predominantly descriptive, because of the small sample size.

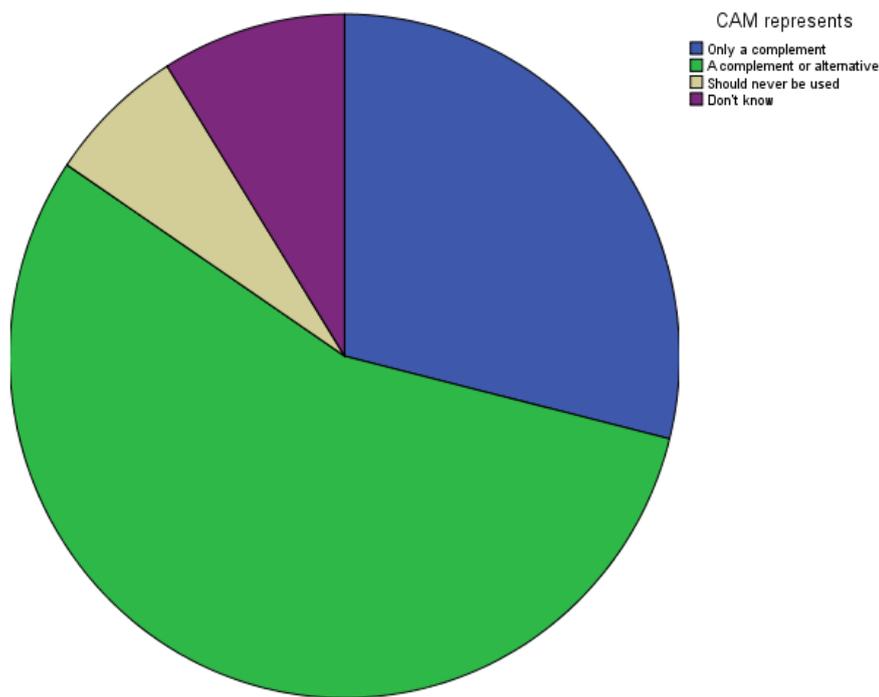
7.4. Results

In this section, the findings of the survey are overviewed. Each of the 15 questions of the questionnaire are presented separately (Figures 7.4.1 – 7.4.8), either with a pie chart, a bar chart or in the text. Of the 50 physicians randomly selected to answer the questionnaire, 45 completed it (14 physicians or 28%, returned the questionnaire by post), three did not wish to participate, and 2 were ill and were unable to participate. The high response rate (90%) was possible because the non respondents (31 physicians or 62%, who did not return the questionnaire by post) were contacted in person on several occasions (3 or 4 times) and encouraged to participate. Personal information regarding gender, number in years of medical practice and ethnicity of the physicians are presented in Table 7.1.

TABLE 7.1. CHARACTERISTICS OF THE PARTICIPATING PHYSICIANS

Gender %	Male	Female	
	60	40	
Ethnicity %	White	Black	Other
	95.6	0	4.4
Medical practice %	<5 yrs	5-10 yrs	>10 yrs
	0	2.2	97.8

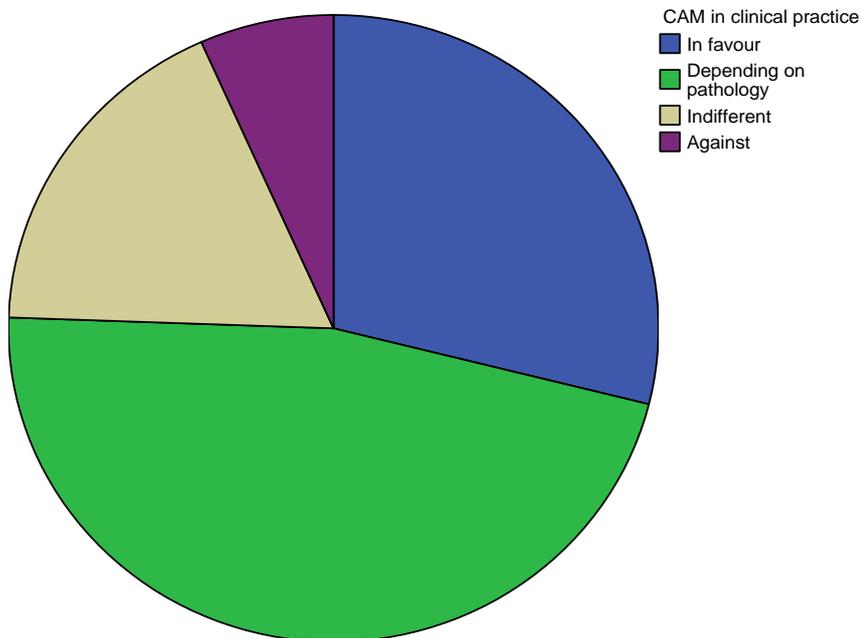
Figure 7.4.1. Pie chart of question 1. Compared to conventional medicine, CAM represents:



	Response
• Only a complement	28.9%
• A complement or alternative, depending on pathology	55.5%
• Should never be used	6.7%
• I don't know	8.9%

Among the physicians interviewed, 55.5% considered CAM a complement or an alternative depending on pathology, while for 28.9% CAM represented only a complement, if compared with conventional medicine. Only a minority (6.7%) claimed that complementary and alternative treatments should never be utilized.

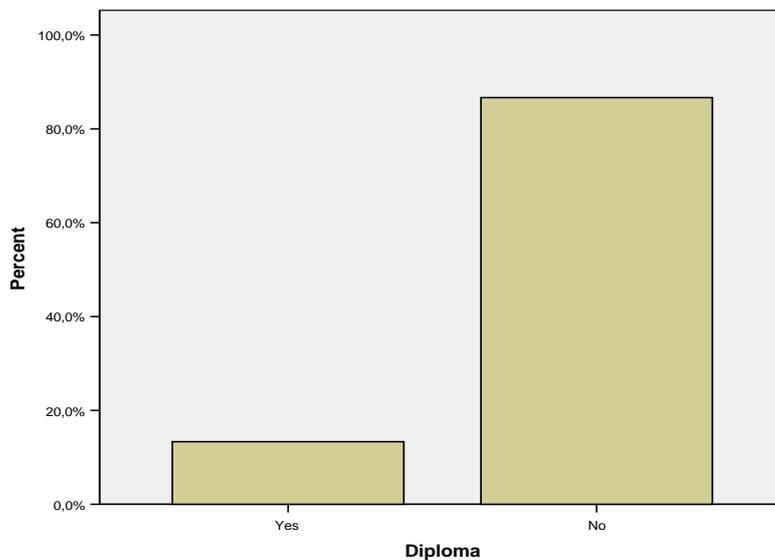
Figure 7.4.2. Pie chart of question 2. Are you in favour of using CAM in clinical practice?



	Response
• In favour	28.9%
• Depending on pathology and its severity	46.7%
• Indifferent or sceptical	17.7%
• Against	6.7%

Overall, 75.6% of the general practitioners interviewed were in favour of the utilization of CAM. Only a minority, 6.7%, were openly against its use.

Figure 7.4.3. Bar chart of question 3. Do you have a Diploma in CAM?

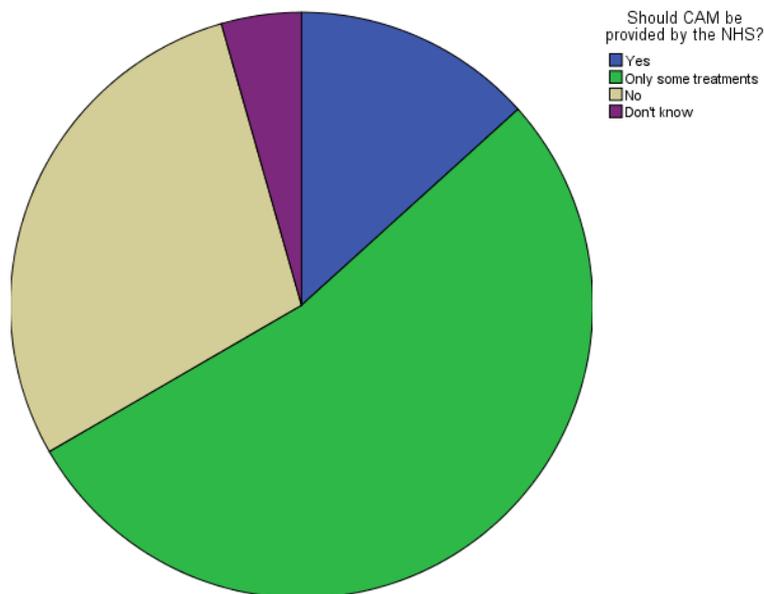


	Response
• Yes	13.3%
• I am in training	0
• No	86.7%

The majority (86.7%) of general practitioners who completed the questionnaire did not have a Diploma in CAM. Among those, only 25.6% were interested in CAM training, while 66.7% were not interested in obtaining a Diploma. A small percentage (7.7%) did not express an opinion (did not answer) with regard to their interest in CAM training.

With regard to question 4 of the questionnaire (Are you favourable to the teaching of CAM in the Medical School?), 60% of the general practitioners interviewed were in favour of teaching CAM, while 24.4% were against, and 15.6% did not express an opinion (did not know).

Figure 7.4.4. Pie chart of question 5. Should CAM be provided by the National Health Service?

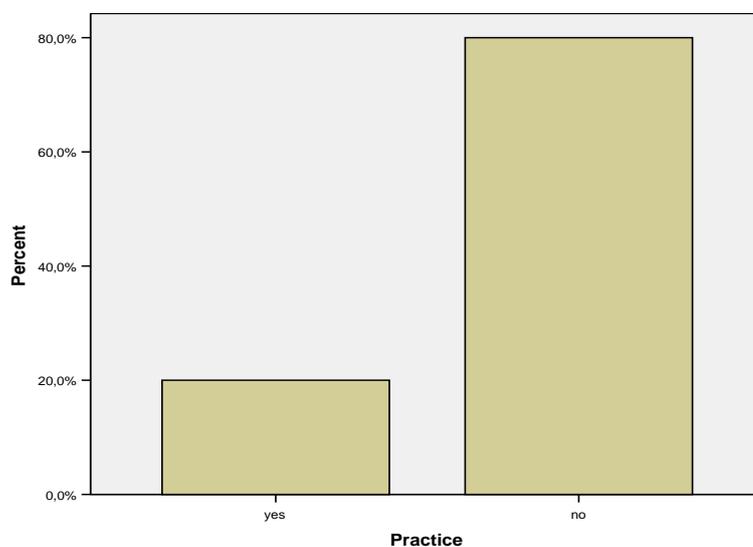


	Response
• Yes	13.3%
• Only some treatments	53.3%
• No, they should only be paid by users	28.9%
• Don't know	4.5%

Overall, 66.6% of the physicians interviewed thought that CAM treatments should be covered, in part or completely, by the National Health Service. A minority (28.9%) differed in that their costs should be met by users. Among the complementary treatments that should be covered by the National Health Service were acupuncture, bodywork techniques, herbalism, homeopathy, and animal facilitated therapy, with 22, 16, 8, 7 and 6 preferences, respectively.

With regard to question 6 of the questionnaire (Have you ever suggested a CAM treatment to your patients?), the majority (86.7%) of general practitioners had suggested a complementary treatment. Among the CAM treatments suggested were acupuncture, body-work techniques, homeopathy, herbalism, and animal facilitated therapy, with 33, 23, 18, 12, and 9 preferences, respectively. The reasons for this choice of treatments were supported by less side-effects than drugs and conventional medicine (18 preferences), the effectiveness of treatment (18 preferences), the limited or lack of effectiveness of conventional medicine (16 preferences), and the holistic approach of CAM (14 preferences). The remaining 13.3% had never suggested a complementary treatment, because of the lack of adequate scientific evidence.

Fig.7.4.5. Bar chart of question 7. Do you practice CAM ?

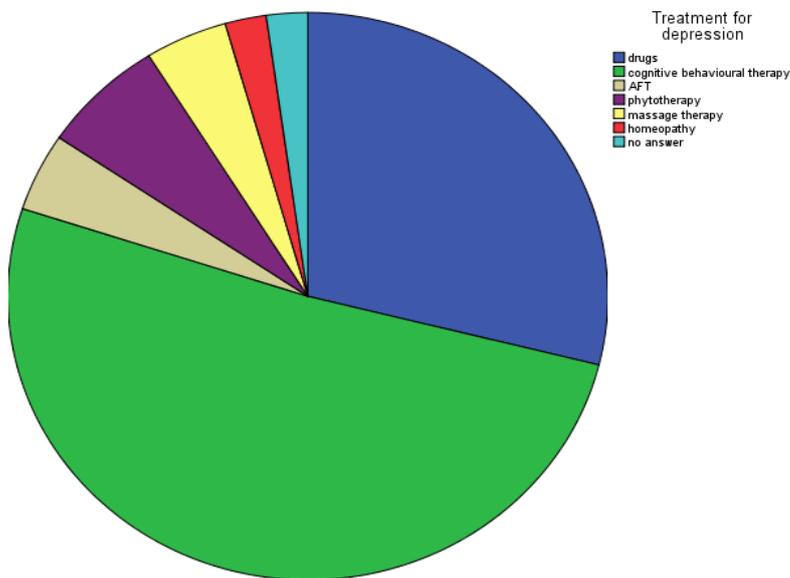


- | | Response |
|-------|----------|
| • Yes | 20% |
| • No | 80% |

A minority (20%) of physicians practiced CAM, particularly, homeopathy.

With regard to question 8 (Have you ever used a CAM treatment for yourself?), 40% of the sample had used a CAM treatment, particularly, homeopathy, acupuncture and osteopathy, because of the lower side-effects, the effectiveness of the treatment, and the holistic approach involved. All of them had some benefit and would use it again.

Fig.7.4.6. Pie chart of question 9. Which first-line treatment of choice would you prescribe for mild or moderate depression?



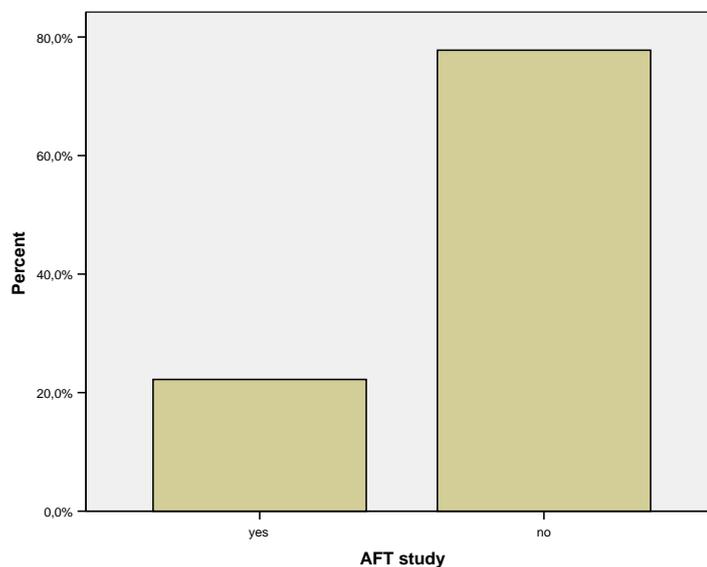
	Response
• Drugs	28.9%
• CBT (cognitive behavioural therapy)	51.1%
• AFT (animal facilitated therapy)	4.4%
• Herbalism	6.6%
• Acupressure, reflex-therapy and bodywork	4.4%
• Other	4.4%

Cognitive-behavioural therapy was the most popular first line treatment for mild or moderate depression, with 51.1% of preferences, while pharmacological treatment would

be prescribed by 28.9% of the physicians interviewed. Overall, 20% would prescribe a complementary therapy as a remedy for mild – moderate depression. Only 4.4% would prescribe animal facilitated therapy for mild or moderate depression.

With regard to question 10 (Would you consider AFT with dolphins a treatment for depression?), 48.9% of the sample would not consider animal facilitated therapy with dolphins as treatment for depression, because of the lack of scientific evidence, logistical difficulties, and related costs. One third (28.9%) would instead consider it, because of the related emotional impact and environmental factors involved, while 22.2% did not feel adequately informed to answer.

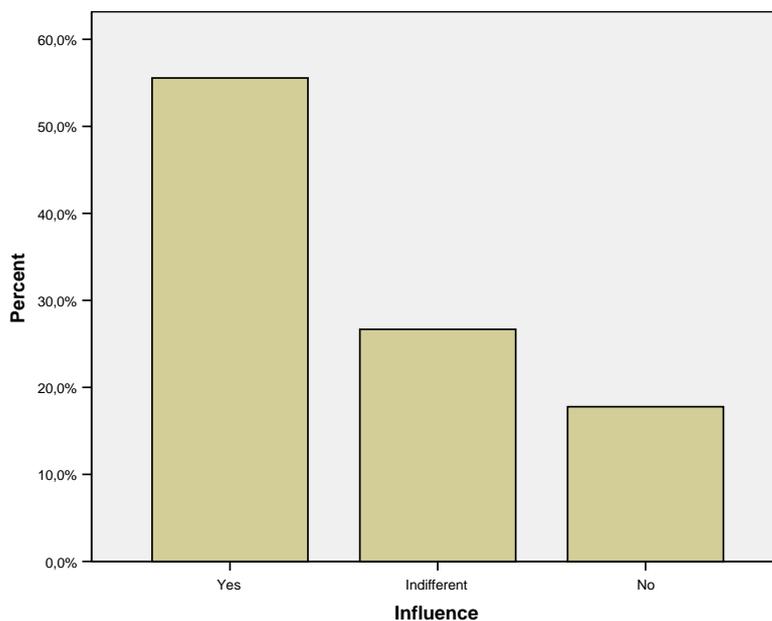
Fig.7.4.7. Bar chart of question 11. Have you heard about the study on AFT with dolphins published in the BMJ?



- | | Response |
|-------|----------|
| • Yes | 22.2% |
| • No | 77.8% |

The majority of the sample (77.8%), did not know about the study on animal facilitated therapy with dolphins. In Italy, the study was popularized less intensively, compared with other countries. The remaining 22.2% knew about the research through the newspapers, internet and television.

Fig.7.4.8. Bar chart of question 12. Have the results of this study made a difference to your opinion of AFT (Animal Facilitated Therapy)?



	Response
• Yes	55.6%
• Indifferent	26.7%
• No	17.7%

Over half (55.6%) of the general practitioners interviewed, were influenced by the results of the AFT research published in the BMJ. The study made a difference to their opinion of AFT because the prescription of antidepressants may not be necessary when using animal facilitated therapy in a natural setting. Only 17.7% affirmed the contrary.

Question 13 (Are you in favour of using AFT in clinical practice?) highlighted that the majority (68.9%) of the participating physicians, were in favour of applying animal facilitated therapy in clinical practice, because of the absence of side-effects, the effectiveness of the treatment, and the holistic approach involved. Only 4.4% were against its use in clinical practice, because of the limited scientific evidence.

With regard to question 14 of the questionnaire (In which cases would you consider AFT an intervention for adult depression?), 28.9% of the sample considered AFT as an alternative first line treatment for adult depression, while 51.1% only as a complementary treatment. A small percentage (6.7%) stated that they would never consider it.

Finally, question 15 (Would you prescribe AFT to your patients?) highlighted that 71.1% of the sample would prescribe AFT to their patients. In particular, 48.9% only with some species of animals, 20% with all species of animals, and 2.2% only with dolphins.

7.5. Discussion of the findings

Based on the above findings, it would seem that the general practitioners affiliated to the national health service of the city of Torino, Italy, had a positive attitude towards CAM. This positive view that the majority of general practitioners had on CAM may be explained by the ongoing increase of the public demand on complementary treatments (Antonioli and Cristina, 2007). Only a minority claimed that complementary and alternative treatments should never be utilized because of the lack of adequate scientific evidence. Despite the majority of physicians being in favour of the utilization of complementary and alternative medicine in clinical practice, they did not own a Diploma in CAM and seemed to have little knowledge of the topic. These findings are not surprising, as they are consistent with previous literature (Giannelli et al., 2007; Ozcakin et al., 2007; Hadley et al., 2008).

Animal facilitated therapy was not perceived as a first-line treatment for mild to moderate depression (question 9), nevertheless after reading the AFT study abstract, published in the BMJ, a higher percentage (28.9% versus 4.44%) of the sample considered AFT as an alternative first-line treatment for adult depression. Over half (55.6%) of the general practitioners interviewed, were influenced by the results of the AFT study. However, because of the small sample, these findings must be considered only as indicative of the health community of the city of Torino.

It can be concluded that the previous animal facilitated therapy research findings had a positive impact on practitioners' perceptions of this treatment, and influenced physicians' view of CAM. Moreover, the limited scientific evidence on the efficacy of alternative treatments represents an obstacle to the utilization of CAM, and particularly AFT. However, future research on public and health staff perceptions of CAM and AFT is needed, as this sample does not allow the generalization of the findings.

CHAPTER 8

CHAPTER 8

OVERARCHING DISCUSSION AND CONCLUSIONS

8.1. Discussion of integrated findings

The concept of biophilia, the human innate tendency to affiliate with nature and other living organisms, was examined, correlating and highlighting the potential restoring capacity of nature with the vitality of the human-animal bond, and the existing but limited research evidence. Animal facilitated therapy can be defined as a treatment involving the use of a pet or animal by a trained professional, as a tool to facilitate a healing process. Hence, it should be distinguished from pet ownership, and from animal assisted activities, where the animal simply assists and helps disabled people to cope with their deficit. Indeed, animals can have both positive and negative impact on some aspect of health, which involves the integration of psychological, physical, social, environmental and spiritual factors (Friedmann, 2000).

Among the types of interaction between people and animals, previously described (Fine, 2000), the model of intervention chosen for the animal facilitated therapy study was represented by the ecotherapy programs, which usually last for two or more weeks. In such circumstances, the interaction takes place in non urban settings, usually natural parks or in the wild. Animals such as dolphins are typical species for ecoprograms. Such a model was chosen because of the potentially greater emotional impact that it may exert on people (Kellert, 2005). It is self evident that most people with depression will not be able to swim with dolphins. The study does not, therefore, propose that animal facilitated therapy with dolphins will be a common therapy for people with depression. The purpose of the study

was to establish a framework, rather than develop a universal therapy with dolphins for everyone. More studies with other animals are needed. If similarly successful, AFT could be incorporated in the treatment of depression even in severe cases, eventually integrating the program with pharmacological treatment. It has been shown that the biophilia principle can be used to develop effective therapies and that their validation by randomized controlled trials is feasible.

Furthermore, one of the factors involved, is probably the echolocation system and the production of sounds which are specific to dolphins. Other pet-animals do not have the echolocation system and this is the fundamental difference, in association with water, thus the need to compare dolphins with other animals. More controlled trials of alternative and complementary therapies are also needed, as this relatively new field evolves.

Practitioners' perceptions of animal facilitated therapy as a treatment for depression and other psychiatric disorders were also evaluated. As AFT and other complementary treatments are still relatively new and often not widely integrated in health care provision, it was important to establish whether the interest from such research was sustained within the health community. In particular, the second study evaluated the impact of the AFT research on the Italian medical community, examining the practitioners' perceptions of complementary and alternative medicine (CAM), with a particular focus on animal facilitated therapy as treatment of depression.

Based on the findings, it would seem that the general practitioners affiliated to the national health service of the city of Torino, Italy, had a positive attitude towards CAM. The positive view that the majority of general practitioners had on CAM may be explained by the ongoing increase of the public demand on complementary treatments (Antonioli and Cristina, 2007). Only a minority claimed that complementary and alternative treatments

should never be utilized because of the lack of adequate scientific evidence. Despite the majority of physicians being in favour of the utilization of complementary and alternative medicine in clinical practice, they did not own a Diploma in CAM and seemed to have little knowledge of this topic. These findings are not surprising, but consistent with previous literature (Giannelli et al., 2007; Ozcakin et al., 2007; Hadley et al., 2008). However, because of the small sample, these findings must be considered only as indicative of the reality of the health community of the city of Torino, and the generalization of the findings is therefore not possible.

8.2. Conclusions

The biophilic method of intervention represents a new emphasis in mental health care and has the potential to add alternative clinical strategies to the treatment of depressive and other emotional disorders. The animal care program was effective in alleviating symptoms of depression after two weeks of treatment. It can thus be concluded that animal facilitated therapy with dolphins is an effective treatment for mild to moderate depression, and is based on a holistic approach, through interaction with animals in nature. Participants in both groups of the study (ACP and ONP) reported lasting symptom improvement.

For some patients with mild or moderate depressive symptoms, using medication or conventional psychotherapy may not be necessary when biophilic treatment with animals is used. The animal facilitated therapy research findings had a positive impact on practitioners' perceptions of this treatment, and influenced physicians' view of CAM. Moreover, the limited scientific evidence on the efficacy of alternative treatments represents an obstacle to the utilization of CAM, and particularly AFT. Further research, training opportunities and evidence-based services will be essential in increasing the availability and provision of CAM and AFT for a range of mental health conditions.

APPENDIX 1

ETHICAL APPROVAL, PATIENT INFORMATION AND CONSENT FORM

ETHICAL APPROVAL



**UNIVERSIDAD NACIONAL AUTONOMA DE
HONDURAS
FACULTAD DE CIENCIAS MEDICAS
UNIDAD DE INVESTIGACION CIENTIFICA
COMITÉ DE BIOETICA**



CONFIDENCIAL

CONSTANCIA

Por este medio El Comité de Bioética de la Unidad de Investigación Científica hace

CONSTAR que el proyecto de investigación:

**BIOFILIA: EL VALOR TERAPEUTICO DE LOS ANIMALES EN EL
TRATAMIENTO DE TRASTORNOS AFECTIVOS.**

Presentado por: Dr. Christian Antonioli, Profesor Michael Reveley

Fue sometido a un proceso de revisión, análisis, corrección y readecuación, concluyendo como dictámen final que dicho protocolo:

FUE APROBADO

Conforme a las normas éticas nacionales e internacionales vigentes, quedando pendiente de incluir en el protocolo del estudio lo siguiente:

- Criterios que se utilizarán para la selección y seguimiento del subgrupo de 4-5 pacientes mencionados.
- Consignar en el consentimiento informado el derecho de los pacientes de autorizar que los resultados del estudio se publicarán.

Para los fines que al interesado(a) convenga se le extiende la presente a los 21 días del mes de mayo del 2002


Dr. Denis Padget Moncada
Coordinador
Comité de Bioética UIC.


Dr. Iván Espinoza Salvadó
Secretario
Comité de Bioética UIC.

PATIENT INFORMATION FORM

Project title

Biophilia: The therapeutic value of animals in the treatment of depression.

Ethical approval

Ethical permission for the study has been obtained from the UNAH (Universidad Nacional Autonoma de Honduras)

Investigators Responsible for the Study

Dr. Christian Antonioli and Professor Michael Reveley.

University of Leicester (UK).

Division of Clinical Psychiatry

Neuropsychopharmacology Unit. Leicester General Hospital.

Gwendolen Road, Leicester LE5 4 PW UK.

Tel. +44 (0) 116 2257924

Principal Investigator

Dr. Christian Antonioli

You may contact Dr. Christian Antonioli or Professor Michael Reveley at the Division of Clinical Psychiatry, Neuropsychopharmacology Unit, LGH. Leicester LE5 4 PW UK. Tel. +44 (0) 116 2257924 or at the Roatan Institute for Marine Sciences. Roatan, Bay Islands, Honduras. Tel. (504) 4451327.

Research Advisers

Professor Stephen Kellert, Yale University, USA. Professor Costantino Balestra, Université Libre de Bruxelles, Belgium.

Subjects

Fifty patients with mild/moderate depression (ICD-10 criteria), aged between 18 and 65 (working age) will be the study subjects. Subjects currently receiving drug therapy or psychotherapy and with psychotic features, secondary depression, cyclothymia or bipolar disorders will be excluded.

Participants will be asked for a medical certification from their treating therapists, stating a diagnosis of mild or moderate depression without psychotic features. The treating therapist will also certify that none of the exclusion criteria are present and that antidepressant drugs or psychotherapy are not required. Patients will be assisted during their permanence at the Institute with professional and volunteering services, and a care team will be available in helping to solve any inconvenience that may arise. A first aid and infirmary with recompression chamber is also located at the Institute.

Clarification

This study is not intended to be a therapy in the treatment of affective disorders, but a verification of the efficacy that the animal-facilitated psychotherapy may have on subjects suffering of depression. To the best of our knowledge, no research have been done on the proposed topic.

1. What is the purpose of this study?

The purpose of this study is to investigate the therapeutic value of dolphins in the treatment of affective disorders, and particularly on mild/moderate depression, in the context of the biophilia hypothesis. The study will examine the psychological, physiological and biological changes derived from the therapeutic use of animals. The research will focus primarily on human-dolphin interactions, investigating its effectiveness in the treatment of mild/moderate depression. Can a dolphin encounter alleviate mild/moderate depressive

disorders? How much change, if any, is due to the natural setting (e.g. water) and how much is due to the animal?

If effective, this study will bring considerable benefits to clinical strategies related to emotional disorders.

2. What will be involved if I take part in the study?

This study will involve one visit to the Roatan Institute for Marine Sciences (Roatan, Bay Islands, Honduras) lasting two weeks. You will be asked to take part either to the ACP (Animal Care Programme) or the ONP (Outdoor Nature Programme). All the study subjects will be randomly allocated to the two programmes. In the ACP all trials will be conducted in the presence of dolphins and you will be asked to swim, play and take care of the animals. The ONP will be involving the same water activities as the ACP but in the absence of dolphins, in order to control for the influence of water and other non-specific environmental factors. In the ONP, patients will be explained about the marine ecosystem and the barrier coral reef (the second largest in the world after the great barrier coral reef of Australia). Each session will last approximately one hour per day. No invasive techniques will be employed. We will take a saliva sample from you (you will have just to spit in a tube) before and after the therapy, and immediately after the first trial, and we will examine your heart rate, blood pressure and respiratory rate before and after each trial. Finally, you will be asked a number of questions to evaluate your psychological state. We will record your answers and data, but we will not record your name. The data will be stored using a code.

3. Will information in the study be kept confidential?

You will not be identified in any documents relating to the study. The information in the study will be used for research purposes by the Division of Clinical Psychiatry. The patient

will not be identified by name in the study. Each patient will be given a code number, which will be used for all data collection and analysis purposes.

4. What are the risks of the study?

There are no risks or side-effects, other than accidental injury in the water.

5. What happens if I do not wish to participate in this study or wish to withdraw from the study?

If you do not wish to participate in this study or if you wish to withdraw from the study, you may wish to do so at any time without justifying your decision, and your future treatment will not be affected.

PATIENT CONSENT FORM

Biophilia: The therapeutic value of animals in the treatment of affective disorders

Principal Investigator Dr. Christian Antonioli

This form should be read in conjunction with the Patient Information Leaflet

I agree to take part in the above study as described in the Patient Information Leaflet.

I understand that I may withdraw from the study at any time without justifying my decision and without affecting my normal care and medical management.

I understand that members of the research team may wish to view relevant sections of my medical records, but that all the information will be treated as confidential.

I also understand that the researchers, the University nor the Roatan Institute for Marine Sciences will in any way be liable for any accidents, mishaps or other occurrences which may result from my actions or behaviour.

I have read the patient information leaflet on the above study and have had the opportunity to discuss the details withand ask any questions.

The nature and the purpose of the tests to be undertaken have been explained to me and I understand what will be required, if I take part in the study. I authorize the publication of the results of the study.

Signature of patient.....Date...

(Name in BLOCK LETTERS)

I confirm I have explained the nature of the trial, as detailed in the Patient Information leaflet, in terms, which in my judgment are suited to the understanding of the patient.

Signature of Investigator.....Date...

(Name in BLOCK LETTERS)

APPENDIX 2

AUTHORIZATION BY THE ITALIAN MINISTRY OF PUBLIC HEALTH

**AUTHORIZATION BY THE ITALIAN MINISTRY OF PUBLIC
HEALTH FOR THE TRANSPORTATION OF BIOLOGICAL
SAMPLES FROM HONDURAS TO ITALY**

MODULARIO
Sanità - 4

Mod. 4 U.G.P.

Li. **16 AGO. 2003** 20


Ministero della Salute
Ufficio Sanità Aerea Milano Malpensa

N.° 8442
Risposta al Foglio del
N.°

A Tursiops Society ONLUS
Corso Fiume, 10
10133 Torino
c.a. Sig.ra Soardo Silvana

Alla Direzione Dogana
Aeroporto Malpensa

OGGETTO:

Importazione di campioni di materiale biologico a scopo di ricerca
provenienti da Ospedale Tegucigalpa - Houndaras
e diretti a Tursiops Society ONLUS – Corso Fiume, 10 Torino
Referente: Sig. ra Soardo Silvana

Viste le assicurazioni contenute nell'allegata nota, pari protocollo
(parte integrante del provvedimento),

SI RILASCIA NULLA OSTA all'importazione,
dei campioni biologici di cui all'oggetto

per uso:
"ricerca (analisi biologiche per rilevamenti livelli immunoglobuline, beta-endorfine,
cortisolo)" .

Il presente documento, prot. **8442** del 16.08.2003, ha validità: fino al 31.12.2003.

Per l'intero periodo il materiale andrà in ogni caso utilizzato a norma di legge,
rispettando in particolare le modalità e i fini dichiarati.

IL DIRETTORE
Dirigente Medico di II fascia
Dott.ssa Anna Maria Maniezzi
Anna Maria Maniezzi

All. c.s.d.

ISTITUTO POLIGRAFICO E ZECCA DELLO STATO S.p.A. - IS

APPENDIX 3

**BECK DEPRESSION INVENTORY (BDI-IA), HAMILTON RATING
SCALE FOR DEPRESSION (Ham-D) AND ZUNG SELF RATING
ANXIETY SCALE (SAS)**

BDI

Subject n°: _____ Age: _____ Sex : _____

This questionnaire consists of 21 groups of statements. After reading each group of statements carefully circle the number (0, 1, 2 or 3) next to the one statement in each group which best describes the way you have been feeling the past week, including today. If several statements within a group seem to apply equally well, circle each one. Be sure to read all the statements in each group before making your choice.

1	0 I do not feel sad 1 I feel sad 2 I am sad all the time and I can't snap out of it 3 I am so sad or unhappy that I can't stand it	8	0 I don't feel I am any worse than anybody else 1 I am critical of myself for my weaknesses or mistakes 2 I blame myself all the time for my faults 3 I blame myself for everything bad that happens
2	0 I am not particularly discouraged about the future 1 I feel discouraged about the future 2 I feel I have nothing to look forward to 3 I feel that the future is hopeless and that thing cannot improve	9	0 I don't have any thoughts of killing myself 1 I have thoughts of killing myself, but I would not carry them out 2 I would like to kill myself 3 I would kill myself if I had the chance
3	0 I do not feel like a failure 1 I feel I have failed more than the average person 2 As I look back on my life, all I can see is a lot of failures 3 I feel I am a complete failure as a person	10	0 I don't cry any more than usual 1 I cry more now than I used to 2 I cry all the time now 3 I used to be able to cry, but now I can't cry even though I want to
4	0 I get as much satisfaction out of things as I used to 1 I don't enjoy things the way I used to 2 I don't get real satisfaction out of anything anymore 3 I am dissatisfied or bored with everything	11	0 I am no more irritated now than I ever am 1 I get annoyed or irritated more easily than I used to 2 I feel irritated all the time now 3 I don't get irritated at all by the things that used to irritate me
5	0 I don't feel particularly guilty 1 I feel guilty a good part of the time 2 I feel quite guilty most of the time 3 I feel guilty all of the time	12	0 I have not lost interest in other people 1 I am less interested in other people than I used to be 2 I have lost most of my interest in other people 3 I have lost all of my interest in other people
6	0 I don't feel I am being punished 1 I feel I may be punished 2 I expect to be punished 3 I feel I am being punished	13	0 I make decisions about as well as I ever could 1 I put off making decisions more than I used to 2 I have greater difficulty in making decisions than before 3 I can't make decisions at all anymore
7	0 I don't feel disappointed in myself 1 I am disappointed in myself 2 I am disgusted with myself 3 I hate myself	14	0 I don't feel I look any worse than I used to 1 I am worried that I am looking old or unattractive 2 I feel that there are permanent changes in my appearance that make me look unattractive 3 I believe that I look ugly

_____ Subtotal page 1

CONTINUE ON BACK

<p>15 0 I can work about as well as before 1 It takes an extra effort to get started at doing something 2 I have to push myself very hard to do anything 3 I can't do any work at all</p>	<p>19 0 I haven't lost much weight, if any, lately 1 I have lost more than 5 pounds 2 I have lost more than 10 pounds 3 I have lost more than 15 pounds</p>
<p>16 0 I can sleep as well as usual 1 I don't sleep as well as I used to 2 I wake up 1-2 hours earlier than usual and find it hard to get back to sleep 3 I wake up several hours earlier than I used to and cannot get back to sleep _____ INCREASED _____ DECREASED</p>	<p>I am purposely trying to lose weight by eating less. Yes _____ No _____ GAINED _____ POUNDS LOST _____ POUNDS</p>
<p>17 0 I don't get more tired than usual 1 I get tired more easily than I used to 2 I get tired from doing almost anything 3 I am too tired to do anything</p>	<p>20 0 I am no more worried about my health than usual 1 I am worried about physical problems such as aches and pains; or upset stomach; or constipation 2 I am very worried about physical problems and it's hard to think of much else 3 I am so worried about my physical problems that I cannot think about anything else</p>
<p>18 0 My appetite is no worse than usual 1 My appetite is not as good as it used to be 2 My appetite is much worse now 3 I have no appetite at all anymore</p>	<p>21 0 I have not noticed any recent change in my interest in sex 1 I am less interested in sex than I used to be 2 I am much less interested in sex now 3 I have lost interest in sex completely</p>

_____ INCREASED _____ DECREASED

_____ Subtotal Page 2

_____ Subtotal Page 1

_____ Total Score

HAMILTON PSYCHIATRIC RATING SCALE FOR DEPRESSION

Subject N.

ROW NO.	Mark each item on left half of scoring sheet on row specified Use marking positions 0-4, columns 1-5
1	1. DEPRESSED MOOD (<i>Sadness, hopeless, helpless, worthless</i>) 0 = Absent 1 = These feeling states indicated only on questioning 2 = These feeling states spontaneously reported verbally 3 = Communicates feeling states non-verbally – i.e., through facial expression, posture, voice, and tendency to weep 4 = Patient reports VIRTUALLY ONLY these feeling states in his spontaneous verbal and non-verbal communication
2	2. FEELINGS OF GUILT 0 = Absent 1 = Self reproach, feels has let people down 2 = Ideas of guilt or rumination over past errors or sinful deeds 3 = Present illness is a punishment. Delusions of guilt 4 = Hears accusatory or denunciatory voices and/or experiences threatening visual hallucinations
3	3. SUICIDE 0 = Absent 1 = Feels life is not worth living 2 = Wishes he were dead or any thoughts of possible death to self 3 = Suicide ideas or gesture 4 = Attempts at suicide (<i>any serious attempt rates 4</i>)
4	4. INSOMNIA EARLY 0 = No difficulty falling asleep 1 = Complains of occasional difficulty falling asleep – i.e., more than ½ hour 2 = Complains of nightly difficulty falling asleep
5	5. INSOMNIA MIDDLE 0 = No difficulty 1 = Patient complains of being restless and disturbed during the night 2 = Waking during the night – any getting out of bed rates 2 (<i>except for purposes of voiding</i>)
6	6. INSOMNIA LATE 0 = No difficulty 1 = Waking in early hours of the morning but goes back to sleep 2 = Unable to fall asleep again if he gets out of bed
7	7. WORK AND ACTIVITIES 0 = No difficulty 1 = Thoughts and feelings of incapacity, fatigue or weakness related to activities; work or hobbies 2 = Loss of interest in activity; hobbies or work – either directly reported by patient, or indirect in listlessness, indecision and vacillation (<i>feel he has to push self to work or activities</i>) 3 = Decrease in actual time spent in activities or decrease in productivity 4 = Stopped working because of present illness
8	8. RETARDATION (<i>Slowness of thought and speech; impaired ability to concentrate; decreased motor activity</i>) 0 = Normal speech and thought 1 = Slight retardation at interview 2 = Obvious retardation at interview 3 = Interview difficult 4 = Complete stupor
9	9. AGITATION 0 = None 1 = Fidgetiness 2 = Playing with hands, hair, etc. 3 = Moving about, can't sit still 4 = Hand wringing, nail biting, hair-pulling, biting of lips

ROW NO.	Continue marking on left half of scoring sheet on row specified
10	10. ANXIETY PSYCHIC 0 = No difficulty 1 = Subjective tension and irritability 2 = Worrying about minor matters 3 = Apprehensive attitude apparent in face or speech 4 = Fears expressed without questioning
11	11. ANXIETY SOMATIC 0 = Absent 1 = Mild 2 = Moderate 3 = Severe 4 = Incapacitating Physiological concomitants of anxiety, such as: Gastro-intestinal – <i>dry mouth, wind, indigestion, diarrhea, cramps, belching</i> Cardio-vascular – <i>palpitations, headaches</i> Respiratory – <i>hyperventilation, sighing</i> Urinary frequency Sweating
12	12. SOMATIC SYMPTOMS GASTROINTESTINAL 0 = None 1 = Loss of appetite but eating without staff encouragement. Heavy feelings in abdomen 2 = Difficulty eating without staff urging. Requests or requires laxatives or medication for bowels or medication for G.I. symptoms
13	13. SOMATIC SYMPTOMS GENERAL 0 = None 1 = Heaviness in limbs, back or head. Backaches, headache, muscle aches. Loss of energy and fatigability. 2 = Any clear-cut symptom rates 2
14	14. GENITAL SYMPTOMS 0 = Absent 1 = Mild 2 = Severe Symptoms such as: <i>Loss of libido, menstrual disturbances</i>
15	15. HYPOCHONDRIASIS 0 = Not present 1 = Self-absorption (bodily) 2 = Preoccupation with health 3 = Frequent complaints, requests for help, etc. 4 = Hypochondriacal delusions
16	16. LOSS OF WEIGHT <i>Rate either A or B</i> A. When Rating By History: 0 = No weight loss 1 = Probable weight loss associated with present illness 2 = Definite (according to patient) weight loss 3 = Not assessed
17	B. On Weekly Rating By Ward Psychiatrist, When Actual Weight Changes Are Measured: 0 = Less than 1 lb. Weight loss in week 1 = Greater than 1 lb. Weight loss in week 2 = Greater than 2 lb. Weight loss in week 3 = Not assessed
18	17. INSIGHT 0 = Acknowledges being depressed and ill 1 = Acknowledges illness but attributes cause to bad food, climate, overwork, virus, need for rest, etc. 2 = Denies being ill at all

Tot.

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

NATIONAL INSTITUTE OF MENTAL HEALTH

SAS

William W.K., Zung M.D.

INSTRUCTIONS: Listed below are 20 statements. Please read each one carefully and decide how much of the statement describes how you have been feeling during the past week. Decide whether the statement applies to you **NONE OR A LITTLE OF THE TIME, SOME OF THE TIME, A GOOD PART OF THE TIME, OR MOST OR ALL OF THE TIME.** Mark the appropriate column for each statement.

PLEASE USE A NO. 2 PENCIL. BE SURE TO MAKE MARKS HEAVY AND DARK. ERASE COMPLETELY ANY MARKS YOU WISH TO CHANGE.

SUBJECT N°

	None or a little of the time	Some of the time	A good part of the time	Most or ALL of the time
1. I feel more nervous and anxious than usual	1	2	3	4
2. I feel afraid for no reason at all	1	2	3	4
3. I get upset easily or feel panicky	1	2	3	4
4. I feel like I'm falling apart and going to pieces	1	2	3	4
5. I feel that everything is all right and nothing bad will happen	1	2	3	4
6. My arms and legs shake and tremble	1	2	3	4
7. I am bothered by headaches, neck and back pains	1	2	3	4
8. I feel weak and get tired easily	1	2	3	4
9. I feel calm and can sit still easily	1	2	3	4
10. I can feel my heart beating fast	1	2	3	4
11. I am bothered by dizzy spells	1	2	3	4
12. I have fainting spells or feel like it	1	2	3	4
13. I can breathe in and out easily	1	2	3	4
14. I get feelings of numbness and tingling in my fingers, toes	1	2	3	4
15. I am bothered by stomachaches or indigestion	1	2	3	4
16. I have to empty my bladder often	1	2	3	4
17. My hands are usually dry and warm	1	2	3	4
18. My face gets hot and blushes	1	2	3	4
19. I fall asleep easily and get a good night's rest	1	2	3	4
20. I have nightmares	1	2	3	4

APPENDIX 4

QUESTIONNAIRE ITEMS AND COVER LETTER

QUESTIONNAIRE ITEMS

Time estimated to complete the questionnaire: 7 minutes

PLEASE, TICK ONLY ONE BOX UNLESS SPECIFIED OTHERWISE

Personal information:

Sex

- Male
- Female

Number of years in practice

- < 5
- 5 to 10
- > 10

What is your ethnicity?

- White
- Black
- Other, please specify _____

1] Compared to conventional medicine , CAM (Complementary and alternative medicine) represent:

- Only a complement
- A complement or alternative depending on pathology
- They should never be used
- I don't know

2] Are you in favour about the use of CAM in clinical practice?

- In favour
- Depending on pathology and its severity
- Indifferent or skeptical
- Against

3] Do you have a Diploma in CAM?

- Yes
- I'm in training
- No
- ***If no, would you be interested in training?*** Yes No

4] Are you favourable to the teaching of CAM in the medical school?

- Yes
- No
- I don't know

5] CAM should be covered by the National Health Service:

- Yes
- Only some treatments
- No, they should be paid only by users
- ***If only some treatments, which one? (You can choose one or more answers)***
 - Acupuncture
 - Homeopathy
 - Herbalism
 - Body-work
 - Traditional Chinese Medicine
 - Ayurveda
 - AFT (animal facilitated therapy)
 - Other, please specify _____

6] Have you ever suggested a CAM treatment to your patient?

- Yes, often
- Yes, sometime
- Never

- *If yes, which one? (You can choose one or more answers)*
 - Acupuncture
 - Homeopathy
 - Herbalism
 - Body-work
 - Traditional Chinese Medicine
 - Ayurveda
 - AFT (animal facilitated therapy)
 - Other, please specify _____

• *If yes, why? (You can choose one or more answers)*

- Less side effects than drugs and conventional medicine
- Efficacy of treatment
- No or little results with conventional medicine
- Natural based treatment
- Cultural belief
- Holistic approach
- The only alternative for some pathology
- Other, please specify _____

• *If never, why? (You can choose one or more answers)*

- Lack of adequate scientific evidence
- Costs involved
- Lack of reliable recognised centers.
- Other, please, specify _____

7] Do you practice CAM?

• Yes

• No

• ***If yes, which one? (You can choose one or more answers)***

Acupuncture

Homeopathy

Herbalism

Body-work

Traditional Chinese Medicine

Ayurveda

AFT (animal facilitated therapy)

Other, please, specify _____

8] Have you ever used a CAM treatment for yourself?

• Yes

• No

• ***If yes, which one? Please, specify*** _____

• ***If yes, why? (You can choose one or more answers)***

- Less side effects than drugs and conventional medicine
- Efficacy of treatment
- No or little results with conventional medicine
- Curiosity
- Natural based treatment
- Cultural belief
- Holistic approach
- The only alternative for some pathology
- Other, please, specify_____

• ***If yes, did you have benefit?***

- Yes
- In part
- No

• ***If yes, would you use a CAM treatment again, in case of necessity?***

- Yes
- No

9] Which first-line treatment of choice would you prescribe for mild or moderate depression?

- Drugs
- CBT (cognitive behavioural therapy)
- AFT (animal facilitated therapy)
- Herbalism
- Acupressure, reflex-therapy and bodywork

10] Would you consider AFT with dolphins a treatment for depression?

- Yes
- Only with wild dolphins
- Only with semi-captive dolphins (kept in a natural setting, not in artificial tanks)
- No

• ***If yes, why? (You can choose one or more answers)***

- Emotional impact
- Environmental factors
- Sound produced by dolphins
- All of the above
- Other, please, specify_____

• ***If not, why? (You can choose one or more answers)***

- Logistic difficulties
- Costs involved
- Little scientific evidence
- All of the above
- Other, please, specify_____

11] Have you heard about the study on AFT with dolphins published in the BMJ?

- Yes
- No

• ***If yes, where? (You can choose one or more answers)***

- Television
- Magazine / Newspaper
- Radio
- Internet
- Other, please, specify_____

Here is reported the abstract of the study published in the BMJ 2005;331:1231-4

Objective To evaluate the effectiveness of animal facilitated therapy with dolphins, controlling for the influence of the natural setting, in the treatment of mild to moderate depression and in the context of the biophilia hypothesis.

Setting The study was carried out in Honduras, and recruitment took place in the United States and Honduras.

Design Single blind, randomised, controlled trial.

Participants Outpatients, recruited through announcements on the internet, radio, newspapers, and hospitals.

Results Of the 30 patients randomly assigned to the two groups of treatment, two dropped out of the treatment group after the first week and three withdrew their consent in the control group after they had been randomly allocated. For the participants who completed the study, the mean severity of the depressive symptoms was more reduced in the treatment group than in the control group (Hamilton rating scale for depression, $P=0.002$; Beck depression inventory, $P=0.006$). For the sample analysed by modified intention to treat and last observation carried forward, the mean differences for the Hamilton and Beck scores between the two groups was highly significant ($P=0.007$ and $P=0.012$, respectively).

Conclusions The therapy was effective in alleviating symptoms of depression after two weeks of treatment. Animal facilitated therapy with dolphins is an effective treatment for mild to moderate depression, which is based on a holistic approach, through interaction with animals in nature.

Although the study was with dolphins, could you answer the following questions in relation to other animals or pets:

12] Have the results from this study made a difference to your opinion of AFT (Animal facilitated therapy) ?

- Yes
- Indifferent
- No

- ***If yes, in what way? (You can choose one or more answers)***

- Prescription of antidepressants may not be necessary when using AFT
- Symptoms are alleviated in a shorter period of time
- AFT and the interaction with animals should occur in a natural setting
- All of the above
- Other, please, specify_____

13] Are you in favour about the use of AFT (animal facilitated therapy) in clinical practice?

- In favour
- Indifferent or skeptical
- Depending on pathology and its severity
- Against

- ***If in favour, why? (You can choose one or more answers)***

- Efficacy of the treatment
- Natural based treatment
- Holistic approach
- No side effects
- All of the above
- Other, please, specify_____

- ***If against, why? (You can choose one or more answers)***

- Little scientific evidence
- Logistic difficulties
- Costs involved
- All of the above
- Other, please, specify_____

14] In which cases would you consider AFT (Animal facilitated therapy) an intervention for adult depression?

- As an alternative first line treatment for mild or moderate depression
- Only as a complementary treatment
- Never

15] Would you prescribe AFT to your patients?

- With all species of animals
- Only if the animals utilised are dolphins
- Only with some species of animals
- Never

COVERING LETTER TO GENERAL PRACTITIONERS

Dear Dr _____,

The Study Center for Natural Medicine – University of Leicester, UK, in collaboration with the ASL 4 TO is undertaking a research study on CAM (Complementary and alternative medicine). Your opinion is of great importance. We would be very grateful to you indeed, if you could spend a bit of your time (7 minutes: time estimated to complete the questionnaire) to answer the questionnaire. If you return the questionnaire within a week, you will receive a free book on CAM. We thank you for your collaboration. Kindest Regards,

APPENDIX 5

PUBLICATIONS ARISING FROM THE WORK OF THIS THESIS

SCIENTIFIC PUBLICATIONS

Antonioli C., Reveley M. Randomised controlled trial of animal facilitated therapy with dolphins in the treatment of depression. *BMJ* 2005; 331(7527):1231.

Antonioli C., Reveley M. Letter: Human and animal health: strengthening the link. Reply to methodological concerns. *BMJ* 2005; 331:1407.

Antonioli C. Letter. Clarification. *BMJ* 2005; 331:1231.

Antonioli C., Cristina E. Medicine non convenzionali: Opinioni, uso e pratica dei medici di base della città di Torino. *Psichiatria / Informazione* 2010. In press.

BOOK

Antonioli C., Cristina E. Atti. Convegno Internazionale di Medicine Naturali sull'integrazione tra tecniche terapeutiche convenzionali e complementari. *Ufficio Stampa Regione Piemonte* 2007.

CONFERENCE PRESENTATIONS

Antonioli C. Biofilia. Ability techn help and pet therapy, Novembre 2004. Lingotto, Torino Italy.

Antonioli C. Biofilia e terapia facilitata con l'ausilio di animali. Convegno Internazionale di Medicine Naturali, Ottobre 2006. Barolo, Italy.

PUBLICATIONS IN THE MEDIA

For the full list, please visit the University of Leicester's website at:

<http://ebulletin.le.ac.uk/news/in-the-headlines/2000-2009/2005/11/nparticle-thy-pt4-7fd>

Publications in the media are reported in the next Appendix.

APPENDIX 6

FULL PAPER AND LETTERS PUBLISHED IN THE BMJ

Paper

Randomised controlled trial of animal facilitated therapy with dolphins in the treatment of depression

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Abstract

Objective To evaluate the effectiveness of animal facilitated therapy with dolphins, controlling for the influence of the natural setting, in the treatment of mild to moderate depression and in the context of the biophilia hypothesis.

Setting The study was carried out in Honduras, and recruitment took place in the United States and Honduras.

Design Single blind, randomised, controlled trial.

Participants Outpatients, recruited through announcements on the internet, radio, newspapers, and hospitals.

Results Of the 30 patients randomly assigned to the two groups of treatment, two dropped out of the treatment group after the first week and three withdrew their consent in the control group after they had been randomly allocated. For the participants who completed the study, the mean severity of the depressive symptoms was more reduced in the treatment group than in the control group (Hamilton rating scale for depression, $P = 0.002$; Beck depression inventory, $P = 0.006$). For the sample analysed by modified intention to treat and last observation carried forward, the mean differences for the Hamilton and Beck scores between the two groups was highly significant ($P = 0.007$ and $P = 0.012$, respectively).

Conclusions The therapy was effective in alleviating symptoms of depression after two weeks of treatment. Animal facilitated therapy with dolphins is an effective treatment for mild to moderate depression, which is based on a holistic approach, through interaction with animals in nature.

Introduction

Although public demand for alternative treatments in psychiatry—particularly animal facilitated therapy—has increased considerably in recent years, the lack of adequately controlled and designed research studies has led to considerable speculation. We studied the effectiveness of animal facilitated therapy with dolphins in treating mild to moderate depression and in the context of the biophilia hypothesis, controlling for the influence of the natural setting.

The term biophilia was first used by psychologist Erich Fromm to underline "the need for cultivating the capacity for love as a basis for our mental health and emotional wellbeing."¹⁻³ Kellert and Wilson further developed the concept of biophilia.^{1,2} Its expression shows how human health and wellbeing are strictly dependent on our relationships with the natural environment. In the biophilic vision, the manifestation of

emotions and the affiliation with the living diversity are an innate human tendency. Disrupting the affiliation with nature and thus losing the biophilic equilibrium means altering and damaging our psychophysical health.^{4,5}

Rates of depression seem to be higher in industrialised countries than in developing ones.^{6,7} Numerous researchers have presented evidence showing the therapeutic value of nature and animals for sick and disabled people.⁸⁻¹² The aetiology of affective disorders includes genetic, biochemical, psychological, sociological, and environmental factors.^{5,13-16} Among the several aspects of biophilia, we focused our study on the therapeutic benefit that the interaction with animals may have in treating mild to moderate depressive disorders. This aspect is an integral part of the concept of biophilia. We chose the bottlenose dolphin, *Tursiops truncatus*, was the species chosen for the animal facilitated therapy and mild to moderate depression (according to the diagnostic criteria for research from ICD-10—*International Classification Of Diseases*, 10th revision¹⁷) as the illness to be treated. We examined biopsychological changes derived from the therapeutic use of dolphins and the effectiveness of this treatment, controlling for the influence of the natural setting (for example, water) and other non-specific environmental factors.

Methods

We studied outpatients, recruited through announcements on the internet, radio, newspapers, and hospitals in the United States and Honduras between November 2002 and December 2003, who had a diagnosis of a mild or moderate depressive disorder according to ICD-10 criteria.¹⁷ To avoid social desirability bias in responses to assessment, we emphasised the fact that people were only taking part in a research study and told them not to expect any improvement. Eligibility criteria for the study included an age of 18-65 and a score of at least 11 on the modified, 17 item, Hamilton rating scale for depression¹⁸ at baseline, after a period of four weeks without taking drugs. On this scale, higher scores indicate more severe depression. Serious anxiety disorder was defined a priori as a score on Zung's self rating anxiety scale of 45 or more.¹⁹ Patients were required to discontinue taking any kind of antidepressant drugs or psychotherapy at least four weeks before entering the study. We excluded patients with psychotic features, major depressive disorders, cyclothymia, or bipolar disorders. Patients were not allowed to take antidepressant or anxiolytic drugs during the study.

Procedure

All patients provided written informed consent to participate. Field research work took place at the Roatan Institute for Marine Sciences (Roatan, Bay Islands, Honduras) between July 2002 and December 2003. After participants had read the information form we asked them for a medical certificate from their treating therapist that confirmed a diagnosis of mild or moderate depression without psychotic features. Once participants had been selected by the panel of psychiatrists and clinical psychologists, and on their arrival at the institute, they were asked to sign the patients' consent form. A psychological and medical examination was then done, and participants received an induction to the institute facilities and the island. Experienced clinical raters who were blinded to treatment assignments, to the hypothesis under testing, and to the fact that block randomisation was being used administered the Hamilton rating scale for depression at baseline and at the end of the treatment.

We followed this protocol during the entire research period. We used block randomisation to assign participants randomly to one of two groups of treatment.²⁰ A research assistant used a random number table to generate the block allocation sequence. The block lengths were 2, 4, 6 and varied randomly. The allocation sequence was concealed until treatments were assigned. We kept the randomisation sequence hidden from the investigators giving the treatments by using a set of opaque numbered sealed envelopes, each containing

the allocation for one patient. The appropriate envelope then went to an external medical officer. In the experimental group, all subjects were assigned to an animal care programme, and all trials were conducted in the presence of dolphins. Participants were asked to play, swim, and take care of the animals. They had an introductory session, to explain about dolphin behaviour and water safety. The first part of the trial, which took half an hour, was structured so the participants could familiarise themselves with the animals. Participants were standing in the water, close to the trainer. The dolphins, following the trainer's signals, performed trained behaviours (such as a jump or a swim). Participants were able to touch the dolphins when close to the trainer. The second part of the trial, another half an hour, was unstructured, and free and spontaneous interactions occurred. Participants were snorkelling in the water with the dolphins. In the control group, participants were assigned to an outdoor nature programme featuring the same water activities as the animal care programme but in the absence of dolphins, to control for the influence of water and other, non-specific, environmental factors. In the outdoor nature programme, participants had to swim and snorkel in the barrier coral reef for one hour a day and had a similar degree of individualised human contact as in the animal care programme. Patients were informed of the marine ecosystem, the barrier coral reef (the second largest in the world after the great barrier reef of Australia), and water safety.

Each session took about one hour a day. To avoid disappointment for the participants in the control group, which might have affected the results of the study, they also had a day session with the dolphins at the end of the treatment and after the final evaluation. Both programmes were run simultaneously and lasted for a period of two weeks for each group. The treatments were given daily, Monday to Friday, one hour per day.

Assessment

Behavioural and psychological measures were conducted at baseline and at the end of treatment by using a modified, 17 item, Hamilton rating scale for depression,¹⁸ the Beck depression inventory,^{21,22} and the Zung self rating anxiety scale.¹⁹ In the modified Hamilton scale, we did not consider the last four original items because they describe aspects of the illness rather than its severity (such as diurnal variation). We defined a clinically important improvement a priori as a Hamilton score of no more than 7 at the end of treatment, and a satisfactory therapeutic response as a reduction in the Hamilton score by at least 50% from baseline to the end of treatment.

Our hypothesis was that a clinically important improvement of the depressive symptoms of the patients would be 80% in the animal care programme and 30% in the control group. On the basis of 0.8 power to detect a significant difference ($P = 0.05$; two sided), we needed 30 patients in total. To compensate for patients whom we could not evaluate, we planned to enrol 50 patients in total.

Statistical analysis

We used SPSS, version 11 (SPSS, Chicago, IL, USA) for our statistical analysis. We conducted preliminary *t* tests for equality of means for two independent groups of observations for the Hamilton, Beck, and Zung's scores, to evaluate the significance of the changes in the scores from baseline to the end of treatment. The primary analysis was a modified analysis by intention to treat and last observation carried forward.

Results

Altogether 105 patients responded to the invitations for the study. We included 50 patients but then excluded 20 of these for non-compliance or other reasons (for example, they could not reach the island); 55 patients did not meet the selection criteria. A total of 30 patients underwent block randomisation: 15 were assigned to the

experimental group to take part in the animal care programme, and 15 to the control group, to take part in the outdoor nature programme ([table 1](#)). In the control group, three participants withdrew their consent before the treatment started, and in the experimental group, two participants dropped out after the first week of treatment.

Table 1 Baseline characteristics of the randomised patients. Values are numbers (percentages) of patients unless otherwise indicated

Characteristic	Animal care programme (n=15)	Outdoor nature programme (n=15)	All participants (n=30)
Female sex	14 (93)	13 (87)	27 (90)
White	12 (80)	10 (67)	22 (73)
Mean age in years (SD)	41.0 (12.5)	39.5 (10.8)	40.2 (11.5)
Marital status:			
Married or cohabiting	3 (20)	4 (27)	7 (23)
Single	8 (53)	8 (53)	16 (53)
Divorced or separated	4 (26)	3 (20)	7 (23)
Depression diagnosis:			
Mild depression	6 (40)	7 (47)	13 (43)
Moderate depression	9 (60)	8 (53)	17 (57)
Anxiety symptoms	5 (33)	7 (47)	12 (40)
Prior treatment for depression:			
None	6 (40)	5 (33)	11 (37)
Psychotherapy	2 (13)	2 (13)	4 (13)
Antidepressants	4 (26)	6 (40)	10 (33)
Antidepressants and psychotherapy	3 (20)	2 (13)	5 (17)

The difference between the groups did not reach significance.

Treatment and efficacy

The preliminary two tailed *t* test for equality of means for two independent groups of observations for the Hamilton and Beck scores from baseline to the end of treatment was highly significant in the patients who completed treatment (animal care programme, *n* = 13; outdoor nature programme, *n* = 12). For the Hamilton scale (95% confidence interval 1.66% to 6.11%, *P* = 0.002; equal variances not assumed), the mean differences in change scores for the animal care programme and the outdoor nature programme were 8.38 (SD 1.98) and 4.50 (SD 3.15), respectively. For the Beck depression inventory-IA (2.43% to 13.3%, *P* = 0.006; equal variances assumed), the mean differences in scores between the programmes were 15.46 (SD 5.69) and 7.58 (SD 7.42), respectively. Therefore the animal care programme had a significantly higher effect in decreasing the depressive symptoms of the subjects than the outdoor nature programme.

For the modified analysis by intention to treat and last observation carried forward, the two tailed *t* test for equality of means for two independent groups of observations confirmed the significant differences for the Hamilton and Beck scores ([table 2](#)). The animal care programme group improved significantly more than the outdoor nature programme group for both scales.

The proportion who fell below the cut-off point on the Hamilton scale (participants who completed the study and received a score no higher than 7 on this scale) was 77% for the animal care programme and 25% for the outdoor nature programme. For the sample analysed by modified intention to treat and last observation carried forward, the proportions were 67% and 20%, respectively.

Although the mean anxiety scores in both treatment groups fell, the *t* test for the Zung scores did not reach significance (95% confidence interval -0.65% to 9.24%, *P* = 0.086; equal variance assumed). The mean difference in change scores for the animal care programme was 11.46 (SD 6.32) and for the outdoor nature programme 7.17 (SD 5.57). The animal care programme did not have a significantly greater effect in reducing the anxiety symptoms of the subjects than the outdoor nature programme. However, only 40% of the sample had a clinically important anxiety score before the treatment (Zung score > 45). In other words, only 40% of the sample under study had mild or moderate depression with anxiety symptoms before the treatment. For the modified analysis by intention to treat and last observation carried forward, the *t* test for equality of means for two independent groups of observations for the Zung scores did not reach significance ([table 2](#)).

Table 2 Mean of the difference in scores from baseline to end of study and mean scores at baseline and week 2 on the Hamilton rating scale for depression, Beck depression inventory, and Zung's self rating anxiety scale in the modified intention to treat sample*.

Variable	P value (95% CI) [†]	No of participants	Mean difference in change scores (SD)	95% CI [‡]	Mean score at baseline (SD)	Mean score at week 2 (SD)
Hamilton rating scale for depression						
Treatment group	0.007 (1.112 to 6.221)	15	7.27 (3.47)	5.46 to 9.07	14.53 (2.59)	7.27 (2.52)
Control group		15	3.60 (3.36)	1.79 to 5.41	14.47 (2.20)	10.87 (3.38)
Beck depression inventory						
Treatment group	0.012 (1.774 to 12.89)	15	13.40 (7.58)	9.47 to 17.33	20.27 (6.65)	6.87 (5.60)
Control group		15	6.07 (7.28)	2.14 to 10.00	18.80 (6.91)	12.73 (7.64)
Zung self rating anxiety scale						
Treatment group	0.102 (NS) (0.861 to 8.994)	15	9.80 (7.32)	6.32 to 13.28	42.87 (8.37)	33.07 (6.01)
Control group		15	5.73 (5.76)	2.25 to 9.22	43.20 (7.62)	37.47 (9.18)

* Scores represent the amount of reduction from baseline to end of treatment. Higher scores on the scales, indicate more severe depression or anxiety.

[†] t test for independent groups of observations, comparing mean difference in change scores for treatment group and control group. The 95% confidence interval refers to the mean difference in change scores; equal variance assumed.

[‡] Confidence interval for mean difference in change scores between baseline and week 2.

Discussion

Animal facilitated therapy with dolphins is more effective than "water" therapy in treating people with mild to moderate depression after the influence of the natural setting has been controlled for, as shown by our randomised, single blind, controlled trial. The animal care programme improved the depressive symptoms of the participants significantly more than the outdoor nature programme. The natural setting itself is also an important factor that has to be considered in the treatment of emotional disorders. This is confirmed by other studies.^{8 23 24} The effects exerted by the animals were significantly greater than those of just the natural setting. The echolocation system, the aesthetic value, and the emotions raised by the interaction with dolphins may explain the mammals' healing properties. Further research to explore the influence of sounds and the echolocation system is needed.

Depressive symptoms improved after two weeks of treatment. In conventional therapy—psychotherapy or drug therapy—symptoms usually improve substantially after four weeks. No side effects were noted, although accidental injuries may occur. Although water phobia and inability to swim represent limitations of the treatment, the presence of dolphins may help to overcome such limitations, functioning as a distractive element. The difference in reduction of anxiety symptoms between the animal care programme and the outdoor nature programme did not reach significance; however, only 40% of the sample under study had clinically important anxiety symptoms before the treatment. The overall reduction in the anxiety symptoms in both treatment groups may be explained by the therapeutic property of water in relieving anxiety, as shown in other studies.²⁴

Limitations

A limitation of our study that is common to all studies of psychotherapy was our inability to blind participants to the treatment; knowledge of the intervention may therefore have influenced their reactions. Another limitation was posed by the restrictive exclusion criteria, which may reduce the generalisability of the findings. To avoid social desirability bias in responses to assessment, we emphasised to the patients the fact that they were only taking part in a research study and told them not to expect any improvement. To prevent disappointment in the participants in the control group—which might have affected the results of the study—they also had a day session with the dolphins after the final evaluation. Participants in the control group were therefore not excluded from an encounter with dolphins. Because of logistical and financial limitations, we did not do a follow-up study; however, three months or more after the intervention, the 10 participants in the animal care programme and the three participants in the outdoor nature programme who had a score of no more than 7 on the Hamilton rating scale for depression at the end of treatment (clinically important improvement) provided a self report about their mental health status. Nine of the 10 participants in the animal care programme and all three of the outdoor nature programme reported lasting improvement and did not require treatment.

What is already known on this topic

Animal facilitated therapy may help improve psychological disorders

What this study adds

The biophilic method of intervention, which is based on a holistic approach through the interaction with animals in nature, and the stimulation of the nervous system through the senses, has the potential to bring alternative clinical strategies to the treatment of emotional disorders

Participants in both groups of the study (the animal care group and the outdoor nature group) reported lasting improvement of their symptoms

In patients with mild or moderate depression, using drugs or conventional psychotherapy may not be necessary when biophilic treatment with animals is used

Conclusions

The biophilic method of intervention represents a new emphasis in psychiatry and has the potential to bring alternative clinical strategies to the treatment of emotional disorders. Psychiatric rehabilitation occurs operating on the emotional, holistic, and psychophysical aspects of participants through the interaction with animals in nature and the stimulation of the nervous system through the senses. Our psychophysical health is strictly dependent on the environment, hence the importance to protect and conserve it.

We are thankful for the support given by the Tursiops Society Onlus and the advice and support given by Andrew Weil and Brian Becker of the University of Arizona, USA; Stephen Kellert of Yale University, USA; and Costantino Balestra of the Université Libre de Bruxelles, Belgium. We thank Yvonne Hartgers, Arnoldo Javier Montoya Stone, Aida Lagos, Hector Murcia Pinto for medical, psychological diagnosis and assistance; the research participants, the Psychiatric Hospital of Tegucigalpa and Roatan Hospital. We also thank the following for logistical support: Honduras Institute of Tourism; Universidad Nacional Autonoma de Honduras; Regione Piemonte, Italy; Anthony's Key Resort; IGV Club; TGI Diving; International Dolphin Watch; Voice Magazine Bay Islands; G **Antonioli** Clothing, Turin, Italy.

Contributors: CA participated in the design of the study, carried out the trial, and wrote the paper. MR led the design of the study, supervised the data analysis, and cowrote the paper. Both authors are joint guarantors.

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Competing interests: None declared.

Ethical approval: Bioethical committee of the scientific research unit of the Universidad Nacional Autonoma de Honduras, Faculty of Medical Sciences.

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(Accepted 27 June 2005)

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Biju Basil and Maju Mathews

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Letter

Human and animal health: strengthening the link

Methodological concerns about animal facilitated therapy with dolphins

Editor—We have the following concerns with **Antonioli** and Reveley's study of animal facilitated depression with dolphins in the treatment of depression.¹

The study was small (30 patients), only 13 people from the animal care programme and 12 from the outdoor nature programme completing the study. The authors used a conservative measure to estimate the number of patients required for this study, and even then fell short by 17%.

Single women predominated in both arms.

It is difficult to fathom how clinical raters can be blinded to the treatment hypothesis.

The authors did not mention the ethnic group of the participants.

Only people who could go to Honduras were able to take part in this study. Most people with mild depression will not be able to take a three week holiday.

The findings are not generalisable as most people would not be able to afford to go to such a location and swimming and snorkeling are not necessarily favourite pastimes.

There may be a vacation bias. If the study group sponsored the three week trip to Honduras we suspect that a free three week trip to a seaside location in Latin America would in itself be a powerful antidepressant.

There may be a disappointment bias. If the control group were aware of the potential to be in a group where they could interact with dolphins for two weeks before they reached Honduras, they could be disappointed in missing out. People with depression perceive disappointment more intensely.

The study could have been done in a more natural and plausible setting with common pets such as dogs or cats for a fraction of the cost.

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Drexel University College of Medicine, Philadelphia, PA 19124 USA

Competing interests: None declared.

Letter

Human and animal health: strengthening the link

Authors' reply to methodological concerns

Editor—Depression is an important health problem worldwide. The lifetime prevalence of depressive disorders is 15%, and the cost in morbidity and economics is substantial. Despite limitations of current treatments, and the extent of the problem, there has heretofore been no serious attempt to validate an alternative treatment with anecdotal evidence of efficacy in some mental disorders and disabilities.

The aim of our study was to begin to establish an evidence base for animal assisted therapy in depression. We used the gold standard of the randomised controlled trial. It was necessarily single blind, as is the case in most, if not all, trials of a psychotherapy in which fully informed consent is obtained. To our knowledge, it is the only randomised controlled trial of animal assisted therapy with any animal using strictly defined diagnostic criteria and rigorous inclusion and exclusion criteria to be published in a refereed journal. We showed that such studies can be done, enabling further randomised trials with other animals to establish evidence based efficacy not only for depression but also for other psychiatric illnesses and disabilities.

We used an intent to treat, last observation carried forward, analysis, which means that all 30 subjects who were randomised to enter the study, including those who dropped out, were included in the analysis. This provides a conservative measure, making it more difficult to show an effect. The results were highly significant statistically, reflecting the large differences in improvement between the groups and the small variance, despite the modest sample size.

Women outnumber men two to one in the prevalence of depression, and being unmarried without a close, confiding relationship is a risk factor for depression. This may explain the preponderance of unmarried women in the sample. We believe men would be as responsive as women to the therapy, but it may be that those without close human relationships would be more responsive. This is an issue for further research.

It is self evident that most people with depression will not be able to swim with dolphins. The purpose of the study was to establish a principle, not to develop a universal therapy with dolphins for everyone.

Participants paid for their own travel expenses and food. The study was supported by the voluntary contributions of those acknowledged and not by an external grant awarding body. It is true that going to a pleasant location, away from the stress of one's usual environment, would be expected to improve mood and reduce anxiety, even in depressed people. That is precisely why we had a control group with the same non-specific experiences as the experimental group.

We think that disappointment bias was not a significant factor as the control group swam with dolphins after the study ended. The control group also improved slightly during the study, reflecting the placebo effect of the pleasant location. The controls did not become more depressed, as might be expected if depressed people had perceived disappointment more intensely.

We fully discussed the limitations of the study in the paper. We do not propose that dolphin assisted therapy will be a common therapy for most people. More studies with other animals are needed. We showed that the

biophilia principle can be used to devise effective therapies and that their validation by randomised controlled trials is feasible. In the era of evidence based medicine more controlled trials of alternative therapies are needed. We hope our study will inspire others to develop and validate new therapies for the millions of people world wide who suffer from depression.

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Competing interests: None declared.

Letter

Clarification

1 December 2005



Christian Antonioli,
President
Tursiops Society Onlus

Dear Editor,

Send response to
journal:
[Re: Clarification](#)

It appears, from the responses we read, a misunderstanding of our work. In 1995 Roger Montenegro wrote: "Mankind is now at a turning point. The continuous damage of the ecosystems on which we depend to survive in our planet has led us to the urgency of planning some sort of joint action to achieve better conditions of living for everybody. The preservation and improvement of the ecosystems is closely bound to the improvement of quality of life and health.[...]." In 1995 the Executive Committee of the World Psychiatric Association accepted Roger Montenegro's request of founding the WPA Section "Ecology, Psychiatry and Mental Health". We are not trying to advocate the utilization of dolphins versus other animals, but simply to put in evidence the biophilic method of intervention, which is based on a holistic approach, through interaction with animals in nature and the stimulation of the nervous systems through the senses. This, represents a new emphasis in psychiatry and has the potential to bring alternative clinical strategies to the treatment of emotional disorders. We encourage further research in the field of integrative medicine.

Competing interests: None declared

APPENDIX 7

LIST OF THE MEDIA THAT REPORTED THE BIOPHILIA STUDY

LIST OF THE MEDIA

30 November 2005

[WebMD - Swim With Dolphins, Cut Depression](#) - a PhD candidate in psychiatry at England's University of Leicester Medical School. The findings appear in the British Medical Journal. Depression and Dolphins The study included 30 people with mild to moderate depression. They spent two weeks at the Roatan Institute for Marine Sciences in Honduras. The researchers assigned one group of patients

[cooltech.iafrica.com - Swimming with dolphins lifts depression](#) - Antonioli and Michael Reveley at Britain's University of Leicester, recruited 30 people in the United States and Honduras who had been diagnosed with mild or moderate depression. The severity of their symptoms was calculated according to established yardsticks for mental health, the Hamilton and Beck scales, which are based on interviews and

29 November 2005

[Cape Times - Swim with dolphins, feed your soul](#) - with other humans. Psychiatrists from the University of Leicester compared two groups of patients with depression, half of whom swam and snorkelled with dolphins while the other half spent the same time snorkelling with each other on a coral reef in the absence of the dolphins.

[Earth Times - Swimming with Dolphins cures mild to moderate depression](#) - Researchers from the University of Leicester in the UK have found that swimming with dolphins can be a potentially relaxing exercise and can cure mild to moderate depression. These findings are evidence that the biophilia theory could hold some water. The theory states that the health and well-being of humankind is in some way

[DNC: Health News - Dolphins May Provide Best Antidote to Depression](#) - Researcher Professor Michael Reveley, of the University of Leicester Medical School, said the trial was the first of its kind. "It has the potential to bring alternative clinical strategies to the treatment of emotional disorders," he added. "Psychiatric rehabilitation occurs through the interaction with animals in nature and the stimulation of

28 November 2005

***** Clip 1 Summary *****

KGBT 4 - TV Harlingen, TX: A Dolphin at Play Keeps the Blues Away Source:
KBGT 4 (TX): KGBT 4 (TX) Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<<
Medical School, noted that the study supports the theory of biophilia, which
contends that human health and well-being is dependent on the human connection
with the natural world. More information The U.S. National Institute of Mental
Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174135333-481266840> URL at source site: <http://www.team4news.com/Global/story.asp?S=4165060&nav=6uz2>

***** Clip 2 Summary *****

health.iafrica.com | health features Swimming with dolphins lifts depression
Source: iafrica.com

Antonioli and Michael Reveley at Britain's >>>University of Leicester<<<, recruited
30 people in the United States and Honduras who had been diagnosed with mild
or moderate depression. The severity of their symptoms was calculated according
to established yardsticks for mental health, the Hamilton and Beck scales, which
are based on interviews and

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174136914-481272835> URL at source site: <http://health.iafrica.com/features/616144.htm>

Audience: 7,000 Visitors/day

***** Clip 3 Summary *****

WVLT VOLUNTEER TV Knoxville, TN: A Dolphin at Play Keeps the Blues Away
Source: WVLT Volunteer TV Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174137366-481274136> URL at source site: <http://www.volunteertv.com/Global/story.asp?S=4165060&nav=4QcP>

Audience: 1,000 Visitors/day

***** Clip 4 Summary *****

A Dolphin at Play Keeps the Blues Away Source: WEHT News25.US Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174137504-481274443> URL at source site: <http://www.abc25.com/Global/story.asp?S=4165060&nav=Fadr>

***** Clip 5 Summary *****

***** Clip 6 Summary *****

Swimming with dolphins can alleviate depression, University of Leicester Source: Medical News Today: News Service: Web Pubs

of depression BMJ Volume 331, pp 1231-4 >>>University of Leicester<<< Medical School >>>Leicester<<< General Hospital >>>Leicester<<< UK

<http://www.>>>leicester<<<.ac.uk> Click here to view full paper in THE BRITISH MEDICAL JOURNAL - View the latest Depression News. - View all the latest Medical News Headlines. - Get the latest medical news in your email every week with

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174140408-481288044> URL at source site: <http://www.medicalnewstoday.com/medicalnews.php?newsid=34149>

***** Clip 7 Summary *****

WAVY.COM - A Dolphin at Play Keeps the Blues Away Source: WAVY News 10
Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174142098-481294174> URL at source site: <http://www.wavy.com/Global/story.asp?S=4165060&nav=23il>

***** Clip 8 Summary *****

A Dolphin at Play Keeps the Blues Away Source: WLUC TV 6 Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174143003-481297593> URL at source site: <http://www.wluctv6.com/Global/story.asp?S=4165060&nav=81Ac>

***** Clip 9 Summary *****

FOX Carolina The Ten O'Clock News A Dolphin at Play Keeps the Blues Away
Source: Fox Carolina - WHNS: News Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection

with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174145009-481302501> URL at source site: <http://www.fox21.com/Global/story.asp?S=4165060&nav=GMg5>

***** Clip 10 Summary *****

FOX5 Las Vegas - KVVU FOX5 - A Dolphin at Play Keeps the Blues Away
Source: FOX 5 KVVU-TV Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174152641-481326686> URL at source site: <http://www.kvvutv.com/Global/story.asp?S=4165060&nav=7CPT>

***** Clip 11 Summary *****

KAIT - Jonesboro, AR: A Dolphin at Play Keeps the Blues Away Source: KAIT 8
Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174152674-481326786> URL at source site: <http://www.kait8.com/Global/story.asp?S=4165060>

***** Clip 12 Summary *****

KTRE-TV - Lufkin/Nacogdoches, TX - A Dolphin at Play Keeps the Blues Away
Source: KTRE (TX) Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174154446-481333300> URL at source site: <http://www.ktre.com/Global/story.asp?S=4165060&nav=2FH9>

***** Clip 13 Summary *****

Eyewitness News - A Dolphin at Play Keeps the Blues Away Source: WPRI Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174157127-481341898> URL at source site: <http://www.eyewitnessnewstv.com/Global/story.asp?S=4165060>

***** Clip 14 Summary *****

14 WFIE, The Tri-State's News Leader: A Dolphin at Play Keeps the Blues Away Source: WFIE Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174157231-481342069> URL at source site: <http://www.14wfie.com/Global/story.asp?S=4165060>

***** Clip 15 Summary *****

A Dolphin at Play Keeps the Blues Away Source: WKRN-TV Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174158788-481348688> URL at source site: <http://www.wkrn.com/Global/story.asp?S=4165060&nav=2CSG>

***** Clip 16 Summary *****

United Press International - NewsTrack - Swimming with dolphins helps in depression Source: United Press International Service: Web Pubs

The study, by researchers of at the >>>University of Leicester<<<, involved 30 patients diagnosed with mild or moderate depression -- half were assigned to the experimental group and half to the control group. Over a two-week period, participants in the experimental group swam and snorkeled in the water with dolphins for one hour a day. Participants in

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174160810-481356385> URL at source site: <http://www.upi.com/ConsumerHealthDaily/view.php?StoryID=20051125-105510-3357r>

Audience: 26,000 Visitors/day

***** Clip 17 Summary *****

WISV.com Columbia, SC: A Dolphin at Play Keeps the Blues Away Source: WIS 10 Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174161235-481358437> URL at source site: <http://www.wistv.com/Global/story.asp?S=4165060>

***** Clip 18 Summary *****

iWon - Health Source: iWon.com Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression.

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174162736-481363705> URL at source site: <http://health.iwon.com/article/id/529320.html>

Audience: 4,431,000 Visitors/day

***** Clip 19 Summary *****

News Story - InfoSpace Broadband Portal Source: InfoSpace Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression.

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174164701-481373065> URL at source site: http://kevxml2a.infospace.com/_1_ZRYTN203BE8EO6__infobb.mypro/health/hlt-story.htm&qid=529320&qt=9

Audience: 36,000 Visitors/day

***** Clip 20 Summary *****

KRISTV.COM - Corpus Christi, TX - A Dolphin at Play Keeps the Blues Away
Source: KRIS (TX) Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174164977-481373676> URL at source site: <http://www.kristv.com/Global/story.asp?S=4165060&nav=Bsmk>

***** Clip 21 Summary *****

A Dolphin at Play Keeps the Blues Away Source: WHBF Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174167175-481382505> URL at source site: <http://www.whbf.com/Global/story.asp?S=4165060>

***** Clip 22 Summary *****

***** Clip 23 Summary *****

***** Clip 24 Summary *****

WANE-TV Coverage You Can Count On: A Dolphin at Play Keeps the Blues Away Source: WANE News15 Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174172471-481404328> URL at source site: <http://www.wane.com/Global/story.asp?S=4165060&nav=0RYe>

***** Clip 25 Summary *****

WLOX-TV - The News for South Mississippi: A Dolphin at Play Keeps the Blues Away Source: WLOX 13 Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174175490-481417640> URL at source site: <http://www.wlox.com/Global/story.asp?S=4165060>

***** Clip 26 Summary *****

WKYT 27 NEWSFIRST & WYMT Mountain News - A Dolphin at Play Keeps the Blues Away Source: WKYT 27 Newsfirst (KY) Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174178290-481430023> URL at source site: <http://www.wkyt.com/Global/story.asp?S=4165060&nav=NebM>

***** Clip 27 Summary *****

Excite - Health Source: Excite (US) Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection

with the natural world. More information The U.S. National Institute of Mental Health has more about depression.

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174180200-481437888> URL at source site: <http://health.excite.com/article/id/529320.html>

Audience: 3,000 Visitors/day

***** Clip 28 Summary *****

Gives new meaning to swimming with the fish Source: Red State Moron: (Blogs) Service: Web Pubs

The research, partly carried out by >>>Leicester University<<< Medical School, appears in a special human and animal health issue of the BMJ, highlighting the impact nature has on people's well-being. The study was carried out in Honduras, with 30 patients diagnosed with mild or moderate depression. For two weeks half of the group swam and snorkelled

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174182366-481450394> URL at source site: http://redstatemoron.typepad.com/red_state_moron/2005/11/gives_new_meani.html

***** Clip 29 Summary *****

***** Clip 30 Summary *****

Health News : Swimming with dolphins eases depression: study, (Kerala news, India News,Us,UK,Kerala Shopping,Onam Special,Kerala Recipes,Kerala tourism,Hindi Tutor,Malayalam tutor, VCD's, DVD's,Bharatnatyam, Yoga Source: Kerala Next Service: Web Pubs

Antonioli and Michael Reveley at Britain's >>>University of Leicester<<<, recruited 30 people in the United States and Honduras who had been diagnosed with mild or moderate depression. The severity of their symptoms was calculated according to established yardsticks for mental health, the Hamilton and Beck scales, which are based on interviews and

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174190365-481494577> URL at source site: <http://www.keralanext.com/news/?id=446911>

***** Clip 31 Summary *****

Sunday Times: Dolphins can beat the blues [27nov05] Source: Sunday Times
Service: Web Pubs

animals. Researcher Michael Reveley, of the >>>University of Leicester<<<'s Medical School, in England, said the trial was the first of its kind. "It has the potential to bring alternative clinical strategies to the treatment of emotional disorders," Professor Reveley said. "Psychiatric rehabilitation occurs through the interaction with animals in

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174203667-481580362> URL at source site: http://www.sundaytimes.news.com.au/common/story_page/0,7034,17373044%25E950,00.html

***** Clip 32 Summary *****

News Story - InfoSpace Broadband Portal Source: InfoSpace Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression.

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174212748-481645679> URL at source site: http://kevxml2a.infospace.com/_1_2ZRRTN204SMNMYU__infobb.mypro/health/hlt-story.htm&qid=529320&qt=9

Audience: 36,000 Visitors/day

***** Clip 1 Summary *****

Depressed? Swim with the dolphins Source: South African Sunday Times Service: Web Pubs

Antonioli and Michael Reveley at Britain's >>>University of Leicester<<<, recruited 30 people in the United States and Honduras who had been diagnosed with mild or moderate depression. The severity of their symptoms was calculated according to established yardsticks for mental health, the Hamilton and Beck scales, which are based on interviews and

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174017936-480786066> URL at source site: <http://www.sundaytimes.co.za/zones/sundaytimesNEW/basket7st/basket7st1132894378.aspx>

***** Clip 2 Summary *****

Swimming with dolphins good for depression - 25 Nov 2005 - World News Source: New Zealand Herald, The Service: Web Pubs Hits: 1

with other humans . Psychiatrists from the >>>University of Leicester<<< compared two groups of patients with depression, half of whom swam and snorkelled with dolphins while the other half spent the same time snorkelling with each other on a coral reef in the absence of the dolphins. In the study, at the Roatan Institute for Marine Sciences in

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174018457-480788304> URL at source site: http://www.nzherald.co.nz/section/story.cfm?c_id=2&ObjectID=10356990

Audience: 9,000 Visitors/day

***** Clip 3 Summary *****

BMJ -- Press Releases Source: bmj.com Service: Web Pubs Hits: 7

Michael Reveley, Professor of Psychiatry, >>>University of Leicester<<< Medical School, >>>Leicester<<< General Hospital, >>>Leicester<<<, UK Email: rev{at}le.ac.uk or Dr Christian Antonioli, Tursiops Society, Torino, Italy Email: info{at}tursiopssociety.org (2) ARE PETS GOOD FOR YOU? (Pet ownership and human health)

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174018478-480788356> URL at source site: http://bmj.bmjournals.com/content/vol331/issue7527/press_release.shtml

***** Clip 4 Summary *****

Randomised controlled trial of animal facilitated therapy with dolphins in the treatment of depression -- Antonioli and Reveley 331 (7527): 1231 -- BMJ Source: bmj.com Service: Web Pubs

Sciences, Division of Clinical Psychiatry, >>>University of Leicester<<< Medical School, >>>Leicester<<< General Hospital, >>>Leicester<<< LE5 4PW
Correspondence to: M A Reveley rev{at}le.ac.uk Objective To evaluate the effectiveness of animal facilitated therapy with dolphins, controlling for the influence of the natural setting, in the treatment of mild to

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174019175-480791551> URL at source site: <http://bmj.bmjournals.com/cgi/content/abstract/331/7527/1231>

***** Clip 5 Summary *****

Randomised controlled trial of animal facilitated therapy with dolphins in the treatment of depression -- Antonioli and Reveley 331 (7527): 1231 -- BMJ Source: bmj.com Service: Web Pubs

Sciences, Division of Clinical Psychiatry, >>>University of Leicester<<< Medical School, >>>Leicester<<< General Hospital, >>>Leicester<<< LE5 4PW
Correspondence to: M A Reveley rev{at}le.ac.uk Abstract Top Abstract
Introduction Methods Results Discussion References Objective To evaluate the effectiveness of animal facilitated therapy with dolphins,

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174019197-480791706> URL at source site: <http://bmj.bmjournals.com/cgi/content/full/331/7527/1231>

***** Clip 6 Summary *****

***** Clip 7 Summary *****

Scotsman.com News - UK - Animal magic is best stress-buster Source: Scotsman.com Service: Web Pubs

in Honduras, conducted by researchers at >>>Leicester University<<<, found that those given the opportunity to play with dolphins over a two-week period reported less anxiety and depression than those who simply swam about in the water. Michael Reveley, professor of psychiatry at >>>Leicester<<< General Hospital, said: "Animal-facilitated therapy with

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174020326-480796764> URL at source site: <http://news.scotsman.com/uk.cfm?id=2300132005>

Audience: 6,000 Visitors/day

***** Clip 8 Summary *****

BBC NEWS | Health | Dolphin therapy fights depression Source: BBC Online
Service: Web Pubs

depression, researchers have found. A >>>University of Leicester<<< team tested the effect of regular swimming sessions with dolphins on 15 depressed people in a study carried out in Honduras. They found that symptoms improved more among this group than among another 15 who swam in the same area - but did not interact with dolphins. The study is

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174022950-480809375> URL at source site: <http://news.bbc.co.uk/1/hi/health/4465998.stm>

Audience: 217,000 Visitors/day

***** Clip 9 Summary *****

The Courier-Mail: Swim with dolphins 'lifts depression' [25nov05] Source: Courier-Mail, The Service: Web Pubs

Antonioli and Michael Reveley at Britain's >>>University of Leicester<<<, recruited 30 people in the US and Honduras who had been diagnosed with mild or moderate depression. The severity of their symptoms was calculated according to established yardsticks for mental health, the Hamilton and Beck scales, which are based on interviews and questionnaires

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174026360-480820590> URL at source site: http://www.thecouriermail.news.com.au/common/story_page/0,5936,17360064%25E23272,00.html

***** Clip 10 Summary *****

TerraNet Portal Site Source: Terranet

Antonioli and Michael Reveley at Britain's >>>University of Leicester<<<, recruited 30 people in the United States and Honduras who had been diagnosed with mild or moderate depression. The severity of their symptoms was calculated according to established yardsticks for mental health, the Hamilton and Beck scales, which are based on interviews and

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174031378-480840016> URL at source site: <http://www.terra.net.lb/wp/Articles/DesktopArticle.aspx?ArticleID=257627&ChannelId=1>

***** Clip 11 Summary *****

The Globe and Mail: The shorter your fuse, the higher your cholesterol Source: Globe and Mail Service: Web Pubs

companionship. But British researchers at the >>>University of Leicester<<< have taken the pets-as-medicine theme one big step further. They have found that swimming with dolphins can help lift the dark clouds of depression. Their study, carried out in Honduras, involved 30 people who were diagnosed as having mild to moderate depression. For an hour a

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174033325-480847445> URL at source site: <http://www.theglobeandmail.com/servlet/ArticleNews/TPStory/LAC/20051125/HTAYLOR25/TPHealth/>

***** Clip 12 Summary *****

Depressed? Swim with dolphins Source: News24 Service: Web Pubs

Antonioli and Michael Reveley at Britain's >>>University of Leicester<<<, recruited 30 people in the United States and Honduras who had been diagnosed with mild

or moderate depression. The severity of their symptoms was calculated according to established yardsticks for mental health, the Hamilton and Beck scales, which are based on interviews and

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174036082-480858289> URL at source site: http://www.news24.com/News24/Technology/News/0,,2-13-1443_1840485,00.html

***** Clip 13 Summary *****

Swim with dolphins 'lifts depression' - Central & Sth America - Breaking News 24/7 - NEWS.com.au Source: Business 24/7 Service: Web Pubs

Antonioli and Michael Reveley at Britain's >>>University of Leicester<<<, recruited 30 people in the US and Honduras who had been diagnosed with mild or moderate depression. The severity of their symptoms was calculated according to established yardsticks for mental health, the Hamilton and Beck scales, which are based on interviews and questionnaires

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174036165-480858748> URL at source site: <http://www.news.com.au/story/0,10117,17360064-38199,00.html>

***** Clip 14 Summary *****

The Globe and Mail: The shorter your fuse, the higher your cholesterol Source: Globe and Mail Service: Web Pubs

companionship. But British researchers at the >>>University of Leicester<<< have taken the pets-as-medicine theme one big step further. They have found that swimming with dolphins can help lift the dark clouds of depression. Their study, carried out in Honduras, involved 30 people who were diagnosed as having mild to moderate depression. For an hour a

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174042348-480883204> URL at source site: <http://www.theglobeandmail.com/servlet/ArticleNews/TPStory/LAC/20051125/HTAYLOR25/Health/idx>

***** Clip 15 Summary *****

Virtual Manchester - News - Swimming with dolphins can beat depression Source:
Virtual Manchester Service: Web Pubs

claims a new study. Researchers from the >>>University of Leicester<<< studied the effect of swimming and snorkelling with dolphins on 15 people with depression in Honduras. The researchers found the group's symptoms improved compared to another group who swam in the same area, but not with dolphins. The team assessed the anxiety levels before and

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174043939-480888962> URL at source site: http://www.manchester.com/news/story/15099397/National_News/Swimming_with_dolphins_can_beat_depression.html

***** Clip 16 Summary *****

***** Clip 17 Summary *****

HealthDay Source: HealthDay Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression.

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174062415-480959327> URL at source site: <http://www.healthday.com/view.cfm?id=529320>

***** Clip 18 Summary *****

Health News : Suffering from depression? Swim with dolphin, (Kerala news, India News,Us,UK,Kerala Shopping,Onam Special,Kerala Recipes,Kerala tourism,Hindi Tutor,Malayalam tutor, VCD's, DVD's,Bharatnatyam, Yoga Source: Kerala Next Service: Web Pubs

with natural environment. Researchers from the >>>University of Leicester<<< carried out a study of animal facilitated therapy with dolphins in the treatment of

depression and found it beneficial, reports science portal EurekAlert. The scientists, who wrote about their findings in this week's British Medical Journal, studied 30 people in Honduras.

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174062765-480960241> URL at source site: <http://www.keralanext.com/news/?id=445384>

***** Clip 19 Summary *****

***** Clip 20 Summary *****

***** Clip 21 Summary *****

Swimming with dolphins gives your life porpoise - Health - Specials - smh.com.au
Source: Sydney Morning Herald Service: Web Pubs

The research, partly carried out by >>>Leicester University<<< Medical School, appears in a special human and animal health issue of the journal on the impact nature has on human wellbeing. The study was carried out in Honduras, with 30 patients diagnosed with mild to moderate depression. For two weeks half of the group swam and snorkelled with dolphins

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174074353-481006087> URL at source site: <http://smh.com.au/news/health/swimming-with-dolphins-gives-your-life-porpoise/2005/11/25/1132703377868.html>

Audience: 34,000 Visitors/day

***** Clip 22 Summary *****

***** Clip 23 Summary *****

WBAY-TV Green Bay-Fox Cities-Northeast Wisconsin News: A Dolphin at Play Keeps the Blues Away Source: WBAY ABC 2 Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection

with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174088486-481070814> URL at source site: <http://www.wbay.com/Global/story.asp?S=4165060>

Audience: 36,000 Visitors/day

***** Clip 24 Summary *****

A Dolphin at Play Keeps the Blues Away Source: KFVS 12 Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174092563-481089650> URL at source site: <http://www.kfvs12.com/Global/story.asp?S=4165060&nav=8H40>

***** Clip 25 Summary *****

A Dolphin at Play Keeps the Blues Away Source: WTNZ Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174093624-481093058> URL at source site: <http://www.wtnzfox43.com/Global/story.asp?S=4165060>

***** Clip 26 Summary *****

A Dolphin at Play Keeps the Blues Away Source: KTVO Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174094854-481099553> URL at source site: <http://www.ktvotv3.com/Global/story.asp?S=4165060&nav=1LFv>

***** Clip 27 Summary *****

Swimming with dolphins can beat depression | the Daily Mail Source: Daily Mail Service: Web Pubs

>> The research, partly carried out by >>>Leicester University<<< Medical School, appears in a special human and animal health issue of the BMJ, highlighting the impact nature has on people's well-being. The study was carried out in Honduras, with 30 patients diagnosed with mild or moderate depression. For two weeks half of the group swam and

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174096475-481107928> URL at source site: http://www.dailymail.co.uk/pages/live/articles/health/healthmain.html?in_article_id=369683&in_page_id=1774&ct=5

***** Clip 28 Summary *****

A Dolphin at Play Keeps the Blues Away Source: KOLD-TV 13 Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174096704-481108438> URL at source site: <http://www.kold.com/Global/story.asp?S=4165060&nav=14RW>

Audience: 1,000 Visitors/day

***** Clip 29 Summary *****

ABC News: A Dolphin at Play Keeps the Blues Away Source: ABC News Service:
Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<<
Medical School, noted that the study supports the theory of biophilia, which
contends that human health and well-being is dependent on the human connection
with the natural world. More information The U.S. National Institute of Mental
Health has more about depression.

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174098814-481117277> URL at source site: <http://abcnews.go.com/Health/Healthology/story?id=1345922>

Audience: 477,000 Visitors/day

***** Clip 30 Summary *****

***** Clip 31 Summary *****

KLASTV.com - A Dolphin at Play Keeps the Blues Away Source: KLAS-TV
Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<<
Medical School, noted that the study supports the theory of biophilia, which
contends that human health and well-being is dependent on the human connection
with the natural world. More information The U.S. National Institute of Mental
Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174100926-481125723> URL at source site: <http://www.klas-tv.com/Global/story.asp?S=4165060&nav=168gGhiv>

***** Clip 32 Summary *****

Baton Rouge Television Weather News Louisiana Sports Health Recipes Events
WAFB CBS Programming Mississippi A Dolphin at Play Keeps the Blues Away
Source: WAFB 9 Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174103712-481136288> URL at source site: <http://www.wafb.com/Global/story.asp?S=4165060>

***** Clip 33 Summary *****

***** Clip 34 Summary *****

A Dolphin at Play Keeps the Blues Away Source: WEHT Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174103802-481137543> URL at source site: <http://www.weht.com/Global/story.asp?S=4165060&nav=FadrG9Fh>

***** Clip 35 Summary *****

A Dolphin at Play Keeps the Blues Away Source: KWQC TV6 Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174105037-481141934> URL at source site: <http://www.kwqc.com/Global/story.asp?S=4165060&nav=190z>

Audience: 3,000 Visitors/day

***** Clip 36 Summary *****

Welcome to AJC! | ajc.com Source: Atlanta Journal-Constitution, The: News Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression.

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174105575-481144243> URL at source site: <http://www.ajc.com/health/content/shared-auto/healthnews/depr/529320.html>

***** Clip 37 Summary *****

statesman.com Source: Austin American-Statesman Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression.

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174105722-481144604> URL at source site: <http://www.statesman.com/health/content/shared-auto/healthnews/depr/529320.html>

***** Clip 38 Summary *****

KPLC-TV Lake Charles/Lafayette, Louisiana: A Dolphin at Play Keeps the Blues Away Source: KPLC-TV Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection

with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174105842-481144795> URL at source site: <http://www.kplctv.com/Global/story.asp?S=4165060&nav=0nr4>

Audience: 6,000 Visitors/day

***** Clip 39 Summary *****

Palm Beach Post: Palm Beach & Treasure Coast news, sports, entertainment, jobs, cars, homes Source: GoPBI.com Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression.

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174105960-481145028> URL at source site: <http://www.palmbeachpost.com/health/content/shared-auto/healthnews/depr/529320.html>

***** Clip 40 Summary *****

WECT TV6 & WECT.com - Wilmington, NC news and weather - A Dolphin at Play Keeps the Blues Away Source: WECT TV6 Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174107790-481153031> URL at source site: <http://www.wect.com/Global/story.asp?S=4165060&nav=2h4o>

***** Clip 41 Summary *****

WIVB TV4 Buffalo, NY - A Dolphin at Play Keeps the Blues Away Source: WIVB
Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<<
Medical School, noted that the study supports the theory of biophilia, which
contends that human health and well-being is dependent on the human connection
with the natural world. More information The U.S. National Institute of Mental
Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174108500-481155552> URL at source site: <http://www.wivb.com/Global/story.asp?S=4165060>

***** Clip 42 Summary *****

A Dolphin at Play Keeps the Blues Away Source: FOX 21 Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<<
Medical School, noted that the study supports the theory of biophilia, which
contends that human health and well-being is dependent on the human connection
with the natural world. More information The U.S. National Institute of Mental
Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174108503-481155554> URL at source site: <http://www.kxtu.com/Global/story.asp?S=4165060>

***** Clip 43 Summary *****

***** Clip 44 Summary *****

WTNH.com - A Dolphin at Play Keeps the Blues Away Source: WTNH.com
Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<<
Medical School, noted that the study supports the theory of biophilia, which
contends that human health and well-being is dependent on the human connection
with the natural world. More information The U.S. National Institute of Mental
Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174108982-481157692> URL at source site: <http://www.wtnh.com/Global/story.asp?S=4165060&nav=0RdX>

***** Clip 45 Summary *****

A Dolphin at Play Keeps the Blues Away Source: WKBT TV (WI): News Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174109269-481158205> URL at source site: <http://www.wkbt.com/Global/story.asp?S=4165060&nav=KoJH>

***** Clip 46 Summary *****

A Dolphin at Play Keeps the Blues Away Source: KLFY Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174109593-481159088> URL at source site: <http://www.klfy.com/Global/story.asp?S=4165060>

***** Clip 47 Summary *****

KWWL Television Waterloo Cedar Rapids Dubuque Iowa City Decorah News Channel Weather Plus Sports Health Corridor Cedar Valley Tri State - A Dolphin at Play Keeps the Blues Away Source: KWWL Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which

contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174109750-481160492> URL at source site: <http://www.kwwl.com/Global/story.asp?S=4165060>

***** Clip 48 Summary *****

A Dolphin at Play Keeps the Blues Away Source: WACH Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174109850-481160669> URL at source site: <http://www.wach.com/Global/story.asp?S=4165060&nav=E8Z8>

***** Clip 49 Summary *****

A Dolphin at Play Keeps the Blues Away Source: WATE Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174110577-481163443> URL at source site: <http://www.wate.com/Global/story.asp?S=4165060>

***** Clip 50 Summary *****

WALB-TV, Albany. South Georgia's #1 News Source: A Dolphin at Play Keeps the Blues Away Source: WALB-TV Georgia Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174113128-481175430> URL at source site: <http://www.walb.com/Global/story.asp?S=4165060&nav=0RYN>

Audience: 1,000 Visitors/day

***** Clip 51 Summary *****

Shreveport weather stormtracker KSLA News 12 ArkLaTex Ark-La-Tex Doppler Texarkana Bossier MarshallA Dolphin at Play Keeps the Blues Away Source: News 12 KSLA-TV Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174113989-481178494> URL at source site: <http://www.ksla.com/Global/story.asp?S=4165060&nav=1T6N>

***** Clip 52 Summary *****

***** Clip 53 Summary *****

A Dolphin at Play Keeps the Blues Away Source: WOITV Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174115007-481181811> URL at source site: <http://www.woi-tv.com/Global/story.asp?S=4165060&nav=1LFa>

***** Clip 54 Summary *****

A Dolphin at Play Keeps the Blues Away Source: KFSM Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174115337-481182549> URL at source site: <http://www.5newsonline.com/Global/story.asp?S=4165060>

***** Clip 55 Summary *****

A Dolphin at Play Keeps the Blues Away Source: WTVM News - Columbus (GA) Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174115848-481184844> URL at source site: <http://www.wtvm.com/Global/story.asp?S=4165060&nav=0zH3>

***** Clip 56 Summary *****

KPHO Phoenix - A Dolphin at Play Keeps the Blues Away Source: KPHO TV Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection

with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174115904-481185043> URL at source site: <http://www.kpho.com/Global/story.asp?S=4165060&nav=23Kx>

***** Clip 57 Summary *****

Swimming with dolphins can beat depression | the Mail on Sunday Source: Mail on Sunday (News and Features), The: Mail on Sunday Service: Web Pubs

>> The research, partly carried out by >>>Leicester University<<< Medical School, appears in a special human and animal health issue of the BMJ, highlighting the impact nature has on people's well-being. The study was carried out in Honduras, with 30 patients diagnosed with mild or moderate depression. For two weeks half of the group swam and

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174116612-481188364> URL at source site: http://www.mailonsunday.co.uk/pages/live/articles/health/healthmain.html?in_article_id=369683&in_page_id=1774&ct=5

***** Clip 58 Summary *****

WWAY NewsChannel 3, Wilmington, NC: A Dolphin at Play Keeps the Blues Away Source: WWAY NewsChannel 3 Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174117084-481190084> URL at source site: <http://www.wwaytv3.com/Global/story.asp?S=4165060&nav=0zHV>

***** Clip 59 Summary *****

LEX18 - A Dolphin at Play Keeps the Blues Away Source: LEX 18 Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174117614-481192752> URL at source site: <http://www.lex18.com/Global/story.asp?S=4165060&nav=EQIs>

***** Clip 60 Summary *****

WFSB A Dolphin at Play Keeps the Blues Away Source: WFSB Channel-3 Eyewitness News Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174119625-481200316> URL at source site: <http://www.wfsb.com/Global/story.asp?S=4165060&nav=3HvS>

Audience: 13,000 Visitors/day

***** Clip 61 Summary *****

KXAN.com - A Dolphin at Play Keeps the Blues Away Source: KXAN.com Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174120077-481202625> URL at source site: <http://www.kxan.com/Global/story.asp?S=4165060&nav=0s3d0uzl>

Audience: 5,000 Visitors/day

***** Clip 62 Summary *****

A Dolphin at Play Keeps the Blues Away Source: TV 7 & 4 (MI) Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174120703-481209536> URL at source site: <http://www.tv7-4.com/Global/story.asp?S=4165060&nav=1vrn>

***** Clip 63 Summary *****

News Story - InfoSpace Broadband Portal Source: InfoSpace Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression.

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174123868-481224991> URL at source site: http://kevxml2a.infospace.com/_1_YR3TN2022IN9G6__infobb.mypro/health/hlt-story.htm&qid=529320&qt=9

Audience: 36,000 Visitors/day

***** Clip 64 Summary *****

A Dolphin at Play Keeps the Blues Away Source: WAFF Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174124249-481226098> URL at source site: <http://www.waff.com/Global/story.asp?S=4165060&nav=0hBL>

***** Clip 65 Summary *****

FOX Carolina The Ten O'Clock News A Dolphin at Play Keeps the Blues Away
Source: WHNS Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174124260-481226107> URL at source site: <http://www.whns.com/Global/story.asp?S=4165060>

***** Clip 66 Summary *****

KESQ NewsChannel 3 Palm Springs, CA: A Dolphin at Play Keeps the Blues Away
Source: KESQ TV Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174125311-481230406> URL at source site: <http://www.kesq.com/Global/story.asp?S=4165060&nav=CcXS>

***** Clip 67 Summary *****

WorldNews Source: Italy Times Service: Web Pubs

depression, researchers have found. | A >>>University of Leicester<<< team tested the effect of regular swimming sessions with dolphins on 15 depressed people in a study carried out in Honduras. | They found th... (photo: Ark Animal Photo) Tehran Times more Related Links Do animals induce a sense of wellbeing? Dolphin therapy fights depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174125931-481231898> URL at source site: <http://cgi.wn.com/?t=worldnews/onephoto.txt&action=display&article=40570058>

***** Clip 68 Summary *****

A Dolphin at Play Keeps the Blues Away Source: WQAD Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174126604-481233987> URL at source site: <http://www.wqad.com/Global/story.asp?S=4165060&nav=1sWD>

***** Clip 69 Summary *****

A Dolphin at Play Keeps the Blues Away Source: WMCTV.com Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174129921-481246840> URL at source site: <http://www.wmctv.com/Global/story.asp?S=4165060&nav=4XzZ>

***** Clip 70 Summary *****

KCBD - NewsChannel 11 / Lubbock, TX: A Dolphin at Play Keeps the Blues Away
Source: KCBD News Lubbock Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<<
Medical School, noted that the study supports the theory of biophilia, which
contends that human health and well-being is dependent on the human connection
with the natural world. More information The U.S. National Institute of Mental
Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174130047-481247287> URL at source site: <http://www.kcbd.com/Global/story.asp?S=4165060&nav=CcXL>

***** Clip 71 Summary *****

A Dolphin at Play Keeps the Blues Away Source: WTKR Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<<
Medical School, noted that the study supports the theory of biophilia, which
contends that human health and well-being is dependent on the human connection
with the natural world. More information The U.S. National Institute of Mental
Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174130301-481249467> URL at source site: <http://www.wtkr.com/Global/story.asp?S=4165060&nav=1mXR>

***** Clip 72 Summary *****

WNEM-TV5 A Dolphin at Play Keeps the Blues Away Source: WNEM Service:
Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<<
Medical School, noted that the study supports the theory of biophilia, which
contends that human health and well-being is dependent on the human connection
with the natural world. More information The U.S. National Institute of Mental
Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174130993-481252213> URL at source site: <http://www.wnem.com/Global/story.asp?S=4165060&nav=7k79>

***** Clip 73 Summary *****

WHO TV - Des Moines: A Dolphin at Play Keeps the Blues Away Source: WHOTV
Service: Web Pubs

from the division of clinical Psychiatry at the >>>University of Leicester<<< Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174131069-481252377> URL at source site: <http://www.whotv.com/Global/story.asp?S=4165060>

***** Clip 74 Summary *****

BBC NEWS | Health | Dolphin therapy fights depression Source: BBC News
Service: Web Pubs

depression, researchers have found. A >>>University of Leicester<<< team tested the effect of regular swimming sessions with dolphins on 15 depressed people in a study carried out in Honduras. They found that symptoms improved more among this group than among another 15 who swam in the same area - but did not interact with dolphins. The study is

URL with keywords highlighted: <http://ewatch.prnewswire.com/rs/display.jsp?a=20011-174134935-481265316> URL at source site: <http://newsvote.bbc.co.uk/1/hi/health/4465998.stm>

Audience: 394,000 Visitors/day

25 November 2005

` Professional Security Magazine Online

<<http://www.professionalsecurity.co.uk/newsdetails.aspx?NewsArticleID=4400&imgID=1>>` _ - at the Gilbert

Murray Conference Suite, University of Leicester include: Kate Broadhurst, Head of Research at Perpetuity; Becca Friswell, Head of Commissioning, Adult Social Services, Bedfordshire County Council; Paul Marriot, West Midlands Police; Neil Chakraborti, University of Leicester; Dr Teerry Cocks, Crime Prevention and Design Advisor,

[Independent Online Edition - Higher Education](#) - by Professor Robert Burgess, vice chancellor of Leicester University, simpler classifications are to be balanced with a transcript detailing students' achievements over the course of their degree. Britain's six-tier system of degree classification has been under fire for more than a decade, but in the last two years criticism has intensified. In

Life got no porpoise? Try dolphin therapy. A team from Leicester University took 30 patients with mild to moderate depression to Honduras and encouraged them either to swim with dolphins or just to swim ... This story appeared in various publications, including the following selection:

[Times Online](#)

[Independent](#)

[ABC Science Online](#)

[The Sunday Mail Online](#)

[The Mercury](#)

[BBC](#)

23 December 2005

[The Age - A dose of dolphins for depression](#) - Reveley, a professor of psychiatry at the University of Leicester in England. To try to draw a valid comparison, another group got the same regimen, minus the dolphins. The study found that the patients who took part in the program that let them spend time with bottlenose dolphins for two weeks enjoyed relief from their symptoms. Patients in the...

11 December 2005

[New York Times - Therapies: A Dose of Dolphins for Moderate Depression](#) - A.

Reveley, a professor of psychiatry at the University of Leicester in England and the senior author of the study. Skip to next paragraph More Vital Signs Columns To try to draw a valid comparison, another group got the same regimen, minus the dolphins. The study found that the patients who took part in the program that let them spend time

[Deccan Chronicle - Swimming with Dolphins Helps Treat Depression](#) - Reveley, a professor of psychiatry at the University of Leicester in England and the senior author of the study. To try to draw a valid comparison, another group got the same regimen, minus the dolphins. The study found that the patients who took part in the program that let them spend time with bottlenose dolphins for two weeks enjoyed relief

10 December 2005

[bmj.com - Human and animal health: strengthening the link: Authors' reply to methodological concerns](#) - Sciences, Division of Clinical Psychiatry, University of Leicester Medical School, Leicester General Hospital, Leicester LE5 4PW Michael Reveley, professor of psychiatry Department of Health Sciences, Division of Clinical Psychiatry, University of Leicester Medical School, Leicester General Hospital, Leicester LE5 4PW rev{at}le.ac.uk

[News Target - Swimming with dolphins shown to benefit depressed patients](#) -

Medical Journal has published study from the University of Leicester detailing how swimming with dolphins has benefited a select group of 30 depressed patients.

09 December 2005

[Newstarget.com \(Taiwan\) - Swimming with dolphins shown to benefit depressed patients](#) - ... A team from Leicester University took 30 patients with mild to moderate depression to Honduras and encouraged them either to swim with dolphins or just to swim ...

08 December 2005

[International Herald Tribune - Depression treatment: Dolphin therapy](#) - Reveley, a professor of psychiatry at the University of Leicester in England and the senior author of the study. To try to draw a valid comparison, another group got the same regimen, minus the dolphins. The study found that the patients who took part in the program that let them spend time with bottlenose dolphins for two weeks enjoyed relief from

[World of Psychology - Therapies: A Dose of Dolphins for Moderate Depression](#) - A. Reveley, a professor of psychiatry at the University of Leicester in England and the senior author of the study. Skip to next paragraph Related More Vital Signs Columns To try to draw a valid comparison, another group got the same regimen, minus the dolphins. The study found that the patients who took part in the program that let them spend

06 December 2005

[New York Times - Therapies: A Dose of Dolphins for Moderate Depression](#) - ... sun, sand and dolphins, said Dr. Michael A. Reveley, a professor of psychiatry at the University of Leicester in England and the senior author of the study. ...

01 December 2005

[DNC: Health News - Dolphins May Provide Best Antidote to Depression](#) - Researcher Professor Michael Reveley, of the University of Leicester Medical School, said the trial was the first of its kind. "It has the potential to bring alternative clinical strategies to the treatment of emotional disorders," he added.

"Psychiatric rehabilitation occurs through the interaction with animals in nature and the stimulation of...

[ABC Online News - Swimming with dolphins lifts depression](#) - Antonioli and Professor Michael Reveley at the University of Leicester recruited 30 people in the US and Honduras who had been diagnosed with mild or moderate depression. The severity of their symptoms was calculated according to established yardsticks for mental health, the Hamilton and Beck scales, which are based on interviews and

[village - A Dolphin at Play Keeps the Blues Away](#) - from the division of clinical Psychiatry at the University of Leicester Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression.

[KFOR News Channel 4 - A Dolphin at Play Keeps the Blues Away](#) - from the division of clinical Psychiatry at the University of Leicester Medical School, noted that the study supports the theory of biophilia, which contends that human health and well-being is dependent on the human connection with the natural world. More information The U.S. National Institute of Mental Health has more about depression...

06 January 2006

Daily Telegraph: Professor Reveley (Psychiatry) study on depression:

<http://www.telegraph.co.uk/health/main.jhtml?view=DETAILS&grid=P8&xml=/health/2006/01/06/hlefanu06.xml>

APPENDIX 8

MEDIA'S ARTICLES ON THE BIOPHILIA STUDY



- Africa
- Americas
- Asia-Pacific
- Europe
- Middle East
- South Asia
- UK
- Business
- Health

- Medical notes
- Science & Environment
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Dolphin therapy fights depression

BBC NEWS

Swimming with dolphins appears to help alleviate mild to moderate depression, researchers have found.



Dolphins are increasingly being used in therapeutic treatments

A University of Leicester team tested the effect of regular swimming sessions with dolphins on 15 depressed people in a study carried out in Honduras.

They found that symptoms improved more among this group than among another 15 who swam in the same area - but did not interact with dolphins.

The study is published in the British Medical Journal.

All the volunteers who took part in the trial stopped taking antidepressant drugs or undergoing psychotherapy at least four weeks beforehand.

Regular sessions

Half the volunteers swam and snorkelled around dolphins for one hour a day over a two-week period.

The others took part in the same activities, but without dolphins around.

Two weeks later, both groups showed improved mental health, but especially so among patients who had been swimming with the dolphins.

“ Animals, and especially mammals, can favourably change our social dynamic ”

Dr Iain Ryrie

“ We are part of the natural world, and interacting with it can have a beneficial effect on us ”

Professor Michael Reveley

The researchers say dolphins' aesthetic value, and the emotions raised by the interaction may have healing properties. Some have speculated that the ultrasound emitted by dolphins as part of their echolocation system may have a beneficial effect.

The Leicester team believe that using animals in this way could be a productive way to treat depression and other psychiatric illnesses.

Researcher Professor Michael Reveley said: "Dolphins are highly intelligent animals who are capable of complex interactions, and regard humans positively.

"Some people who are depressed may have issues with other humans, and might respond more positively to other types of interaction.

"We need to remember that we are part of the natural world, and interacting with it can have a beneficial effect on us."

Dolphin therapy is already used to help children undergoing rehabilitation for a range of conditions.

Shared brain system

Dr Iain Rylie, research programme director at the Mental Health Foundation, said that humans and dolphins shared a limbic brain system that plays a key role in regulating many of the body's physiological and emotional processes.

He said: "Emotional contact is a biological need for mammals, stimulating their limbic systems, ensuring the suckling response and providing gentle encouragement toward ever more maturity.

"As humans we are hard-wired to need touch and to be connected to others, something that differentiates us from reptiles say, who don't have a limbic communication system and who are not suckled.

"So it's possible for humans to make loving relationships with many different mammals because of this biological/social similarity."

Dr Rylie said research had shown the symptoms of depression could be ameliorated by pet assisted therapy.

The technique had also been shown to aid young people with attention deficit hyperactivity disorder, and older people with dementia.

"Animals, and especially mammals, can favourably change our social dynamic, which is typically one of withdrawal and increasing isolation among people with depression.

"Swimming with and caring for dolphins as a group activity in a vacation context is very likely therefore to alleviate depression."

However, he said researchers would probably do better to focus their efforts on animal interactions that were more readily available closer to home.

VITAL SIGNS

Therapies: A Dose of Dolphins for Moderate Depression



By ERIC NAGOURNEY

Published: December 6, 2005

Researchers working in Honduras have taken an unusual approach to treating mild to moderate [depression](#): they teamed their patients up with dolphins.

To test unconfirmed reports that dolphins could help people with learning disabilities and [mental health](#) problems, the researchers offered 10 patients a regimen of surf, sun, sand and dolphins, said Dr. Michael A. Reveley, a professor of psychiatry at the University of Leicester in England and the senior author of the study.

Related [More Vital Signs Columns](#)

To try to draw a valid comparison, another group got the same regimen, minus the dolphins.

The study found that the patients who took part in the program that let them spend time with bottlenose dolphins for two weeks enjoyed relief from their symptoms.

Patients in the control group, who spent quality time in the sun and the water, without the dolphins, did not experience the same benefit, the researchers found.

The research took place at a marine science institute in Honduras, and the findings were reported in BMJ, the British medical journal. The patients in the dolphin group were taught about the animals' behavior and water safety. When they were rescreened for depression at the end of two weeks, they scored

better than they had on arrival. Based on their own reports three months later, nine of the patients reported lasting improvement.

Dolphin therapy offers some obvious advantages over drug therapy. "No side effects were noted," the researchers wrote, "although accidental injuries may occur." While the approach is hardly suited to widespread application, the findings shows the importance of maintaining a strong connection to nature, the researchers said.

Some conservationists, however, frown on swim-with-dolphin programs, contending they are stressful to the animals.



Depression treatment: Dolphin therapy

By Eric Nagourney

Published: Wednesday, December 7, 2005

Researchers working in Honduras have taken an unusual approach to treating mild to moderate depression: they teamed up their patients with dolphins.

To test unconfirmed reports that dolphins could help people with learning disabilities and mental health problems, the researchers offered 10 patients a regimen of surf, sun, sand and dolphins, said Dr. Michael Reveley, a professor of psychiatry at the University of Leicester in England and the senior author of the study.

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Some conservationists, however, frown on swim-with-dolphin programs, contending they are stressful to the animals.

*Physician-authored
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Summary and Comment

Dolphins: A Novel Treatment for Depression

Related Links

- ▶ [Table of Contents](#)
- [See reference\(s\) for additional links](#)

Interest in using animals to help treat patients with depression is considerable, but evidence of benefit is scarce. In this randomized, controlled trial, 30 people with mild-to-moderate depression attended a marine institute in Honduras for 2 weeks; for 1 hour each day, half of the participants swam with dolphins, whereas the other half swam without dolphins. A total of 25 people completed the study (13 in the dolphin group and 12 in the control group).

At the end of the 2-week period, depression scores had dropped about twice as much in the dolphin group as in the controls. Although formal follow-up assessments were not completed, the 13 patients who experienced clinically meaningful improvements at 2 weeks (10 from the dolphin group and 3 controls) described their mental health status at 3 months or later: 9 of those in the dolphin group and all 3 controls reported lasting improvements and did not require additional treatment for depression.

Comment: Swimming with dolphins clearly had a beneficial effect for patients in this study. Although it might not be practical for many patients, the use of animals for the treatment of depression does merit further exploration. At the time of publication, the [full text of the original article](#) was available free of charge.

— *Keith I. Marton, MD*

Published in Journal Watch January 3, 2006

Source

Antonioli C and Reveley MA. Randomised controlled trial of animal facilitated therapy with dolphins in the treatment of depression. BMJ 2005 Nov 26; 331:1231-4.
[\[Original article\]](#)[\[Medline abstract\]](#)[\[Download citation\]](#)

<http://general-medicine.jwatch.org/cgi/content/full/2006/103/3>

05/01/2006

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