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# Animal-Assisted Interventions; Effects on Human Mental Health - A Theoretical Framework

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## 1. Introduction

In the Western part of the world the public health challenges have changed dramatically during the last decades. Modern medicine and new technology has reduced mortality rates for most diseases and the life expectancy has increased. However, in the modern society of today, we face new threats to public health, mainly related to life style related diseases and illnesses such as obesity, diabetes, cardiovascular disease, musculoskeletal disorders and mental health problems. The prevalence of mental health problems is high and increasing, and previous epidemiological studies have estimated the lifetime prevalence of mental disorders to be approximately 50 % (Kringlen et al., 2001; Robins & Regier, 1991). Affective disorders are one of the most common mental disorders, and in a WHO survey from sixty countries, one-year prevalence for depressive disorders was 3.2 % (Moussavi et al., 2007). This is slightly lower than in a European survey, which estimated one-year prevalence for major depression to be 3.9 % (Alonso et al., 2004). In different surveys the lifetime prevalence varies from 8 to 18 % (Alonso et al., 2004; Kringlen et al., 2001, 2006). In a Norwegian study the diagnoses with the largest percentage increase in sickness absence the last decade were sleep problems, tiredness, anxiety (Ihlebæk et al., 2007), and today mental health problems account for almost 25% of new disability pension grants in Norway (Mykletun & Knudsen, 2009). In addition to individual suffering, this constitutes a major economical challenge to the society, as a review of Luppá et al. (2007) found that indirect economical costs, mainly due to sick leave and work disability, was twice as high as direct costs. Even though there has been substantial economical effort to develop and strengthen the traditional health care system for these problems, it does not seem to reduce the problem and still many patients do not get the treatment and rehabilitation they need. It is therefore necessary to investigate other and complementary interventions and therapeutic approaches that might be useful.

According to historical and prehistoric evidence, it is believed that the social symbiotic relationship between man and animal developed without any coercion from the human's side (Odendaal, 2000). During the 20<sup>th</sup> century the introduction of animals to institutional care settings increased, and the concept of Animal-Assisted Therapy (AAT) was first mentioned by the child psychotherapist Boris Levinson (1962). Levinson described the

benefits of his own dog in counselling sessions with children and youth, and gave numerous examples of ways in which the dog could enhance therapy. A lot of people with mental health disorders have problems in their relationship with other humans. This can be due to several reasons, as rejection, aggressive or sexual assault and other kinds of behavioural problems. Many of these people receive adequate treatment, but for some it may be favourable to use activities related to animals as a means of developing skills in making and maintaining relations with other people to support the ordinary treatment. However, the theoretical foundations for the benefits of interacting with animals are still poorly understood, and the plausible mechanisms are still to be confirmed. The aim of this chapter is to describe different aspects of the human-animal relationship, with emphasis on the positive impact animals may have on human mental health.

## 2. Defining Animal - Assisted Interventions (AAI)

According to Kruger and Serpell (2010), Animal-Assisted Interventions (AAI) is defined as “any intervention that intentionally includes or incorporates animals as a part of a therapeutic or ameliorative process or milieu”. AAI is used as a colloquial term that encompasses both Animal-Assisted Therapy (AAT) and Animal-Assisted Activities (AAA). According to Delta Society (2011), AAT is a goal-directed intervention with animals as an integral part of the treatment process for a particular human client. The process is directed by a therapist who is practicing within the scope of his/her professional expertise. Key features include specific goals and objective for each individual and a standardized evaluation of the progress. AAA provides opportunities for motivational, educational, recreational, and/or therapeutic benefits to enhance quality of life, and is delivered in a variety of environments by specially trained professionals and /or volunteers (Delta Society, 2011). AAA refers to a general category of interventions without a common protocol, and may involve the introduction of one or more animals to an individual in a private or group setting. Related to these definitions, a clear distinction should be made between emotional response to animals and therapy. However, many applications of AAA are designed to benefit individuals by reducing stress and loneliness, and inducing attention to and interaction with the outside world. Several studies designed to evaluate AAT, were evaluating AAA under more current nomenclature (Friedmann et al., 2010). Thus, to meet these somewhat mixed concepts, the term AAI was introduced. This definition provides the flexibility needed to discuss programs that can fit into a medical model, and those of a more quasi-medical nature, which still seek to “affect the course “of people’s lives in a positive direction (Kruger & Serpell, 2010).

Despite that some attempts have been made to standardize terminology and procedures, the research on AAI is still struggling to demonstrate their efficacy and validity. However, some mechanisms and theories have stood the test of time. The first mechanism is related to animals as agents of socialization, the second mechanism is due to the beneficial effects of AAI on symptoms (mainly anxiety and depression) and physiological indicators of stress/distress, and the third mechanism is related to animals as facilitators to improvement of self-esteem and self-efficacy. The attachment theory is often mentioned as one of the basic theories in the field, although it is not a single mechanism. However, related to the fact that it is one of the explanations of the bond between human and animals, it is described as an important aspect of AAI. Although most of the available studies concerning AAI are dealing with the interaction with companion animals, a few studies of AAI are describing

and measuring the effects of farm animals (including horses) on human mental health. Until now most of these studies are designed in the context of Green care.

## 2.1 Green care

*Green care* is an inclusive term for many complex interventions, such as social and therapeutic horticulture, animal-assisted therapy, care farming, green exercise, ecotherapy, wilderness therapy, e.g (Haubehofer et al., 2010). Although there is much diversity under the umbrella of Green care, the term is grounded on the positive relationship between exposure of nature and human health (Sempik et al., 2010). Care farming (also called *social farming* or *green care farming*) is the use of commercial farms and agricultural landscapes as a base for promoting human mental and physical health, social inclusion and educational benefits through normal farm activity (Sempik, 2008). Most farms are ordinary family-based commercial farms, but also farms connected to health institutions and farms as part of therapeutic communities exist within Green care. Today the estimated number of Green care farms in Norway is 950 (Logstein & Bleksaune, 2010), and other European countries have similar figures (Haubehofer et al., 2010). There is much variety among care farms, with differences in the extent of farm production or care, and in client groups. These may include patients with defined psychiatric diagnoses, people with learning disabilities, those with a drug history, disaffected youth or elderly people, as well as persons suffering from the effects of work-related stress or obesity. Many care farms offer contact with farm livestock (AAA), while others provide specific Animal-Assisted Therapy (AAT). Typically, the participants take part in the ordinary work tasks, like feeding animals, cleaning animals and the barn, milking cows, and they have the opportunity to pet and interact with the animals as much as they like. Although animal-assisted interventions with farm animals appear to be the most thoroughly studied type of Green care service, the evidence-based research is still scarce.

## 3. The human-animal relationship

Several authors have highlighted the association between people and animals, and provided some insights to this relationship. Tannenbaum (1995) claimed that the human-animal relationship need to be of a continuous nature and should be bi-directional and voluntary, while Russow (2002) claimed that the relationship must be reciprocal and persistent. She express further that there are no true relationship if the animal don't recognize you. However, it is not obvious that the human and the animal have a similar perception of their interaction. What a human experiences as pleasant, may be unpleasant for the animal. It has been known for many years that dogs and cats that have close contact with humans early in their lives are much friendlier to humans than animals that are exposed later on (Bateson, 1990). The restricted age-range within which such socialization is readily formed is known as the sensitive period for socialization, typically 3-12 weeks of age in dogs and cats. When this period starts, the animal is ready to form an attachment to a wide range of objects, but as it receives experiences with one object, it narrows its preferences to that one object. The consequence is that the animal is no longer able to enable new attachments. If the animal is exposed to several views of the same object while it is still narrowing its preferences, each of those views will be equally effective. Similarly, if the animal is exposed to different animals, including humans, it may form attachments to each of the objects, and the strength of the

attachment will be related to the length of the exposure to the different individuals. When young animals are being exposed to several human individuals, the effect is more a general socialization on humans than attachment to a specific individual. If pet breeders do not give the young animals sufficient experience with humans, the animals will hardly function as pleasant, sociable pets. It is assumed that also farm animals should be socialized on humans in early life to function most effectively in animal-assisted interventions, and to avoid aggressive or fearful behaviour (Berget, 2006). Even without specific work on socialization, farm animals can usually be stroked, people can talk to them, and they may be good transitional beings like pets are.

#### **4. Animals as attachment figures**

Katcher (2000) states that animals makes good transitional beings because they show intentional behaviour, they are capable of giving active affection, they can never contradict the attributes projected into them with words, and they can serve as vehicles for projection traits one might find lacking in human beings. According to Triebenbacher (1998) humans have an innate, biologically-based need for social interactions, and this interaction becomes increasingly focused toward specific persons. Behaviours such as following, smiling toward, holding and touching are evident in the relationship between child and attachment figures. Bowlby (1982) defined attachment as a form of behaviour in an individual seeking or maintaining proximity to another that serves as a secure base, and who is perceived as better able to cope with life stressors. Fundamentally this kind of attachment is found between a mother and offspring.

To date theories of attachment used in research on human-animal relationships are based on theories applied on human-human relationships. Katcher and Beck (1989) recorded that a lot of persons appeared to have an attachment to their companion animals similar to that experienced with their friends and family, and Stallones et al. (1988) found that 95 % of elderly respondents regarded their companion animals as friends. In other studies, Cain (1983) and Voith (1985) found that a majority of the subjects regarded the pets as members of the family. Sife (1998) showed that as many as 70 % of people who share their lives with companion animals reported that they consider them as children. A similar study by Wallendorf and Belk (1987) documented that a majority of the respondents answered that their pets were substitutes for children, which may explain the tendency for people to use baby talk when speaking to their pets. Many human personality variables have been identified as being related to pet attachment. For example, people who had pets during childhood or adolescence tended to be more attached to their current pet than first-time caregivers (Kidd & Kidd, 1980), while the single adults tended to be more attached than the married adults. People who indicated a dog as their favourite pet tended to express a stronger attachment than those who reported a cat to be their favourite pet (Johnson et al., 1992).

Crawford et al. (2006) examined if there were some common concepts between traditional attachment theory and human-animal attachment. The authors divided these aspects into among others; emotional bond, secure base, and representational models:

##### *Emotional bond*

According to Crawford et al. (2006), emotional bond is associated with closeness, frequency of petting or grooming one's animal, and levels of exercise. Enders-Slegers (2000) related



emotional bond to caressing or holding an animal, or comfort derived from the relationship with the companion animal, while Odendaal (2000) claimed that the success of human-animal interaction is based on a two-way fulfilling of attention needs, and that the more social behaviour an animal exhibits, the more successful the bonding between human and animal can be.

#### *Secure base*

As earlier mentioned, the concept of secure base is fundamental in the field of attachment theory (Bowlby, 1988). The emotional security that pet owners report feeling in the relationship with their pets may in some ways parallel physical and emotional security as discussed within attachment theory (Triebenbacher, 1998).

#### *Representation models*

One's representational model of attachment often influences one's ability to deal with stressful life events (Bretherton, 1985). Similarly with traditional attachment theory, an individual's relationship with a companion animal may determine how well he or she will cope with stressful life events (Siegel, 1990).

To summarize, attachment implies a long-lasting bond, and correlations between attachment and positive therapeutic outcomes have yet to be convincingly established in relation to human-animal relationship. In the context of AAI, the animal as a transitional object may appear to be more therapeutically desirable than that of an attachment figure (Katcher et al., 2000; Kruger & Serpell, 2006).

## **5. Animals as agents of socialization**

In the late eighteenth century, theories concerning the socializing influence of animals began to apply to the treatment of mentally ill. In the *Description of the Retreat*, Samuel Tuke described how different animals, like rabbits, sea-gulls, hawks and poultry were a part of the milieu at the mental institution. The intention was that the interaction with the animals not only should give a means of innocent pleasure, but also to awaken the social and benevolent feelings (Serpell, 2010).

### **5.1 Animals as facilitators of social support**

According to Cobb (1976) social support is defined as an interpersonal relationship that leads to "the persons believe in being cared for, loved, esteemed, and a member of a network of mutual obligations". Cobb suggested that social support that derives from a social relationship could provide protection from anxiety, depression and other related illnesses. This belief has been supported by research associated to mortality and morbidity of coronary heart disease (Eriksen, 1994), recovery of surgical procedures (Kulik & Mahler, 1989), and psychological well-being under stress (Winefield et al., 1992). The emotional support in initial stages of a severe stressor, like loss of functionality (Glass et al. 1993) and cancer diagnosis (Worthman, 1984), are also shown to be of importance for successfully coping with such stressors. Social support is an important part of mental health interventions as it could preserve feeling of self-esteem and sense of mastery (Milne, 1999).

It is hypothesized that social support acting as a buffer against stress responses or illness can be derived not only from human relationships, but also from a human-animal

relationship. According to McNicholas and Collis (2006) social support from pets may be a replacement for lacking human support, providing a release from relation obligations, enhance reorganization, re-establish routines, and “top up” existing human support. In a review of psychological, social, behavioural and physical benefits from pets with regard to social support, Garrity and Stallones (1998) found that pet association frequently appeared beneficial both directly and as a buffering factor during stressful life circumstances. In a study of horseback riding among children with mental and neuromuscular disabilities, Hart (1992) found that the intervention released joyous human social support as well as the unique sensation and physical challenge of riding a horse. Even the families of the affected children seemed to benefit.

Appraisal support, with affirmation and feedback, is likely to be a part of the contact between the farmer and the participant in Green care. This was also found in the doctoral thesis of Pedersen (2011) on farm animal-assisted interventions for patients with a clinical depression. In addition to the accepting support the animal provided in her study, the participants expressed that they felt the farmer understood their situation and that they could easily express how they felt. Qualitative studies in The Netherlands (Elings & Hassink, 2008) and in Norway (Bjørgen & Johansen, 2007) have also emphasized the farmer contact and the social setting as important aspects for participants with mental health issues. An exploratory study at the Green Chimneys institution among 80 children with behavioural and mental health problems, showed that the children utilized the farm animals as if utilizing the service of a therapist; they visited the animals to feel better, and they learned about nutrition and caring for animals (Mallon, 1994). In a 12-week pilot project on AAI with goats for ten multiply-disabled adults (all deaf), the video registrations showed that the clients expressed joy and decreased withdrawal in contact with the goats. During the intervention the attentiveness and active participation increased. In contrast no such changes were found in a dining room situation on the residential institution for these persons (Scholl et al., 2008).

## **5.2 Animals as contributors to social contact**

A mechanism often mentioned in the AAI literature is that animals may serve as catalysts or mediators of enhanced communication skills among people. The basis of this mechanism is that animals stimulate conversation by their presence and unscripted behaviour, and by providing a neutral, external subject on which to focus (Fine, 2000; Levinson, 1969). One of the first to evaluate the effects of pets as social catalysts in institutional settings was Corson et al. (1977). They focused on patients who did not respond sufficiently on traditional therapy. However, they failed to find a proper control group, and allowed the experimental group to act as their own controls in an intervention either with a dog in a kennel, on the ward, or at the patients' bedsides. The study showed that the pets and the patients enjoyed much time together, and analyses of videotapes showed that the patients appeared less withdrawn, and communicated more with the therapist. Another study in the early period was the study of Beck et al. (1986) comparing psychiatric inpatients in a room with caged birds with a similar patient group without any animals. The authors concluded that the patients in the room with the birds communicated more, and were more comfortable in communication than the controls. A study by Messent (1983) showed that dog owners walking in a park experienced a significantly higher number of chance conversations with other park users than when walking the same route without the dog. The study also

demonstrated that the conversations were significantly longer when the dog was present. The presence of a dog acted as an ice breaker, providing a neutral and safe opening for conversation. A similar study by McNicholas & Collis (2000) showed that being accompanied by a dog in daily routines such as taking children to school, on public transport, for example, led to an increased number of conversations between people. However, the length of interactions did not increase, and the study demonstrated that the nature of the interaction depended on the relationship between the participants. The effects of the dog as a social catalyst were largest with strangers and smallest with friends. Another study by Bernstein et al. (2000) demonstrated that geriatric persons subjected to AAT were more likely to initiate and participate in longer conversations than a control group getting Non-Animal Therapy (NAT) like arts, crafts and snack bingo. Similar effects were found in a 12-month controlled study of elderly schizophrenic patients where contact with a pet, either a dog or a cat, resulted in significantly improved conversational and social skills in the experimental group compared with the controls (Barak et al., 2001). In a recently randomized controlled trial (RTC) with or without a dog among 24 patients with schizophrenia, Villata-Gil et al. (2009) found significant change in social contact and social relationship in the dog group. However, there were no significant differences in the outcome measures when comparing the two groups. Rosetti & King (2010) found in a review of AAT among a heterogeneous sample of psychiatric patients that AAT can improve socialization. To sum up, positive connections to enhanced social interaction were seen. However, from surveys with pet owners, positive connections to pets as social catalysts are not consistent (Pachana et al., 2005; Parslow et al., 2005).

## **6. Animals as contributors to reduced arousal, anxiety, and depression**

The statement that animals are able to induce and mediate physiologically de-arousing effects, was first forwarded by Edward O. Wilson in his book *Biophilia* (1984). He defined biophilia as humans' natural tendency to focus on life and lifelike processes. This is not single instinct, but complex learning rules which could form a range of emotions like attraction and peacefulness, but also aversion and anxiety (Wilson, 1993). This tendency gave distinctive advantages in human evolution, and therefore there is partly a genetic basis for this positive responsiveness to nature (Kellert, 1993). This hereditary trait is utilized in different forms of nature-assisted therapy, which is documented to be effective for a diversity of diagnoses, such as obesity, schizophrenia and stress related disorders (Annerstedt & Währborg, 2011). The stress reducing effect of outdoor recreation and natural settings are extensively investigated and Ulrich (1993) emphasizes a probable relationship between nature, reduced stress and health. This stress recovery response is also much used as a potential mechanism of the observed health effects in companion animal research. A decline in blood pressure and heart rate are seen in several studies when people interact and have physical contact with a pet animal. The first published report on effects of companion animals on physical health was made by Erika Friedmann et al. (1980). This report showed a relationship between owning a dog or cat and increased probability of survival one year after heart attacks, myocardial infarctions or severe angina pectoris. While 28 % of non-owners died within one year, only 5.7% of pet owners died. Later research has confirmed this finding (Friedmann & Thomas, 1995). The increased survival could not be related to differences in seriousness of the attack, psychological or social status, or demographic variables. Stress-reducing effects of watching fish in an aquarium have been shown in



several studies (e.g. Katcher et al. 1983). The same parasympathetic effects apply to watching animals of other species that people trust, while the opposite may be found for watching threatening animals. Interaction with a companion animal is also related to increased parasympathetic nervous activity (Matsuura et al., 2007), and increased level of salivary amylase activity which is associated with improvement of the immune function.

Positive physical contact between humans like nursing a baby, or stroking, caressing or massaging between adults, may release the hormone *oxytocin* which is produced in the hypothalamus (Uvnäs-Moberg, 1998). General effects of oxytocin are relaxation and reduced stress level. Oxytocin coordinates both the causes and the effects of positive social interactions, and it can be conditioned to the psychological state or imagery of people. An increase in the beneficial hormone oxytocin is also observed when humans interact with pet animals (Handlin, 2010; Miller et al., 2009; Odendaal & Meintjes, 2003). In the PhD-thesis of Handlin (2010), ten female dog owners and their male Labrador dogs participated together with ten controls. Their levels of oxytocin, cortisol and insulin, as well as their heart rate, were measured. The connection between the quality of the dog-owner relationship and hormone levels was also explored. The short-term interaction between the dogs and their owners resulted in oxytocin release in both species, and the oxytocin levels and positive attitudes regarding the dog-owner relationship were positively correlated. In conclusion the study showed that the interaction with the dog induced oxytocin release, and promoted oxytocin mediated effects, such as decreasing cortisol levels and blood pressure. Other intervention studies with companion animals have shown a decrease in levels of stress hormones like adrenalin and noradrenalin (Barker et al., 2005; Odendaal, 2000).

Several studies of AAs with companion animals have examined the connection between changes in physiological measures and reduced state anxiety (Barker et al. 2003a,b; Cole et al., 2007; Hoffmann et al., 2009). There are only a few studies that have examined whether a decrease in anxiety are valid also for interaction with farm animals. However, Berget et al. (2011) found a decline in state anxiety at follow-up six months after the end of a three-month intervention with farm animals for the intervention group of 41 participants with various psychiatric diagnoses (schizophrenia and schizotypal disorders, affective disorders, anxiety and stress-related disorders, and disorders of adult personality and behaviour) compared with the control group, as measured by Spielberger State-Trait Anxiety Inventory (state subscale, STAI-SS). Among the studied diagnoses, beneficial effects on anxiety tended to be higher among the persons with affective disorders. Among clinically depressed persons, Pedersen (2011) found a significant association between a high frequency of complex work tasks with dairy cattle and a decline in state anxiety (STAI-SS) during a 12-week intervention.

Complementary and supplementary treatments are widely used in treatment of depression. More than 50 % of people with depression reported using complementary treatment alone or together with conventional treatment in the US (Kessler et al. 2001). The reasons for this use are several; the side effects of medication are for many people difficult to accept, and a negative view of drug treatment in general could act as an incitement to use complementary treatments. Contact with pet animals is seen to be beneficial for mental health and depression. Souter and Miller (2007) conducted a meta-analysis to determine the effectiveness of AAT and AAA for reducing depressive symptoms in humans. Only five studies, all using dogs, were identified. The mean effect size for the sample of studies was statistically significant, and the findings supported the hypothesis that AAA and AAT are

effective at alleviating depression. A more comprehensive meta-analysis was conducted by Nimer and Lundahl (2007) identifying 49 studies that met the inclusion criteria. The outcomes in the following four areas were studied; medical difficulties, autism-spectrum symptoms, behavioural problems, and emotional well-being. All studies identified moderate effect sizes in the improving outcomes, but research gaps on AAA and AAT were revealed. Previous controlled studies of interaction with pets have shown significant decrease in depression during one week of hospitalisation among 230 psychiatric patients with psychotic and mood disorders (Barker and Dawson, 1998) and after two weeks of intervention with dolphins (Antonioli and Riveley, 2005). In a controlled pilot study on the effect of AAT on anhedonia among 10 schizophrenic patients, the Snaith-Hamilton Pleasure Scale showed significant improvement in the AAT group with a dog compared with the controls (Nathans-Barel et al., 2005). A few studies point to a reduction in depression among persons working with farm animals (Berget et al., 2011; Hine et al., 2008; Ketelaars et al., 2001; Pedersen, 2011). However, for some persons this is only evident during the follow-up period (Berget et al., 2011) or for those that acquire more complex working skills (Pedersen, 2011). Reduction in depression was also found in the control group, although to a lower degree.

## 7. Animals as facilitators of self-efficacy and self-esteem

Based on social cognitive theory, there is a continuous relationship between a person's cognition, behaviour and environment, and the goal of therapy is to bring about positive changes in a person's self-perception and hence their behaviour by improvements in self-efficacy, self-esteem and locus of control. Perceived self-efficacy is a major determinant of motivation for and choice of activity. It also affects the amount and duration of effort a person will allocate in order to cope in a situation or with a task. According to Albert Bandura (1977) self-efficacy is concerned with judgments of how well one can execute courses of action required to deal with prospective situations. People avoid activities that they believe exceed their coping capacities, but they undertake and perform assuredly those that they judge themselves capable of managing. People with low self-efficacy avoid difficult tasks, they lower their goals, and seek less support from others. Failures make them lose faith in themselves, and in turn contribute to lowered mood and depression (Bandura, 1982, 1986, 1997).

Benefits of AAI is often ascribed as the ability of animals to act as living, interactive tools that can be used to help people see both themselves and the world in new ways, and add new skills and responses to their behavioural repertoires (Nebbe, 2000). Although there is some overlap between these theories and those described in the previous sections, what sets them apart is their emphasis on the formation of a working relation between the client and the animal. Most programs that incorporate equines and animal training and care-taking, draw heavily from these theories. There are to date few long-term follow-up studies of the impact of AAI with companion animals on self-efficacy and self-esteem. However, previous RTC- studies with farm animals for severely diseased psychiatric patients showed an increase in self-efficacy at follow-up six months after the end of a three-month intervention for the treatment group, but not for the controls (Berget et al., 2008a; Pedersen, 2011). The studies indicate that positive effects of animal interventions on self-efficacy among these patient groups may take a long time to develop. However, according to Kruger & Serpell (2010), theories that enhance behaviour changes beyond the context of a working

relationship with an animal are conflicting, and yet no evidence exist that longstanding benefits are derived from participation in such programs.

## 8. Attitudes to Animal-Assisted Interventions among therapists

There are until now a few studies examining the attitudes of AAI's among different groups of health care personnel. A study of Rice et al. (1973) showed that the therapists utilized pets as vehicles for cultivating or modelling the positive nature of interpersonal relationship, and most of the 40 respondents pointed out that animals were used to ease the stress of the initial phase of therapy to establish rapport. A qualitative study among 13 psychotherapists using AAT with dogs, found that the majority of the therapists ranked anxiety disorders as one of the diagnoses that profited most on AAT (Mason & Hagan, 1999). Another study by Berget et al. (2008b) examining 60 psychiatric therapists' knowledge, experience and attitudes to Green care and AAT with farm animals for people with psychiatric disorders, showed that most of the therapists thought that AAT with farm animals contributed to increased skills in interactions with other humans. Two-thirds of the therapists believed that AAT with farm animals to a large extent could contribute better to mental health than other types of occupational therapy. However there were no differences in attitudes to AAT between the different professions. A recent survey of beliefs in treatment effects of AAI's for psychiatric patients among 1100 Norwegian practitioners found that the therapists beliefs in treatment effects were most significant for better physical conditions, less symptoms (e.g. anxiety, depression), and a better ability to cope in daily life. The strongest degree of usefulness was reported for mental retardation, while the least significant one was for schizophrenia disorders. Women, more than men, believed in treatment effects and those with a professional experience with AAI more than those without the same experience. Finally, the beliefs in treatment effects from pets were slightly higher than those for farm animals (Berget & Grepperud, 2011). Future evidence-based studies with AAI's in different therapeutic settings will be of importance to develop more professional standards of practise, achieve additional credibility, and become recognized as a legitimate and multidisciplinary speciality. Also studies to investigate effects of AAI's in combination with different rehabilitation programs need to be explored.

## 9. What kind of species is preferred in AAI's?

Selection of species and type of animal used in AAI's are important in order to obtain the desired outcome. People, who are burdened due to difficult personal circumstances or poor health status, as is common for the elderly, can benefit from choosing a cat that requires less care than a dog or a horse. For people with mental health problems a new branch of AAI's using horses is recently evolving; equine-facilitated psychotherapy (EFP). EFP is an experiential psychotherapy that includes equines, and is facilitated by a licensed credentialed mental health professional together with an appropriately credentialed equine professional. EFP may include handling, grooming, longeing, riding, driving and vaulting (Equine Facilitated Mental Health Association, 2010). Green Chimneys (2010) is an example of a comprehensive residential treatment centre for mentally disturbed children where EFP is one of the important treatment modalities that are available. One difference in using e.g. dogs and horses as complementary treatments is whereas dogs can be available 24 hours a day to provide companionship and comfort, EFP requires a significant infrastructure and

human organization in order to provide treatment. Previous studies have demonstrated that EFP is uniquely effective in motivating psychiatric patients and facilitating treatment (Bizub et al., 2003; Burgon, 2003; Fitzpatrick & Tebay, 1997). Similar findings are also shown in studies with traditionally farm animal species (dairy cattle, beef cattle, sheep and goats) (Berget et al., 2007; Scholl et al., 2008, Pedersen et al., in press). However, Cawley et al. (1994) did not reveal any benefits from an eight-week intervention with a horseback-riding programme on self-conception among adolescents with special educational needs. To sum up, a variety of animal species can be used in AAIs, but it is recommended to restrict them to domesticated species, partly by considerations of the safety of the participants, and partly in order to ensure adequate animal welfare. The most feasible species are therefore companion animals, horses and farm animals.

## 10. Summary and conclusions

The prevalence of mental health problems is high and increasing. Many patients experience that they might not receive satisfactory treatment and rehabilitation in the traditional health care system, and it is therefore necessary to investigate other and complementary interventions and therapeutic approaches. One such complementary intervention is AAI, with growing evidence of beneficial effects. The relationship between people and animals is complex, and should always be bi-directional and voluntary. Processes of human-animal interactions may partly be explained by a number of different models or theories, and most of these are based on theories developed for human-human relationships which are applied for human-animal relationships. These theories are not mutually exclusive; and probably there will be large individual differences in which theoretical framework that are most useful and adequate. There are several common concepts between Bowlby's traditional attachment theory and human-animal attachment, and it is hypothesized that animals could play an important role in creating emotional bonds, provide a secure base, and to assist in building representational models. Another theory is social support, and pets may offer a substitute for lacking human support, and thereby acting as a buffer against stress responses or illness. Furthermore, studies show that pets often acts as catalysts facilitating social contact between humans. The theory of biophilia emphasizes that humans through evolution have a natural tendency to focus on nature and life, and as a consequence there are beneficial relationship between nature, reduced stress and health. A release of the hormone oxytocin and decline in blood pressure and heart rate, are seen in several studies when people interact and have physical contact with a pet animal, and this might explain the reduced arousal, anxiety, and depression reported in several studies on AAI. Yet another relevant theoretical framework is Bandura's model of self-efficacy, and animals can be seen as living, interactive tools that can be used to help people add new skills and develop coping abilities. Even though several theories have been proposed, the theoretical framework of AAI is still insufficient. New theories should be developed that generate testable predictions of specific effects of human-animal interactions.

## 11. References

- Alonso, J., Angermeyer, M. C., Bernert, S., Bruffaerts, R., Brugha, T. S., Bryson, H., de Girolamo, G., Graaf, R., Demyttenaere, K., Gasquet, I., Haro, J. M., Katz, S. J., Kessler, R. C., Kovess, V., Lepine, J. P., Ormel, J., Polidori, G., Russo, L. J., Vilagut,



- G., Almansa, J., Arbabzadeh-Bouchez, S., Autonell, J., Bernal, M., Buist-Bouwman, M. A., Codony, M., Domingo-Salvany, A., Ferrer, M., Joo, S. S., Martinez-Alonso, M., Matschinger, H., Mazzi, F., Morgan, Z., Morosini, P., Palacin, C., Romera, B., Taub, N. & Vollebergh, W. A. (2004). Prevalence of mental disorders in Europe: results from the European Study of the Epidemiology of Mental Disorders (ESEMeD) project. *Acta psychiatrica Scandinavica, Supplementum*, Vol.420, pp. 21-27.
- Annerstedt, M. & Währborg P. (2011). Nature-assisted therapy: Systematic review of controlled and observational studies. *Scand J Public Health*. Jun, Vol.39, No.4, pp.:371-88.
- Antonioli, C. & Riveley, M.A. (2005). Randomised controlled trial of animal facilitated therapy with dolphins in the treatment of depression. *British Medical Journal*, Vol.331, pp. 1231-1234.
- Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. *Psychological review*, Vol.84, No.2, pp. 191-215.
- Bandura, A. (1982). Self-efficacy, mechanism in human agency. *American Psychologist*, Vol.37, pp. 122-147.
- Bandura, A. (1986). The explanation and predictive scope of self-efficacy theory. *Journal of Social and Clinical Psychology*, Vol.4, pp. 359-373.
- Bandura, A. (1997). Self-efficacy. *Harvard Mental Health Letter*, Vol.13, pp. 4-7.
- Barak, Y.; Savorai, O., Mavashev, S. & Avshalom, B. (2001). Animal-Assisted Therapy for Elderly Schizophrenic Patients. *American Journal of Geriatric Psychiatry*, Vol.9, pp. 439-442.
- Barker, S.B. & Dawson, K.S. (1998). The effects of animal-assisted therapy on anxiety ratings of hospitalized psychiatric patients. *Psychiatric Services*, Vol. 49, No.6, pp. 97-801.
- Barker, S. B., Pandurangi, A. K. & Best, A. M. (2003a). Effects of animal-assisted therapy on patients' anxiety, fear, and depression before ECT. *Journal of ECT*, Vol.19, No.1, pp.38-44.
- Barker, S. B., Rasmussen, K. G. & Best, A. M. (2003b). Effect of aquariums on electroconvulsive therapy patients. *Anthrozoös*, Vol.16, No.3, pp.229-240.
- Barker, S. B., Knisely, J. S., McCain, N. L. & Best, A. L. (2005). Measuring stress and immune response in healthcare professionals following interaction with a therapy dog: a pilot study. *Psychological Reports*, Vol.98, pp.713-729.
- Bateson, P. (1990). Is imprinting such a special case? *Philosophical Transactions of the Royal Society B: Biological Sciences*, Vol.329, pp.125-131.
- Beck, A.M., Seraydarian, L. & Hunter, G.F. (1986). The use of animals in the rehabilitation of psychiatric inpatients. *Psychological Reports*, Vol.8, pp. 63-66.
- Berget, B. (2006). *Animal-assisted therapy: effects on persons with psychiatric disorders working with farm animals*. Philosophiae Doctor Thesis, Vol.20, ISBN 82-575-0724-5, Norwegian University of Life Sciences, Ås, Norway.
- Berget, B.; Skarsaune, I., Ekeberg, Ø. & Braastad, B.O. (2007). Humans with Mental Disorders Working with Farm Animals: A Behavioral Study. *Occupational Therapy in Mental Health*, Vol.23, No.2, pp. 101-117.
- Berget, B., Ekeberg, O. & Braastad, B. O. (2008a). Animal-assisted therapy with farm animals for persons with psychiatric disorders: effects on self-efficacy, coping ability and quality of life, a randomized controlled trial. *Clinical practice and epidemiology in mental health*, 4:9, Retrieved from



- <http://www.cpementalhealth.com/content/4/1/9>.
- Berget, B., Ekeberg, O. & Braastad, B. O. (2008b). Attitudes to animal-assisted therapy with farm animals among health staff and farmers. *Journal of Psychiatric and Mental Health Nursing*, Vol.15, No.7, pp.576-581.
- Berget, B., Ekeberg, Ø., Pedersen, I. & Braastad, B. O. (2011). Animal-assisted therapy with farm animals for persons with psychiatric disorders: effects on anxiety and depression. A randomized controlled trial. *Occupational Therapy in Mental Health*, Vol.27, No.2, pp.50-64.
- Berget, B., Grepperud, S. (2011). Animal-assisted interventions for psychiatric patients: beliefs in treatment effects among practitioners. *European Journal of Integrative Medicine*, Available from doi: 10.1016/j.eujim.2011.03.001.
- Bernstein, P.L, Friedmann, E. & Malaspina, A. (2000). Animal-assisted therapy enhances resident social interaction and initiation in long-term care facilities. *Anthrozoös*, Vol.3, pp.213-224.
- Bizub, A.L., Joy, A. & Davidson, L. (2003). “ It’s like being in another world”: Demonstrating the benefits of therapeutic horseback riding for individuals with psychiatric disability. *Psychiatric Rehabilitation Journal*, Vol.26, pp.377-384.
- Bjørgen, D. & Johansen, K. J. (2007). Bruker spør bruker, evaluering av Inn på tunet. Brukerevaluering av tilbud til mennesker med psykiske vansker i tre kommuner i Sør-Trøndelag: Prosjektrapport I/2007, Mental helse i Sør- Trøndelag, Norway.
- Bowlby, J. (1982). Attachment and loss: Retrospect and prospect. *American Orthopsychiatric Association*, Vol.52, pp. 664-678.
- Bowlby, J. (1988). *A secure Base*, Basic Books, USA.
- Bretherton, I. (1985). Attachment theory: Retrospect and prospect. *Monographs of the Society for Research in Child Development*, Vol.50, pp.3-35.
- Burgon, H. (2003). Case studies of adults receiving horse-riding therapy. *Anthrozoös*, Vol.16, pp.229-240.
- Cain, A.O. (1983). A study of pets in the family system. In: *New Perspectives in Our Lives with Companion Animals*. A.H.Katcher, & A.M. Beck, (Ed.), University of Philadelphia Press, Philadelphia, PA, USA.
- Cawley, R., Cawley, D. & Retter, K. (1994). Therapeutic horseback riding and self-concept in adolescents with special educational needs. *Anthrozoös*, Vol.7, pp. 129-134.
- Cobb, S. (1976). Social support as a moderator of life stress. *Psychosomatic Medicine*, Vol.38, pp.300-314.
- Cole, K. M., Gawlinski, A., Steers, N. & Kotlerman, J. (2007). Animal-assisted therapy in patients hospitalized with heart failure. *American Journal of Critical Care*, Vol.16, No.6, pp.575-585.
- Corson, S.A., Corson, E.O., Gwynne, P.H. & Arnold L.E. (1977). Pet dogs as nonverbal communication links in hospital psychiatry. *Comprehensive Psychiatry*, Vol.18, pp. 61-72.
- Crawford, E.K., Worsham, N.L. & Swinehart, E.R. (2006). Benefits derived from companion animals, and the use of the term “attachment”. *Anthrozoös*, Vol.19, pp. 98-112.
- Delta Society. Animal-Assisted Activities (AAA); Animal-Assisted Therapy (AAT). Available from: <http://www.deltasociety.org/Page.aspx?pid=319>; <http://www.deltasociety.org/Page.aspx?pid=320>; last visited 18/05/11.

- Elings, M. & Hassink, J. (2008). Green Care Farms, A Safe Community Between Illness or Addiction and the Wider Society. *International journal of therapeutic communities*, Vol.29, No.3, pp.310-322.
- Enders-Slegers, M.J. (2000). The meaning of companion animals: Qualitative analysis of the life histories of elderly cat and dog owners. In: *Companion Animals and us: Exploring the Relationships between People and Pets*. A.L. Podberscek, E.S.Paul, & J.A.Serpell, (Ed.), pp. 209-236, Cambridge University Press, Cambridge, UK.
- Equine Facilitated Mental Health Association. (2010). Retrieved Jan. 15 from <http://www.narha.org/SecEFMHA/WhatIsEFMHA.asp>.
- Eriksen, W. (1994). The role of social support in the pathogenesis of coronary heart disease: A literature review. *Journal of Family Practice*, Vol.11, pp.201-209.
- Fine, A.H. (2000). Animals and therapists: incorporating animals in outpatient psychotherapy. In: *Handbook on Animal-Assisted Therapy. Theoretical Foundations and Guidelines for Practice*. First Edition, A.H.Fine, (Ed.), pp. 179-211, ISBN 0-12-256475-8, San Diego, USA.
- Fitzpatrick, J.C. & Tebay, J.M. (1997). Hippotherapy and therapeutic riding. In: *Companion Animals in Human health*. C.C. Wilson, & D.C. Turner (Ed.), pp. 3-22, Sage Publishers, Thousand Oaks, CA, USA.
- Friedmann, E., Katcher, A.H., Lynch, J.J. & Thomas, S.S. (1980). Animal companions and one-year survival of patients after discharge from a coronary care unit. *Public Health Reports*, Vol.95, pp.307-312.
- Friedmann, E. & Thomas, S.A. (1995). Pet ownership, social support, and one-year survival after acute myocardial infarction in the Cardiac Arrhythmia Suppression Trial (CAST). *American Journal of Cardiology*, Vol.76, pp.1213-1217.
- Friedmann, E., Soon, H. & Tsai, C.C. (2010). The animal/human bond: health and wellness. In: *Handbook on Animal-Assisted Therapy. Theoretical Foundations and Guidelines for Practice*. Third Edition, A.H.Fine, (Ed.), pp. 85107, ISBN 978-0-12-381453-1, San Diego, USA.
- Garrity, T.F. & Stallones, L. (1998). Effects of pet contact on human well-being. In: *Companion Animals in Human health*. C.C. Wilson, & D.C. Turner (Ed.), pp. 3-22, Sage Publishers, Thousand Oaks, CA, USA.
- Glass, T.A., Matchar, D.B., Belyea, M. & Feussner, J.R. (1993). Impact of social support on outcome in first stroke. *Stroke*, Vol.24, pp.64-70.
- Green Chimneys. (2010). Retrieved Jan. 15 from [www.greenchimneys.org/](http://www.greenchimneys.org/).
- Handlin, L. (2010). *Human-Human and Human-Animal Interaction. Some common Physiological and Psychological Effects*. Philosophiae Doctor Thesis, Vol.98, ISBN 978-91-576-7543-9, Swedish University of Agricultural Sciences, Skara, Sweden.
- Hart, L.A. (1992). Therapeutic riding: assessing human versus horse effects. *Anthrozoös*, Vol.5, pp.138-139.
- Haubenhofer, D., Elings, M., Hassink, J. & Hine, R.E (2010). The development of green care in western european countries. *Explore*, Vol.6, pp.106-11.
- Hine, R., Peacock, J. & Pretty, J. (2008). Care Farming in the UK: Contexts, Benefits and Links with Therapeutic Communities. *International journal of therapeutic communities*, Vol.29, No.3, pp.245-260.
- Hoffmann, A. O. M., Lee, A. H., Wertenauer, F., Ricken, R., Jansen, J. J., Gallinat, J. & Lang, U. E. (2009). Dog-assisted intervention significantly reduces anxiety in hospitalized

- patients with major depression. *European Journal of Integrative Medicine*, Vol.1, No.3, pp.145-148.
- Ihlebaek. C., Brage, S. & Eriksen H.R. (2007). Health complaints and sickness absence in Norway, 1996-2003. *Occup Med* (Lond), Jan, Vol.57, No.1, pp.43-9.
- Johnson, T.P., Garrity, T.F. & Stallones, L. (1992). Psychometric evaluation of the Lexington Attachment to Pets Scale (LAPS). *Anthrozoös*, Vol.5, pp. 160-175.
- Katcher, A.H., Friedmann, E., Beck, A.M. & Lynch, J.J. (1983). Talking, looking, and blood pressure: Physiological consequences of interaction with the living environment. In: *New Perspectives in Our Lives with Companion Animals*. A.H.Katcher, & A.M. Beck, (Ed.), University of Philadelphia Press, Philadelphia, PA, USA.
- Katcher, A.H. & Beck, A. (1989). Human-animal Communication. In: *International encyclopedia of communications*. E. Barnow, (Ed.), Oxford University Press, London, UK.
- Katcher, A.H. (2000). The Future of Education and Research on the Animal-Human Bond and Animal-Assisted Therapy. In: *Handbook on Animal-Assisted Therapy. Theoretical Foundations and Guidelines for Practice*. First Edition, A.H.Fine, (Ed.), pp. 461-473, ISBN 0-12-256475-8, San Diego, USA.
- Kellert, S. R. (1993). The Biological Basis for Human Values of Nature. In: *The Biophilia hypothesis*, S.R. Kellert & E.O. Wilson (Ed.), pp. 42-66, Island Press, Washington, D.C., USA.
- Kessler, R. C., Soukup, J., Davis, R. B., Foster, D. F., Wilkey, S. A., Van Rompay, M. I. & Eisenberg, D. M. (2001). The use of complementary and alternative therapies to treat anxiety and depression in the United States. *The American journal of psychiatry*, Vol.158, No.2, pp.289-294.
- Ketelaars, D., Baars, E. & Kroon, H. (2001). *Healing through working. A study of Therapeutic Communities for persons with Psychiatric Problems*. New York, USA, Mercury Press, 206 p.
- Kidd, A.H. & Kidd, R.M. (1980). Personality characteristics of horse, turtle, snake, and bird owners. *Psychological reports*, Vol.46, pp. 939-949.
- Kringlen, E., Torgersen, S. & Cramer, V. (2001). A Norwegian psychiatric epidemiological study. *The American journal of psychiatry*, Vol.158, No. 7, pp. 1091-1098.
- Kringlen, E., Torgersen, S. & Cramer, V. (2006). Mental illness in a rural area: a Norwegian psychiatric epidemiological study. *Social psychiatry and psychiatric epidemiology*, Vol.41, No.9, pp. 713-719.
- Kruger, K.A. & Serpell, A. (2006). Animal-Assisted Interventions in Mental Health: Definitions and Theoretical Foundations. In: *Handbook on Animal-Assisted Therapy. Theoretical Foundations and Guidelines for Practice*. Second Edition, A.H.Fine, (Ed.), pp. 21-38, ISBN 13: 978-0-1236-9484-3, San Diego, USA.
- Kruger, K.A. & Serpell, A. (2010). Animal-Assisted Interventions in mental health. In: *Handbook on Animal-Assisted Therapy. Theoretical Foundations and Guidelines for Practice*. Third Edition, A.H.Fine, (Ed.), pp. 33-48, ISBN 978-0-12-381453-1, San Diego, USA.
- Kulik, J.A. & Mahler, H.I.M. (1989). Social support and recovery from surgery. *Health Psychology*, Vol.8, pp.221-238.
- Levinson, B.M. (1962). The dog as a co-therapist. *Mental Hygiene*, Vol.46, pp. 59-65.

- Levinson, B.M. (1978). Pets and personality development. *Psychological Reports*, Vol.42, pp. 1031-1038.
- Logstein, B. & Bleksaune, A. (2010). *Trender i norsk landbruk. Hedmark*. Vol. 8/10, Norsk senter for bygdeforskning, Trondheim, Norway.
- Luppa, M., Heinrich, S., Angermeyer, M.C., König, H.-H. & Riedel-Heller, S.G. (2007). Cost-of-illness studies of depression: A systematic review. *Journal of affective disorders*, Vol.98, No.1-2, pp. 29-43.
- Mallon, G. P. (1994). Cow as Co-Therapist: Utilization of Farm Animals as Therapeutic Aides with Children in Residential Treatment. *Child and Adolescent Social Work Journal*, Vol.11, No.6, pp.455-474.
- Mason S., Hagan, C.B. (1999). Pet-assisted psychotherapy. *Psychological Reports*, Vol.84, pp.1235-1245.
- Matsuura, A., Nagai, N., Funatsu, A., Yamazaki, A. & Hodate, K. (2007) Changes in automatic nervous activity before and after horse trekking measured by heart rate variability and salivary amylase activity, *Abstracts, 11th International Conference on the Relationship Between Humans and Animals*, p. 39, Tokyo, Japan, 5-8 October, 2007.
- McNicholas, J. & Collis, G.M. (2000). Children's representations of pets in their social networks. *Child Care Health Development*, Vol.27, pp.279-294.
- McNicholas, J., Collis, G.M. (2006). Animals as social supports: Insights for Understanding Animal-Assisted Therapy. In: *Handbook on Animal-Assisted Therapy. Theoretical Foundations and Guidelines for Practice*. Second Edition, A.H.Fine, (Ed.), pp. 49-71, ISBN 13: 978-0-1236-9484-3, San Diego, USA.
- Messent, P.R. (1983). Social facilitation of contact with other people by pet dogs. In: *New Perspectives in Our Lives with Companion Animals*. A.H.Katcher, & A.M. Beck, (Ed.), University of Philadelphia Press, Philadelphia, PA, USA.
- Miller, S. C., Kennedy, C., Devoe, D., Hickey, M., Nelson, T. & Kogan, L. (2009). An Examination of Changes in Oxytocin Levels in Men and Women Before and After Interaction with a Bonded Dog. *Anthrozoös*, Vol.22, No.1, pp.31-42.
- Milne, D. L. (1999). *Social Therapy: A Guide to Social Support Interventions for Mental Health Practitioners*. Chichester, John Wiley, 267 p.
- Moussavi, S., Chatterji, S., Verdes, E., Tandon, A., Patel, V. & Ustun, B. (2007). Depression, chronic diseases, and decrements in health: results from the World Health Surveys. *Lancet*, Vol.370, No.9590, pp. 851-858.
- Mykletun, A. & Knudsen, A.K. (2009). Tapte arbeidsår ved uførepensjonering for psykiske lidelser, Vol.4, Nasjonalt folkehelseinstitutt, Oslo, Norway.
- Nathans-Barel, I., Feldman, P., Berger, B., Modai, I. & Silver, H. (2005). Animal-assisted therapy ameliorates anhedonia in schizophrenia patients - A controlled pilot study. *Psychotherapy and Psychosomatics*, Vol.74, No.1, pp.31-35.
- Nebbe, L. (2000). Nature Therapy. In: *Handbook on Animal-Assisted Therapy. Theoretical Foundations and Guidelines for Practice*. First Edition, A.H.Fine, (Ed.), pp. 179-211, ISBN 0-12-256475-8, San Diego, USA.
- Nimer, J. & Lundahl, B. (2007). Animal-assisted therapy: A meta-analysis. *Anthrozoös*, Vol.20, No.3, pp.225-238.
- Odendaal, J. S. J. (2000). Animal-assisted therapy - magic or medicine? *Journal of Psychosomatic Research*, Vol.49, No.4, pp.275-280.

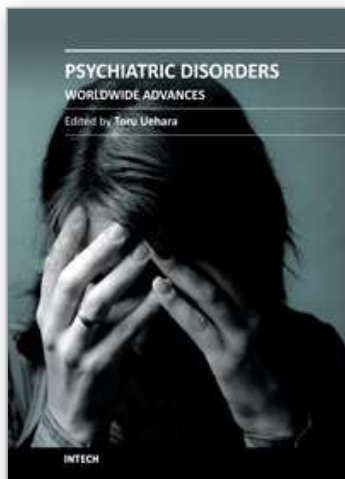


- Odendaal, J. S. & Meintjes, R. A. (2003). Neurophysiological correlates of affiliative behaviour between humans and dogs. *Veterinary journal*, Vol.165, No.3, pp.296-301.
- Pachana, N. A., Ford, J. H., Andrew, B. & Dobson, A. J. (2005). Relations between companion animals and self-reported health in older women: cause, effect or artifact? *International journal of behavioral medicine*, Vol.12, No.2, pp.103-110.
- Parslow, R., Jorm, A., Christensen, H., Rodgers, B. & Jacomb, P. (2005). Pet Ownership and Health in Older Adults: Findings from a Survey of 2,551 Community-Based Australians Aged 60-64. *Gerontology*, Vol.51, No.1, pp.40.
- Pedersen, I. (2011). *Farm animal-assisted interventions in clinical depression*, Philosophiae Doctor Thesis, Vol.25, ISBN 978-82-575-0989-7, Norwegian University of Life Sciences, Ås, Norway.
- Pedersen, I., Nordaunet, T., Martinsen, E.W, Berget, B., Braastad, B.O. Relationship between behavior and change in mental health among persons with clinical depression during a farm animal-assisted intervention. *Issues in Mental Health Nursing* (in press).
- Rice, S., Brown, L. & Caldwell, H. (1973). Animals and psychotherapy: A survey. *Journal of Community Psychology*, Vol.1, pp.323-326.
- Robins, L.N. & Regier, D.A. (1991). *Psychiatric disorders in America*, Free Press, New York, USA.
- Rossetti, J. & King, C. (2010). Use of Animal-Assisted Therapy with Psychiatric Patients: A Literature Review. *Journal of Psychosocial Nursing & Mental Health Services*, Vol.11, pp.44-48.
- Russow, L.M. (2002). Ethical implications of the human-animal bond. *International League of Associations for Rheumatology*, Vol.43, No.1, pp. 33-37.
- Scholl, S., Grall, G., Petzl, V., Röthler, M., Slotta-Bachmayr, L. & Kotrschal, K. (2008). Behavioural Effects of Goats on Disabled Persons. *International journal of therapeutic communities*, Vol.29, No3, pp.297-309.
- Sempik, J. (2008). Green care: A natural resource for therapeutic communities? *International Journal of Therapeutic Communities*, Vol.29, No.3, Autumn (2008), pp. 29:221-27, ISSN 0964-1866.
- Sempik, J., Hine, R.E. & Wilcox, D. (2010). *Green care: A conceptual framework. A report of the working group on the health benefits of Green care. COST Action 866, Green Care in Agriculture*, ISBN 978-1-907382-23-9, Loughborough University, UK.
- Serpell, J. (2010). Animal-assisted interventions in historical perspective. In: *Handbook on Animal-Assisted Therapy. Theoretical Foundations and Guidelines for Practice*. Third Edition, A.H.Fine, (Ed.), pp. 17-32, ISBN 978-0-12-381453-1, San Diego, USA.
- Siegel, J.M. (1990). Stressful life events and use of physician services among the elderly: The moderating role of pet ownership. *Journal of Personality and Social Psychology*, Vol.58, pp.1081-1086.
- Sife, W. (1998). *The Loss of a Pet*, Howell Book House, New York, USA.
- Souter, M. A. & Miller, M. D. (2007). Do animal-assisted activities effectively treat depression? A meta-analysis. *Anthrozoös*, Vol.20, No.2, pp.167-180.
- Stallones, L., Marx, M., Garrity, T.F. & Johnson, T.P. (1988). Attachment to companion animals among older pet owners. *Anthrozoös*, Vol.2, pp. 118-124.
- Tannenbaum, J. (1995). *Veterinary Ethics: Animal Welfare, Client Relations, Competition and Collegiality* (2 end ed.), Mosby, St. Louis, USA.



- Triebenbacher, S. L. (1998). Pets as transitional objects. Their role in children's emotional development. *Psychological Reports*, Vol.82, pp. 191-200.
- Uvnäs-Moberg, K. (1998). Oxytocin may mediate the benefits of positive social interaction and emotions. *Psychoneuroendocrinology*, Vol.23, pp.819-835.
- Ulrich, R. S. (1993). Biophilia, Biophobia and natural landscapes. In: *The Biophilia hypothesis*, S.R. Kellert & E.O. Wilson (Ed.), pp. 73-137, Island Press, Washington, D.C., USA.
- Villalta-Gil, V., Roca, M., Gonzalez, N., Domenec, E., Cuca, Escanilla, A., Asensio, M. R., Esteban, M. E., Ochoa, S. & Haro, J. M. (2009). Dog-Assisted Therapy in the Treatment of Chronic Schizophrenia Inpatients. *Anthrozoös*, Vol.22, No.2, pp.149-159.
- Voith, V.L. (1985). Attachment of people to companion animals. *The Veterinary Clinics of North America: Small Animal Practice*, Vol.15, pp. 289-296.
- Wallendorf, M. & Belk, R. (1987). *Deep Meaning in Possessions*, Marketing Science Institute, Cambridge, MA, UK.
- Wilson, E. O. (1984). *Biophilia*. Cambridge, Harvard University Press, 180 p.
- Wilson, E. O. (1993). Biophilia and the Conservation Ethic. In: *The Biophilia hypothesis*, S.R. Kellert & E.O. Wilson (Ed.), pp. 31-67, Island Press, Washington, D.C., USA.
- Winefield, H.R., Winefield, A.H. & Tiggermann, M. (1992). Social support and psychological well-being in younger adults: The multi-dimensional support scale. *Journal Personal Assess*, Vol.58, pp.198-210.
- Wortman, C.B. (1984). Social support and the cancer patient: Conceptual and methodological issues. *Cancer*, Vol.53, pp.2339-2360.

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A psychiatric disorder is defined as any complex condition that involves the impairment of cognitive, emotional, or behavioral functioning. Aside from knowing the physical organic factors, its causal pathology has remained a mystery. Regarding recent advances in psychiatry and neurosciences, psychiatric disorders have been closely associated with socio-cultural, psychological, biochemical, epigenetic or neural-networking factors. A need for diverse approaches or support strategies is present, which should serve as common knowledge, empathetic views or useful skills for specialists in the field. This book contains multifarious and powerful papers from all over the world, addressing themes such as the neurosciences, psychosocial interventions, medical factors, possible vulnerability and traumatic events. Doubtlessly, this book will be fruitful for future development and collaboration in “world psychiatry”.

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