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Resources for the Study of the Human-Animal Bond

The Effect of Human-Animal Interaction on Human Cardiovascular Health

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About This Document

HABRI Central Briefs are peer-reviewed summaries of particular applications and issues within the field of human-animal interaction. Each Brief presents an overview of the subject matter, assesses the current state of research, then highlights unresolved questions or issues. Key resources are identified for further reading.

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Overview

More than 2,150 Americans die from cardiovascular disease (CVD) daily, an average of 1 death every 40 seconds (Go et al., 2014). In any given year, approximately 620,000 Americans suffer their first coronary attack, and 295,000 have a repeat attack. Even though rates of CVD declined between 2000 and 2010 (Go et al., 2014), its impact on healthcare costs and the lives of affected individuals, their families, and the community is substantial. In an attempt to further reduce rates of CVD and improve myocardial infarction (MI) survival rates, researchers extensively studied the effects of various medical and social variables on cardiovascular health, including human-animal contact. Human-animal interaction (HAI) can include temporary contact, regular contact, cohabitation, or ownership. Distinguishing between the different types of contact is crucial, as some studies involve interaction with a friendly but unfamiliar animal (such as visitation programs), while others (including those evaluating MI survival) involve ownership.

Early studies on HAI and cardiovascular health in humans suggested a relationship between pet ownership and cardiovascular health; pet owners were reported as more likely to survive at least one year after an MI. Subsequent studies produced mixed results, so the true effect of pet ownership on cardiovascular health remains unclear. This brief summarizes the current knowledge on the cardiovascular benefits of HAI and the mechanisms by which they may occur. Additionally, suggestions are made for future research and key resources for further study are identified.

State of Current Knowledge

OWNERSHIP TYPE

PRE-EXISTING OWNERSHIP

A ground-breaking study by Friedman et al. (1980) followed 92 people who had been treated for MI or angina pectoris and discharged (Friedmann, Katcher, Lynch, & Thomas, 1980). Survival after one year was 94% (50/53) for pet owners and 72% (28/39) for those with no pets. Pet ownership correlated with survival and reduced severity of disease. This finding was replicated in a later study of 424 survivors of MI (Friedmann & Thomas, 1995).

Subsequent studies on the cardiovascular benefits of pets produced mixed results. Qureshi et al. (2009) found a beneficial effect only for past cat ownership, not present

cat or dog ownership, while Parker et al. (2010) found that dog owners were more likely to be alive one year post cardiac-related hospitalization, but that cat owners were more likely to experience death or hospital readmission during that same time-frame.

The results regarding the relation of pet ownership with overall health and cardiovascular risk factors are similarly mixed. Headey and Grabka (2007) found that pet owners were healthier overall and have 15% fewer annual doctor visits than non-owners. Pet owners have also been found to have lower blood pressure, rates of smoking, and body mass index scores (Anderson, Reid, & Jennings, 1992). Additionally, pet owners have been found to have lower rates of depression (Perlmutter, Frishman, & Feinstein, 1999) and higher scores on physical quality of life (Lewis, Krägeloh, & Shepherd, 2009). In contrast, Australian research found that pet owners have higher rates of elevated blood pressure and smoking, and that they were not healthier overall (Simons, Simons, McCallum, & Friedlander, 2000). Along the same lines, a Finnish survey found that pet owners were more likely to have high blood pressure and that pet ownership had no correlation with rates of angina pectoris (chest pain) or MI (Koivusilta & Ojanlatva, 2006).

There are many potential confounding factors that may distort the apparent effects of pet ownership on cardiovascular risk factors and outcomes, including that people who decide to get a pet may already be healthier overall than those who do not acquire a pet. Additionally, the type of pet selected may be influenced by health status. A person who is healthier may choose a more demanding pet, such as a dog, while a person whose health is poor may choose a more sedentary pet, such as a cat or fish. Controlled studies, a comprehensive meta-analysis, or regression studies to address potential confounders would assist in clarifying this area of research.

PRESCRIBED OWNERSHIP

It is difficult to use typical experimental controls to study the effects of prescribed pet ownership, and giving pets to people who don't presently own them or withholding pets from people who have or wish to acquire them presents a number of ethical issues for both the person and the animal. As such, studies are generally limited to individuals not opposed to acquiring a pet. This means the majority of participants already have a favorable view of animals, which may influence the outcome. Regardless, there have been several studies on the effects of prescribed pet ownership. Allen, Shykoff, and Izzo (2001) randomly assigned individuals with high blood pressure to either be prescribed a pet or to a control group. At the follow up appointment, the blood pressure of those in the pet ownership group rose less in the presence of stressors when compared to the control group. In another study, elderly volunteers provided with goldfish also demonstrated a decrease in blood pressure (Riddick, 1985).

VISITING OR THERAPY ANIMALS

Many studies have evaluated the effect of visitation with an unfamiliar, but friendly animal. The majority of these studies found that even a few minutes with an animal can have beneficial health effects, including lowering an individual's cortisol levels (Barker, Knisely, McCain, & Best, 2005) and decreasing their blood pressure (Cole, Gawlinski, Steers, & Kotlerman, 2007). However this effect may be mediated by the type of animal, and the person's pre-existing attitudes towards animals (Friedmann, Locker, & Lockwood, 1993).

Mechanisms of Effect

EXERCISE OR OTHER MEANINGFUL ACTIVITY

Owning certain animals, such as dogs and horses, may encourage people to be more physically active. At face value the correlation seems logical, however, the actual relationship between pet ownership and levels of physical activity is not well understood. It is known that increased physical activity can improve health and lead to a better overall quality of life (Lewis et al., 2009), and that cardiovascular health is improved by maintaining a healthy body weight and achieving recommended levels of exercise. It stands to reason, for example, that dog owners would walk their dogs and thus have higher rates of physical activity. In fact, several studies have shown that dog owners do have higher levels of physical activity than non-owners (H. Cutt, Giles-Corti, Knuiman, & Burke, 2007) and that the acquisition of a dog increased activity levels (H. E. Cutt, Knuiman, & Giles-Corti, 2008). Additionally, those dog owners who walk their dogs regularly are more likely to achieve recommended levels of exercise (Thorpe et al., 2006). However, not all studies have found that dog ownership is associated with higher activity levels (Pachana, Ford, Andrew, & Dobson, 2005), and several studies found that pet owners did not have lower body mass indexes (Koivusilta & Ojanlatva,

2006; Serpell, 1991) or a longer lifespan (Gillum & Obisesan, 2010). Additionally a study by Utz (2014) found that pet owners were healthier overall, but that the positive health effects could not be traced to healthy behaviors, such as increased exercise. The conflicting results of studies on pet ownership and exercise have not been adequately elucidated, but may be explained by the a priori reason for the acquisition of the dog and behavioral beliefs of the individual. For example, simply having a dog is unlikely to compel someone to exercise more, however, someone who believes in having an active lifestyle may be more likely to acquire a dog.

Ownership of other pet species, such as cats, has sometimes been associated with a particularly inactive lifestyle (Rijken & van Beek, 2011). However, these pets may still provide health benefits by adding complexity, structure, and social responsibilities to daily life (Friedmann et al., 1980; Rijken & van Beek, 2011).

SOCIAL SUPPORT

Animals, and dogs in particular, are perceived as non-judgmental and hence tend to have a calming and reassuring influence (Allen, 2003). Non-judgmental social support is known to act as a stress buffer, reducing the severity of physical and psychological damage caused by negative experiences. Animals are also viewed as social catalysts, and may facilitate social interactions between their owner and other people (McNicholas & Collis, 2000). Thereby helping their owners engage with their community (Wood, Giles-Corti, & Bulsara, 2005).

Animals may also provide positive focus and daily structure, which can decrease anxiety (Cole et al., 2007). Depression has been linked to higher rates of mortality from heart disease (Welin, Lappas, & Wilhelmsen, 2000), and there is evidence that the presence of an animal reduces depression (Perlmutter et al., 1999). Thus one potential mechanism by which pets can improve cardiovascular health is the reduction of symptoms of anxiety and depression (Friedmann, Thomas, & Son, 2011).

The strongest evidence for pets as a source of social support was a study by Herrald, Tomaka, and Medina (2002) who found that after surgery to correct cardiac insufficiencies, pet owners were more compliant with the cardiovascular rehabilitation program. The authors posited that this increased compliance was the result of the extra social support provided by the pet, the daily structure the pet requires, or even the patients' desire to stay alive so that the pet would be cared for.

PHYSIOLOGY

Some, but not all, studies have found that people with pets have lower resting blood pressure (Allen, Blascovich, & Mendes, 2002; Katcher, Friedmann, Beck, & Lynch, 1983) or that the presence of a pet may make blood pressure less reactive to stressors (Allen, 2003). Thus even when resting blood pressure is not affected, pets may act as a buffer to sudden changes or peaks in blood pressure (Virués-Ortega & Buela-Casal, 2006). For people who enjoy the presence of animals, this buffering effect may also occur in the presence of friendly but unfamiliar pets (Cole et al., 2007). However, people who do not have a favorable view of animals may experience no benefit or actually become stressed in the presence of an animal (Kingwell, Lomdahl, & Anderson, 2001; Zilcha-Mano, Mikulincer, & Shaver, 2012).

Reduced heart rate variability (inter-beat interval) has been associated with cardiac disease and mortality. Both walking with a dog and having a dog visit the home have been shown to improve heart rate variability in elderly individuals (Motooka, Koike, Yokoyama, & Kennedy, 2006).

It has been suggested, but not yet confirmed that the beneficial physiological effects of contact with animals occurs because of the hormone oxytocin (Beetz, Uvnäs-Moberg, Julius, & Kotrschal, 2012). Oxytocin is released during physical acts, such as touch, usually in the context of a secure relationship; it has been shown to have anti-stress effects, increase the pain threshold, stimulate social interaction, and increase the function of the parasympathetic nervous system. The effects of oxytocin cannot explain all of the physiological benefits of HAI, however, it does help to explain the findings of many studies that physical contact with the animal is important (Vormbrock & Grossberg, 1988), and that there is a more pronounced effect with a pet you are familiar with (Virués-Ortega & Buela-Casal, 2006).

Precautions

Interaction with animals should be considered adjunctive to other treatments, and incorporated as part of an overall treatment plan, not as a substitute for human companionship, therapy, or medication (Wolff & Frishman, 2004). Consideration should be given to the ability of the patient to care for an animal, as well as any manner in which the pet may present a health risk or become an obstacle to the owner obtaining health care (Bokkers, 2006; Mayon-White, 2005). Additionally, consideration should be given to the risk of bereavement owing to the loss of the animal. The ideal relationship will be mutually beneficial for the human and the animal, and care should be taken to foster this outcome.

Areas for Future Investigation

The generalizability of current studies is limited by the small sample sizes of controlled studies and the potential impact of confounding variables in larger observational studies. While these limitations are somewhat inherent in working with complex health and relational variables, the funding of more ambitious studies and the use of analytical approaches that address complex correlations should be considered. Where appropriate, randomization strategies should be applied. For example, even if randomization of animal interaction is not possible, random sampling techniques can be utilized.

The current data suggests that HAI has great potential in the prevention and treatment of cardiovascular disease, if the mechanisms of effect and most appropriate techniques can be further elucidated.

Studies have shown great variability in physical activity among dog owners; future research should take into account the effects of policy and the built environment (natural or artificial infrastructure surrounding an individual), as these may be mediating factors.

The majority of studies have analyzed the effects of dogs. There is a need to conduct empirical studies on the potential benefits of other types of HAI employing other domesticated animals, such as horses, or the appreciation of animals in the natural environment.

Conclusion

The benefit of pet ownership on human health has received wide acclaim, however this effect may be overstated or overgeneralized if disproportionate attention is paid to positive findings. There is presently insufficient evidence to conclude that pet owners are healthier than non-pet owners, and the correlation between animal interaction and cardiac health is complex and not currently well understood. However, most studies have demonstrated that the presence of an animal can cause reductions in heart rate and blood pressure or serve as a buffer to stress responses. Additionally, these effects may be stronger with an individual's own animal. The strongest data concerning the cardiac effects of pet ownership relates to the elderly (Lewis et al., 2009; Motooka et al., 2006; Riddick, 1985), people with high stress or isolated lifestyles (Allen et al., 2001; Headey & Grabka, 2007), people with positive attitudes towards pets (Zilcha-Mano et al., 2012), and people who are actively interested in acquiring a pet (Allen et al., 2001; Kingwell et al., 2001).

Some researchers believe that the role of confounding factors make it impossible to accurately assess the impact of companion animals on human health using observational studies (Pachana et al., 2005), and that when other lifestyle or demographic factors are taken into account, the effect of pet ownership on health may be negligible (Wright & Moore, 1982). However, it is likely that various studies have produced mixed results because of the variety of methods used, the complexity of the issues being studied, differences in research goals, and the variable quality of the studies (Bokkers, 2006). Future research which takes into account these issues could bring clarity to the subject and provide HAI programs with a firm empirical foundation.

Pets can provide enriching experiences, and the currently ambiguous state of the literature should not represent an obstacle to ownership. Unless necessary for the health of the patient or animal, those who already own animals should not be subjected to the duress of separation from their animal. Additionally, under certain circumstances, the acquisition of a pet should be considered as part of an overall plan to improve health.

Key Resources

Beetz, A., Uvnäs-Moberg, K., Julius, H., & Kotrschal, K. (2012). Psychosocial and psychophysiological effects of human-animal interactions: The possible role of oxytocin. Frontiers in Psychology, 3(234), 1-15.

Beetz et al. review original studies on human-animal interactions. They find 69 studies which met their inclusion criteria. The beneficial effects of HAI on cardiovascular disease are well documented. There is limited evidence to suggest positive HAI effects on reduction of stress related parameters. The authors propose that the activation of the oxytocin system plays a key role in the reported psychological and physiological effects of HAI.

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). The American Journal of Cardiology, 76(17), 1213-1217.

Friedmann et al. follow 424 patients for one year after an acute MI. Of the 424 participants, 112 of them own pets. Dog ownership, but not cat ownership, is an independent predictor of survival status. There is no evidence of differences in the physiological status of dog owners and non-owners, suggesting that healthier people might own dogs in the first place.

Friedmann, E., Thomas, S. A., & Son, H. (2011). Pets, depression and long term survival in community living patients following myocardial infarction. Anthrozoos, 24(3), 273-285.

Previous studies had demonstrated the correlation of pet ownership and lower mortality rates one year after survival of MI. The present study extends that research by investigating whether or not pet ownership contributed to long term survival. The study finds that even after controlling for the effects of depression that pet ownership does contribute to long-term survival of MI.

Katcher, A. H., Friedmann, E., Beck, A. M., & Lynch, J. J. (1983). Looking, talking and blood pressure: The physiological consequences of interaction with the living environment. New Perspectives on our Lives with Companion Animals, 351-359.

One of the first studies to explore the relationship between companion animal contact and a beneficial physiological response in humans. This study establishes an objective metric—blood pressure—to be used to assess the effect of companion animal contact on stress in humans.

Levine, G. N., Allen, K., Braun, L. T., Christian, H. E., Friedmann, E., Taubert, K. A., . . . Lange, R. A. (2013). Pet ownership and cardiovascular risk: A scientific statement from the American Heart Association. Circulation, 127(23), 2353-2363.

This scientific statement from the American Heart Association reviews the current knowledge on the relationship between pet ownership and cardiovascular health. They conclude that pet ownership is probably associated with decreased cardiovascular disease risk, and that there may be a causal role. However, they caution that pet acquisition should not be done solely for the purpose of reducing cardiovascular disease risk. The authors advise that future studies should be prospective and collect information on socioeconomic factors and comorbid conditions. Additionally, robust statistical methodology, including randomization, are encouraged.

Wolff, A. I., & Frishman, W. H. (2004). Animal-assisted therapy in cardiovascular disease. Seminars in Integrative Medicine, 2(4), 131-134.

Wolff and Frishman give a brief overview of the history of animal assisted therapy, which began in Belgium the 9th century. The beneficial effects of animals as pets is also discussed. Additionally, they review the current knowledge on AAT and the cardiovascular system, and examine the possible mechanisms of action for these effects. The authors conclude that many studies have shown favorable effects of human-animal interaction, and that more studies evaluating the physiological mechanisms are needed. Given the present scientific knowledge, pets should be utilized as an adjunct therapy and should not replace current medical protocols.

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