Childhood Allergies & Immunity

Long before evidence and research specifically defined the benefits of the human and animal bond, people routinely included animals in many aspects of their lives. Many not only viewed these animals as pets, but also as members of their families[1]. According to the American Pet Products Association’s 2009-2010 National Pet Owner’s Survey[2], approximately 62% of American households have pets. Currently some researchers explore the possible protective benefits of pet ownership and animal interactions for children from allergies and respiratory tract infections, as well as their contributions to improved immune function in general.

The National Institute of Allergy and Infectious Diseases defines an allergy as a reaction of the immune system to something that does not affect the majority of the population[3]. An allergic reaction is comparable to a fire department’s response to a false alarm. People with allergies are often sensitive to multiple substances; common ones include pollen, dust mites, mold spores, pet dander, food, insect stings, and medicines[3]. Scientists posit that allergies result from a combination of environmental and genetic factors. The allergic response may include a runny nose, sneezing, itching, rashes, swelling, or asthma. While not usually life-threatening, in severe cases an allergic reaction may cause anaphylaxis, which can be fatal[3].

The term eczema refers to a common skin condition characterized by irritation, reddening, and swelling[4]. Allergies, diseases, irritating substances, and a genetic predisposition all may contribute to eczema. Eczema is not contagious and most commonly occurs in babies and young children[4]. Studies suggest that pets may have a protective effect for young children from allergies and eczema later in life[1].

In addition to conferring protection from certain allergies, exposure to pets may protect children’s health in other ways. Like vaccines, which prompt the body’s immune system to create antibodies to fight specific disease-causing microorganisms[5], pet ownership may protect children against certain kinds of infections[6].

While some studies suggest dogs produce the strongest protective effect against allergies and infections, other studies indicate that exposure to cats and pets of other species also confer this benefit. The mechanisms by which animals generate the effect remain unclear, although researchers propose models and hypotheses for discussion.

State of Current Research

According to Kei E. Fujimura, Christine C. Johnson, Dennis R. Ownby, Michael J. Cox, Eoin L. Brodie, Suzanne L. Havstad, Edward M. Zoratti, Kimberley J. Woodcroft, Kevin R. Bobbitt, Ganesa Wegienka, Homer A. Bosshey, and Susan V. Lynch (2010) the prevalence of asthma among children has been “increasing in westernized nations”[7]. In their 2010 study, the authors examined whether the presence of dogs or cats had an effect on the microbial composition of household dust. The study found that bacterial community richness (determined by the number of bacterial taxa), evenness (distribution of taxa in those communities), and diversity were higher in all households with dogs, and a subset of households with cats[7]. The authors suggest
that the increased bacterial community richness in households with dogs was due to the likelihood that dogs are both indoor and outdoor animals. Because of this, dogs could introduce a greater variety of bacterial species, leading to the development of a more developed immune system response in the child. Cats, on the other hand, are more likely to be exclusively indoor pets, and would not introduce as many new bacteria into the home.

A 2011 study by Tolly Epstein, David Bernstein, Linda Levin, Gurjit Khurana Hershey, Patrick Ryan, Tina Reponen, Manuel Vilareal, James Lockey, and Grace LeMasters investigated the link between “early environmental exposures, including pet ownership patterns, house dust endotoxin levels, sensitization patterns, and the eczema phenotype.” The study involved 636 children in the Cincinnati metropolitan area who were tested by trained clinicians for 15 aeroallergens on a yearly basis from ages one to four years old. In the analysis, children less than a year of age raised with dogs in the household appear to gain a significant eczema-protective effect from the animals. Households with dogs had higher dog allergen concentrations and children in these households had lower eczema risk. Children who had not been exposed to a dog before their first birthday showed a “4-fold increased risk of eczema.” The authors posit that the presence of dog antigens (substances which promote the production of antibodies) can have positive effects on the immune system. Another finding the study considered previously unknown was that early dog ownership for children sensitive to dogs attenuated the association between dog ownership and eczema. The same was not found to be true for cat ownership.

A study of 397 children focusing on their general health by Eija Bergroth, Sami Remes, Juha Pekkanen, Timo Kauppila, Gisela Buchele, and Leea Kiski-Nisula (2012) found that families in Finland who owned dogs had healthier children (measured by fewer respiratory tract symptoms or infections) than families with no dog contact. Families reported via a weekly questionnaire on the health of their child, whether there was a dog or cat in the home, and how much time the animal spent inside. Even after adjusting for possible confounding variables, the analysis indicated that children living in households with dogs were significantly healthier than children who lived in households without dogs. Children who interacted with dogs that spend only part of the day inside had the lowest risk of respiratory tract symptoms and infections. Similar to the conclusions drawn from Fujimura et al.’s study, the authors propose that increased bacterial diversity may have a protective effect on the child’s developing immune system.

**Areas for Investigation**

Based on their data, Fujimura et al. call for further investigation by saying, “We believe that these provocative data, even with a limited number of samples, merit further systematic exploration in a larger population with linked immunologic and disease outcomes to determine the potentially microbe-based mechanisms by which pet exposure appears to reduce the prevalence of allergic disease development.”

Early exposure to animals, especially dogs, is purported to have a protective effect for children against respiratory problems such as allergies and asthma. Are certain breeds of dogs more protective than others? Does the degree of protection depend only on the amount of time the
Key Resources


Alan Beck provides a history of research exploring the benefits of animal interaction as well as concerns raised along the way. Many pet owners view their companion animals as family members. Adults and even children themselves may see small pets as “the children’s children”. One common concern regarding pet ownership is the potential for pet dander to trigger allergic reactions. Beck points to research that suggests early contact with cats and dogs can protect a child from allergic episodes later in life.


This article describes and discusses a birth cohort study that investigated the effects of dog and cat contact on infant health. The researchers compared the degree of contact with dogs and cats and infection rates using reports supplied by the parents of the more than three hundred children. The study found that children in households with dogs were healthier, measured by fewer instances of respiratory tract symptoms or infections. Cats also conferred a protective effect, but to a lesser degree. The authors hypothesize that the amount of dirt dogs bring into the home could play in a role in inoculating the child against infections later in life.


This study examined the relationship between risk factors for eczema in young children (> 4 years of age) and pet ownership. Specifically, researchers investigated dog and cat presence in the household and children’s eczema sensitivity. Canine presence in the household conferred significant protection from eczema when child-dog contact occurred when the child was < 1 year of age, even in dog-sensitive children. However cat ownership increased the incidence of eczema in cat-sensitive children. Why this difference occurred is not clear. The authors also speculate that contact with high traffic areas, leading to more exposure to exhaust and carbon emissions, may increase instances of eczema.

This article describes preliminary research to determine potential benefits of pet ownership for childhood asthma reduction and allergy inoculation. The authors hypothesize that pet ownership may increase a child’s resistance to airborne irritants and allergens by increasing the child’s exposure to a variety of airborne pathogens. The study compares the dust microbial communities of households with dogs, cats, and no pets. Households with dogs were found to contain the greatest microbial diversity. The authors call for more research in this area, citing their small sample size as a limitation.

References


