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**NATURE-ORIENTED ACTIVITIES IN KINDERGARTEN:
LITERATURE REVIEW OF THE EFFECTS OF CHILDREN-
ANIMAL INTERACTION**

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Abstract

Children nowadays tend to spend most of their time in a structured indoor environment. Nature kindergartens wish to reverse this tendency by allowing and stimulating the children to freely interact with nature. As part of their agenda, some mature kindergartens have introduced human-animal interaction activities into the curriculum. Teachers in kindergarten with child-animal interactions portray them as beneficial for the child at emotional and social levels. The current literature review on this subject searched for such the empirical evidence of the beneficial effects of children-animal interaction in kindergartens. Promising empirical evidence on the benefits for children in interacting with animals was found, including stress reduction, and better social and emotional development for the child. However, more research has to be done on this field to fully understand the impact of interaction of animals with children, because teachers in kindergartens as well as education policy makers often hesitate to introduce to kindergarten' curriculum activities that may imply risks to the children, such as child-animal interaction.

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1. Introduction

Educators, parents and education scholars tend to agree that the kindergarten education has tremendously changed in the few decades, shifting from emphasis of playing outdoors and experience nature to playing in an indoor environment, which might diminish the instances of giving children the chance to learn about nature and engage in unstructured play (Skår & Krogh, 2009; Singer, Singer, D'Agostino & DeLong, 2009). It is agreed that these changes may jeopardize the child's social and emotional development, due to the fact that playing is considered to be essential for developing cognitive, emotional and social abilities, as well as for growing up to be a well-balanced happy adult (Wenner, 2009). Also, playing indoors and not being exposed to the richness and beauty of nature might prevent the children from expressing themselves in a creative way and using their imagination (Tullis, 2011). Also, this might have a negative effect on their long-term prospects for success in school. Additionally, playing in nature is beneficial for the child's health, so an emphasis on playing indoors may harm the children's health (Miller & Almon, 2009).

The nature kindergarten education movement that has started in the Scandinavian countries and has now extended to several European and English speaking countries, is seeking to promote the children to experience nature at first hand (Moser & Martinsen, 2010). Among other assumptions of the positive effects of the nature movement, close encounters of children with pets and other domestic animals is considered to bring benefits to the children's emotional, social and cognitive development (O'Brien, 2009). Such human-nature encounters are usually provided in nature kindergarten in which children can freely interact with animals, take care of them and learn about them as part of knowing what treatment the animals need (Raz, 2014). Children-animal interaction has received numerous praises in literature as allowing children to learn about their needs and the needs of other people, contributing greatly to children's social-emotional development and serve as a source of emotional support for the child (Melson, 2003). Further, interaction with animals is also recommended by the National Research Council (NRC) in USA, i.e.: "Students should be engaged in observing and caring for a wide range of organisms that can be housed in the classroom, with an emphasis on local plants and animals. . . . Students should assist in feeding and rearing animals to understand their needs, their behavior, and their life histories" (Hachey & Butler, 2012).

However, when it comes to the decision of including human-animal interaction in the curricula of kindergartens, the knowledge on the benefits of children-animal interactions are sometimes anecdotal and are mostly based on the experience of teacher. Several authors in the field of human-animal interaction point toward the fact that a more intensive appraisal on the inclusion of animal-assisted activities in early stages of the childhood (i.e. formal education) is needed, as child-animal interaction is very common in the context of companion animal ownership: 70% of households in the US and Western Europe with children own a pet (Melson, 2003), and in Israel – 32% of all households own a pet, with parents usually buying a pet "for the children" (Paz, Almog & Rudin, 2008). Also, in the last decades, there has been a significant increase in the level of using animals in therapy, education and care (Beetz et al., 2012), including the nature kindergartens (Raz, 2014).

The article aims to fill in a gap in research by critically reviewing several studies on the impact of children-animal encounters for children, in order to evaluate the evidence and the methods of assessment of the socio-emotional benefits of encounters with animals in kindergarten children.

2. Problem Statement

Teachers in nature kindergartens allowing child-animal interactions are very useful for children and they benefit from it (Melson, 2003). Nature-oriented schooling involving child-animal interaction is not very common in Israel (Sagy & Tal, 2015). One reason for the low level of introduction of children-animal interactions to kindergartens may be a sign of conservatism in many educational systems and/or might be related to the fear of the risks associated with the interactions with animals (e.g. zoonotic risks, aggression, unpredictable behaviour of the animals, etc. (Beate, Sandseter, Little & Wyver , 2012).

Evidence-based information on the benefits of child-animal interaction, as well as on the zoonotic and behaviour management, is needed to persuade educators to introduce child-animal interactions to kindergartens' curriculum.

3. Research Questions

Is there empirical evidence for the benefits of children-animal interaction for children in kindergarten (i.e. typically developed children)?

4. Purpose of the Study

This article aims to review the literature on the benefits of interactions with animals in kindergarten children, in order to provide empirical (rather the anecdotal) evidence on the benefits of this type of interactions in early stages of formal education. We assume that such evidence might convince more kindergarten' teachers to introduce this type of children-animal interaction into their curriculum.

5. Research Methods

The literature review is based on articles published in English language, with full text access, that were found in "Google Scholar" using the key words "preschool Children-animal interactions" (note: it was assumed that Google Scholar is the most accessible data base to kindergarten educators) As this literature review is aimed to reveal only empirical evidence on the research subject, any articles that did not report evidence-based results were eliminated from the review. As Melson (2003) claims that the literature on this subject is scarce, empirical studies on the subject published from 2000 to 2016 were included in the review.

Investigation of the query results show that there are relatively many articles dealing with human-animal interaction (Figure 1). However, only a few articles were found to specifically focus on children-animal interactions in kindergartens and many of them were not empirical studies. Hence, as can be seen in the flow chart, a total of 9 articles were included in the literature review, with two main subjects: the socio-emotional benefits of interaction with animals for children and the neurophysiological support for the benefits of children animal interactions

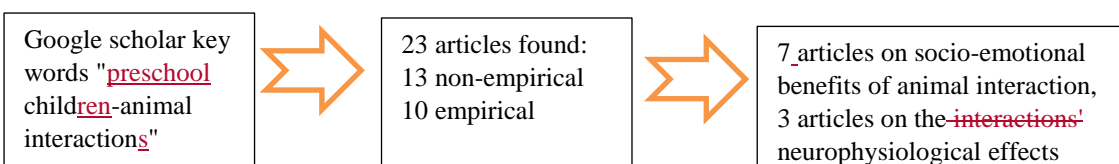


Figure 01. Flow chart diagram of the systematic literature review.

6. Findings

In the nine studies on children-animal interaction included in the systematic review, two main categories of benefits (and support for these benefits) were observed: the socio-emotional impact of these interactions on children and their impact on the children on neurophysiological level. Both these issues are discussed below.

6.1. Benefits of human-animal interactions on socio-emotional development of children

Two studies that were conducted among healthy children revealed evidence on the benefits of children interacting with animals in several aspects. Piek et al. (2013) have evaluated the Animal Fun program in Australia, which was aimed at enhancing the motor ability of young children by imitating the movements of animals. The motor ability of 4-6 years old children was measured before entering the program, and two more times, at 6 and respectively at 18 months after the intervention. Children were randomly assigned to a test group that included animal encounter intervention and a control group that received no treatment. Results show that only the intervention group showed an improvement in motor ability. Another finding was that there was gender gap in the ability to improve motor skills following the intervention: boys benefited in motor skills following encounter with animals, while no such effects were found in girls.

On the subject of learning through interaction with animals, Hachey & Butler (2012) add that this type of interaction promotes the scientific process skills of focused observation and data collection, using the tools needed to gather and convey new discoveries and using the language of measurement; compare, contrast, and classify. Moreover, scientific specific knowledge appear to be acquired by interacting with animal like distinguishing living things from objects, knowledge on the needs of various beings, animal characteristics and behavior, as well as knowledge on the interactions between living forms and the environment.

It is also worth mentioning the results of meta-analysis studies on this subject. Hence, Endenburg & van Lith's (2011) meta-analysis shows that the emotional development level – interaction with animal strengthens the child self-esteem, but only when the animal child bond was established in age lower than six; the self-concept of the child (i.e. mental image or perception that one has of oneself) appears to be more accurate in children bonding with animals. The authors also suggest that bonding with animals makes the child more emotionally developed and stable. With regards to social development, it was found that children growing up in a household with dogs exhibited greater social competence and developed into more socially competent adults than other children. Also, empathy (the perceived emotional experience of another person) is more expressed in children bonding with animals.

A second meta-analysis on human-animal interactions (HAI) by Beetz, Uvnäs-Moberg, Julius & Kotrschal (2012) summarizes the general benefits of, HAI, but no specifically in preschool children. Strong support was found for the benefits of interaction with animals on social attention, social behavior, interpersonal interactions and mood; reduction in stress-related parameters such as cortisol, heart rate, and

blood pressure; lowered self-reported fear and anxiety; better mental and physical health. The meta-analysis has found that limited evidence exists for reduction of stress-related parameters; improvement of immune system functioning and pain management; increased trustworthiness of and trust toward other persons; reduced aggression; enhanced empathy and improved learning.

Another line of studies focused on the benefits of HAI for disabled children. Beetz, Julius, Turner & Kotrschal (2012) have demonstrated the effect of interaction with animals on children with social anxiety in a study in which social stress was measured in 47 male children with insecure-avoidant attachment style. The children were assigned to three groups: one in which they could interact with a friendly dog, second in which they could interact with a friendly human grownup, and third in which they could interact with a toy dog. Results show that the physiological stress (measured by a validated questionnaire) and the cortisol (a hormone that is released during stress) levels were lower in the dog condition in comparison to the two other support conditions (toy dog and adult). Author's conclusion is that increasing practice of animal-assisted education can be helpful in facilitating a positive education/special education climate, in terms of decreasing the physiological indicators of stress in children.

Heimlich (2001) had studied the impact of animal-assisted therapy on severely disabled children. The author has used a comparison to base line approach to measure changes in 14 children's behaviour following the participation in an animal-assisted therapy intervention. The study has resulted in positive effects of the program on all the participants, but the author states that no generalizations could be made of the results, as there were a number of confounding factors in it.

6.2. Neurophysiological support for the benefits of children-animal interactions

Literature on neurological impact of the interaction of children focuses on the peptide hormone oxytocin, which is produced in the hypothalamus and released into the circulatory system and the brain in response to sensory stimulation like breastfeeding, labour, sex, but also touch, warmth, and stroking, usually in the context of trusting relationships. On the social level, the internal release of oxytocin or the exogenous administration stimulates the social interaction by increasing eye contact, empathy, face memory, trust, social skills, positive self-perception, and generosity and decreases depression. It decreases pain, stress and anxiety while having a possible positive effect on the immune system and on growth and restoration of the body (Beetz, Uvnäs-Moberg, Julius & Kotrschal, 2012).

Oxytocin is often called the love hormone, as its release inhibits cortisol synthesis (a hormone that is released in the body in reaction to stress), thus facilitates relaxation and stress regulation. This hormone was found to be released when a child is in a friendly interaction with a dog, especially when stroking it. The amount of Oxytocin release is related to the intensity of physical contact and active stroking of the dog. That is why distant interaction, especially with an unfamiliar animal, is probably not as effective as physical contact in causing an increase in oxytocin levels. This effect makes for a physical explanation for the calming effect and social support that relationship with animals has for children (Beetz, Julius, Turner & Kotrschal, 2012).

In the same direction, Odendaal (2000) reports that several neurochemicals (e.g. oxytocin) are associated with attention-seeking or attention giving behaviour among dogs and humans. The author found that the only statistical significant result in the difference before and after interaction was in oxytocin levels,

which were higher after human-animal interaction compared the levels before the interaction. It was also found that the increase in oxytocin was higher when people interacted with their own dogs. Also, Odendaal & Meintjes (2003) have found that concentrations of β -endorphin, oxytocin, prolactin, β -phenyl-ethylamine and dopamine increased in both species (humans and dogs) after positive interspecies interaction account for better mental health for both.

7. Conclusion

The aim of the current study was to identify the empirical evidence for the benefits of preschool children-animal interaction, assuming that if such benefits were revealed, more kindergartens would integrate this subject into their curriculum, in the direction of providing socio-emotional and neuro-physiological benefiting to the children. The study has used a literature review approach, based on articles published in English (2000-2016) that were found in "Google Scholar" by using the key words "preschool children-animal interactions".

The first conclusion of the study is that there are promising results supporting the inclusion of children-animals activities in the early stages of educational settings (formal and informal settings). It seems that better achievements in the proving the impact of child-animal interaction has been made in the neurological studies, which came out with sound evidence that stroking an animal calms the children and offers them social support (Beetz et al., 2012). A potential path of the positive impact has been also described: an increase in the production of the hormone Oxytocin is associated with an increase in the friendliness of the children and higher level of positive social communication (Odendaal, 2000).

As for the social and emotional benefits of interaction with animals for children, the studies on this review generally suggest that there is a positive impact of the HAI on the emotional and social development of children (Endenburg & van Lith, 2011), learning (Hachey & Butler, 2012) and motoric skills (Piek et al., 2013). They also suggest that the positive effect of interaction with animals exists both for healthy and for children with disabilities (Heimlich, 2001).

The second conclusion of this study is that more research is needed to fully understand the positive impact of child-animal interaction on several socio-emotional aspects.

If benefits of child-animal interactions do exist as suggested by the reviewed literature, than the lack of child-animal interaction in the pre schooling system may deny the children of these benefits. The empirical prove of the benefits has the potential to encourage teachers and personnel in the education systems to introduce children-animal and children-nature themes into the curriculum (Beate, Sandseter, Little & Wyver, 2012).

Existing knowledge indicates that there is a positive impact on children when interacting with animals. There is a gap in the empirical knowledge on this subject, which should be closed, in the expectation that empirical evidence will complement the encouraging results of the studies done so far, which will gather sufficient evidence of the positive effect Of interaction between children and animals on children.

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