

## A Guide to the Socialisation of Puppies – Annotated Bibliography

**Agrawal, H.C., Fox, M.W., Himwich, W.A.(1967) Neurochemical and behavioral effects of isolation-rearing in the dog. Life Sciences 6 (1). 71-78.**

Young puppies reared in partial isolation for one week from 4-5 weeks of age showed behavioral abnormalities, being hyperactive with diffuse reactions. Significant changes also occurred in the concentration of free amino acids in the sub-cortical areas. These changes were most marked in glutamic acid and GABA, but also appeared in the glutamine and aspartic acid levels.

**American Veterinary Society of Animal Behaviour. AVSAB position statement on puppy socialisation. Available at : [www.AVSABonline.org](http://www.AVSABonline.org)**

Short statement with clear advice on when socialisation activities should occur and the types of activity that should be provided. Provides specific advice about attendance at puppy classes and precautions that may be taken to prevent infection.

**Appleby, D., Bradshaw, J. and Casey, R. (2002) Relationship between aggressive and avoidance behaviour by dogs and their experience in the first six months of life. Veterinary Record. 150. 434-8.**

The early experiences of dogs showing avoidance or aggressive behaviour were compared with dogs from the same clinical population who did not show this behaviour. Non-domestic early environments and a lack of experience of urban environments between the ages of three and six months were associated with aggression towards unfamiliar people and avoidance behaviour. Aggression during veterinary examination was more likely in dogs from non-domestic maternal environments.

**Bateson, P. (1979) How do sensitive periods arise and what are they for? Animal Behaviour. 470 – 486.**

Theoretical discussion of sensitive periods in development. Addresses how tendency to escape from novel objects may be overcome during certain times enabling attachments to be formed. The evolutionary basis for the survival role of sensitive periods is also discussed.

**Batt, L., Batt, M., Bagulay, J., McGreevy, P. (2008) The effects of structured sessions for juvenile training and socialisation on guide dog success and puppy-raiser participation. Journal of Veterinary Behaviour. 3. 199-206.**

Study comparing provision of additional socialisation or training of potential guide dogs by puppy raisers between the ages of twelve and sixteen weeks over and above the training and socialisation already provided by the guide dog association. No beneficial effects of assessed improved suitability or success in training of the puppies were observed.

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**Blackwell, E-J, Bradshaw, J.W.S. and Casey, R.A. (2013) Fear responses to noises in domestic dogs: Prevalence, risk factors and co-occurrence with other fear related behaviour. Applied Animal Behaviour Science.145. 15-25.**

Postal and structured interview survey of owner observations of responses to noise. 25% of those in questionnaire sample reporting that their dog showed fear to some noises, 49% in the structured interview sample where specific behaviours were discussed. Age, breed and previous history were found to relate to likelihood of fear response to noise – dogs bred by the owner and kept having reported reduced risk. This accounted for by authors as possible effect of socialisation and noise exposure in similar environment.

**Bradshaw J. W. S., McPherson, J. A., Casey, R. A., Larter, I. S. (2002) Aetiology of separation-related behaviour in domestic dogs, Veterinary Record. 151 (2), 43 - 46.**

Reports a longitudinal study of litters of labradors and border collies. Experience of socially diverse environments between six and twelve months was associated with absence of separation-related problems. In a questionnaire survey of dog owners separation-related issues were frequently reported. This was unaffected by whether a dog was pedigree or mixed-breed. Few owners sought veterinary help with these issues.

**Bradshaw, J. (2011) In defence of dogs. London : Allen Lane.**

Comprehensive discussion of the evolution, development and behaviour of dogs based on the scientific evidence. Includes a detailed discussion of puppy socialisation examining both the findings of the seminal studies conducted in the 1950s and 1960s by Scott and Fuller and others, and more recent investigations.

**Casey, R.A., Loftus, B., Bolster, C., Richards, G.J., Blackwell, E.J. (2013) Human-directed aggression in dogs (Canis familiaris) : Occurrence in different contexts and risk factors. Applied Animal Behaviour Science. <http://dx.doi.org/10.1016/j.applanim.2013.12.003>**

Found aggression to unfamiliar people more common than to familiar people, and aggression to other dogs higher than aggression to people. Most dogs did not show aggression in multiple contexts suggesting a learned situation-specific response. Dogs obtained from rescues, pet shops and Internet sites being somewhat more likely to show aggression to household members. There was a decreased risk for dogs bred in the environment they were later kept in. Attendance at puppy classes reduced risk of aggression to unfamiliar people. Use of punishment was linked to increased aggression. No specific breeds or breed types were found to have increased risk to familiar people, and there was very little association between breed and risk of aggression to unfamiliar people.

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**Clark, C.C., Gruffydd-Jones, T., Murray, J.K (2012) Number of cats and dogs in UK welfare organisations. Veterinary Record 2012, 170(19):493.**

In 2009 based on comprehensive questionnaire survey of rescue organisations estimated that approximately 130,000 dogs entered U.K. rescue organisations. Approximately, 50% of dog welfare organisations reported that they operated at full capacity throughout the year.

**Coile, C. (2010) Little puppy, big world. Dog World. May. 28-33**

One of a series of useful popular articles on puppy socialisation. This examines specifically management of risk of exposure to infection. It makes the strong recommendation that socialisation should not be held up for development of full immunity. It advises on key actions that can be taken to minimise risk.

**Cooper, J.J., Ashton, C., Bishop, S., West, R., Mills, S., Young, R.J. (2003) Clever hounds : social cognition in the domestic dog (Canis familiaris). Applied Animal Behaviour Science. 81. 229-244.**

Discussion of the cognitive capacities of dogs that underpin their ability to live socially with other dogs and humans. Includes coverage of the skills that dogs have for understanding intentional communication by humans to them (such as looking and pointing). The social cognition abilities of dogs identified are examined as means of understanding perspective-taking more generally.

**Denenberg, S., Landsberg, G. M. (2008). Effects of dog-appeasing pheromones on anxiety and fear in puppies during training and on long-term socialization. Journal of the American Veterinary Medical Association, 233(12).**

The study objective was to evaluate the effectiveness of dog-appeasing pheromone (DAP) in reducing fear and anxiety in puppies and its effects on training and socialization. Puppies enrolled in puppy classes were randomly allocated to 1 of 4 groups: 2 large-breed groups (1 DAP and 1 placebo group) and 2 small-breed groups (1 DAP and 1 placebo group). The investigator, trainers, and owners were unaware of treatment allocation throughout the study. Classes lasted 8 weeks, and owners were asked to complete a questionnaire before the first lesson and at the end of each lesson thereafter. Data collected included amount of learning and degrees of fear and anxiety for each puppy. Dogs in DAP and placebo groups were significantly different with respect to degrees of fear and anxiety; longer and more positive interactions between puppies, including play, were evident in dogs in the DAP groups. Data from follow-up telephone surveys indicated that puppies in the DAP groups were better socialized and adapted faster in new situations and environments, compared with puppies in the placebo groups.

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**Dog's Trust (2013) Stray dog survey 2013. Available at :**  
<http://www.dogstrust.org.uk/az/s/straydogsurvey/straydog2013.pdf>

Highlights that an estimated 111,986 stray dogs were handled by local councils between April 2012 and April 2013. About 48% were reunited with their owners, 9% re-homed directly by the pound, 25% passed on to rescue organisations and 7% were euthanized. Others were kept longer term by the pound, kept by finders or died through illness or other cause.

**Donaldson, J. (1996) The Culture Clash. Harpenden : James and Kenneth Publishers.**

Effective and pragmatic discussion and recommendations on best training and socialisation practice from an experienced trainer and behaviourist in light of available evidence.

**Dorey, N.R., Udell, M.A.R., Wynne, C.D.L. (2010) When do domestic dogs, *Canis familiaris*, start to understand human pointing? The role of ontogeny in the development of interspecies communication. *Animal Behaviour*. 79. 37-41.**

Discusses evidence of the ability of dogs to understand a variety of human cues, including pointing. This study found little evidence that puppies younger than 21 weeks had the ability to follow pointing, and improved at the ability as they got older, benefitting from specific training. The authors suggest that while there is a phylogenetic aspect to ability to follow human cues in dogs, there is also a developmental aspect. They recommend that future research should investigate how much and what kinds of social interaction are needed before a puppy can use human cues.

**Dreschel, N.A. (2010) The effects of fear and anxiety on health and lifespan in pet dogs. *Applied Animal Behaviour Science*. 125. 157-162.**

Report of on-line survey of over 700 dog owners whose dog had recently died. Finding that there was a relationship between descriptions of mood and behaviour and illness and age at death. Dogs described as 'well-behaved' lived a longer life. Stranger-directed fear in particular was associated with a shorter lifespan. Non-social fear and separation anxiety were linked to skin problems.

**Duffy, D.L. and Serpell, J.A. (2009) Effects of early rearing on behavioural development of guide dogs. *Journal of Veterinary Behaviour*. 4(6).**

Compared puppies that had been exposed to one of three different rearing environments during the first eight weeks : whelped in a kennel at a guide dog facility; whelped in a kennel at the same facility but reared in volunteer's homes from two to five weeks' whelped and reared at a facility which provided intensive socialisation from birth to eight weeks. Those in the third group showed higher success rate in training when assessed between six and twelve months.

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**Fox, M.W. (1969) Behavioural effects of rearing dogs with cats during the 'critical period of socialisation'. Behaviour. 35. 273-80.**

Classic study in which Chihuahua pups were raised between 8 and 16 weeks with a litter of cats then tested. These pups showed limited response to a mirror, unlike conventionally reared puppies, and reacted in an anxious and submissive way to similar age puppies, but playfully to kittens. However, within a two-week period active and playful response to both mirror and other puppies was increased significantly. Conventionally reared puppies were found to act playfully with kittens at 16 weeks, though this was not true of response to puppies of kittens reared with cats.

**Fox, M.W. and Stelzner, D. (1967) The effects of early experience on the development of inter and intraspecies social relationships in the dog. Animal Behaviour. 15, 377-386**

Effects of varying decrements of socialisation of the dog with its own species were studied in 3 groups at 12 weeks of age.: 1) those hand-reared from 3 days of age, 2) those weaned early at 3 ½ weeks and 3) those weaned at 8 weeks. Marked deficits in intraspecies social reactions were seen in Group 1. Those in Group 2 tended to be intermediate. All groups still showed orientation and attraction to humans. A battery of tests showed qualitative and quantitative differences between the three groups, which indicated the importance of early social experience on subsequent development of behaviour and social relationships with other dogs.

**Fox, M.W., Stelzner, D., 1966. Behavioural effects of differential early experience in the dog. Anim. Behav. 14, 273-281.**

The effects of handling from birth to 5 weeks and isolation from 4 to 5 weeks were studied in twenty two dogs and contrasted with the behaviour of control subjects raised under normal rearing conditions. Differences in behaviour, heart rate and EEG activity were evident in the three differentially reared groups of dogs and were attributed to the effects of handling and isolation in the experimental groups as compared to the control group.

**Freedman, D.G. King, J.A., and Elliott, O. (1961) Critical periods in the social development in dogs. Science. 133 : 1016 – 1017.**

Litters of puppies were isolated, with the bitch, in fenced acre fields from two to fourteen weeks of age. They were removed indoors at different ages, played with for a week, and returned to the field. The pups showed an increasing tendency to withdraw from human beings after five weeks of age. It was concluded that unless socialization occurred before fourteen weeks of age, withdrawal reactions from humans became so intense that normal relationships could not thereafter be established. Socialisation periods were only provided up to 9 weeks of age so conclusions cannot be drawn about the effect of socialisation periods provided after this age and before fourteen weeks.

## **A Guide to the Socialisation of Puppies - Annotated Bibliography**

**Fuller, J.L. (1967) Experiential deprivation and later behaviour. Science. 158. 1645-1652**

Report of series of studies conducted at the Jackson Laboratory prior to 1967. These involved keeping either beagles or terriers in isolation with varying interventions of access to free areas, access to toys, or handling by humans. Dogs were tested at 16 weeks in an open area to range of stimuli. Generally dogs kept isolated between 2 and 16 weeks showed behaviour deficits when in the test situation. However, quite short periods of exposure to the test environment at different stages substantially prevented this. Performance on learning ability tests varied from no effect to significant decrement. Both behaviour and learning changes varied between breeds tested. The authors account for main findings in terms of lack of opportunity to habituate to stimuli in isolated dogs. Performance was often re-instated if puppies were first handled before placing in the test situation or given tranquilising drugs.

**Gagnon, S. and Dore, F.Y. (1994) Cross-sectional study of object permanence in domestic puppies. Journal of Comparative Psychology. 108. 220-232.**

Tested puppies on range of object permanence tests between 5 and 8 weeks of age. Found a consistent increase in object permanence ability with recognition of fact that objects continued to exist and could be searched for when visibly removed behind another object from shortly after weaning. The ability to recognise continued existence of an object and to search for this when the puppy had not been able to see it removed was not found at 8 weeks. However, in other studies the authors report this was observed in puppies prior to one year of age and it is suggested object permanence abilities continue to develop in dogs to a high level throughout the first year.

**Gazzano, A., Mariti, C., Notari, L., Sighieri, C., McBride, E. (2008) Effects of early gentling and early environment on emotional development of puppies. Applied Animal Behaviour Science. 110. 294-304.**

Puppies that were provided with 5 minutes daily 'gentling' were found to show reduced vocalisation when isolated at 8 weeks when brought up in breeding kennels, and to show increased exploration when isolated whether bred in kennels or reared in a domestic environment. These results are inferred to indicate reduced anxiety and increased emotional stability resulting from gentling. It is recommended by the authors that in situations where a puppy is likely to experience reduced human, parental or peer contact that regular gentling from a few days after birth may be beneficial to improve emotional stability.

## A Guide to the Socialisation of Puppies - Annotated Bibliography

**Gazzano, A., Mariti, C., Alvares, S., Cozzi, A., Tognetti, R., Sighieri, C. (2008) The prevention of undesirable behaviours in dogs : effectiveness of veterinary behaviourists' advice given to puppy owners. Journal of Veterinary Behaviour. 3. 125-133.**

Compared the behaviour of puppies whose owners were given advice by a veterinary behaviourist concerning puppy raising during the puppies' first visit to the vet, with a control group not receiving this advice. At time of one year booster vaccination, puppies of owners who had received advice showed less house soiling, mounting, nonstop playing, mouthing and begging for food. The experimental group also showed less aggression to unfamiliar people.

**Hanks, L.A. (2009) The importance of play. Dog World. May. 38-43.**

One of a series of popular articles on socialisation. This examines the role of play in developing skills and ability to relate to other dogs and people. Provides recommendations for play activities and ways of managing play interactions.

**Hiby, E.F., Rooney, N.J. and Bradshaw, J.W.S. (2004) Dog training methods – their use, effectiveness and interaction with behaviour and welfare. Animal Welfare. 13. 63-9.**

Used questionnaire to collect information on how owners trained their dog on a range of specific tasks. Ratings of obedience for each task were also collected. Reward-based training was associated with obedience, but punishment was not. Behavioural problems exhibited were also correlated with use of punishment in training. The authors conclude that the potential for punishment to increase behavioural problems represents a welfare concern.

**Irish Veterinary Journal Continuing Education (2010) Puppy socialisation and the prevention of behavioural problems. Irish Veterinary Journal. 63(10). 630-633.**

General, evidence-based article providing recommendations on puppy socialisation activities both for breeders and when in the home. Includes advice on providing experience of other dogs, people, the environment, outdoor areas and so on. Also provides some discussion of the value of 'puppy parties'.

**Jones, A.C. (2007) Sensory development in puppies (Canis lupus f. familiaris) : implications for improving canine welfare. Animal Welfare. 16 : 319-329.**

Comprehensive review of evidence relating to the physical and perceptual development of puppies and stages in this. This development is related also to observed sensitive periods in the social development of puppies as proposed by Scott and Fuller. The review addresses the development of each sense (sight, hearing, touch, taste, balance). The authors advise on the need to relate socialisation activities to development of relevant capacities.

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**Kaminski, J., Schulz, L., Tomasello, M. (2012) How dogs know when communication is intended for them. *Developmental Science*. 15(2) 222-232.**

Report of a study to investigate how dogs understand that particular gestures (eg gaze, pointing) are intended for them. Eye-contact was found to be particularly important to confirm to a dog that a gesture was for them. In general, dogs ignored communications (eg gestures) that were clearly addressed to other humans.

**MacDonald, K. (1985) Early experience, relative plasticity and social development. *Developmental Review*. 5. 99-121.**

General theoretical discussion concerning the roles of early experience and relative plasticity in the development of social behaviour. Includes discussion of 'sensitive periods' and mechanisms by which they arise. Discusses these issues particularly in relation to primates and canids, and considers the implications of findings for human development.

**McGreavy, I. (2009) A modern dog's life. University of New South Wales Press.**

Comprehensive discussion of the demands created for dogs in modern environments with evidence-based advice on breeding, socialisation, training and behaviour management.

**Mendl, M., Brooks, J., Basse, C., Burman, O., Paul, E., Blackwell, E. & Casey, R. (2010) Dogs showing separation-related behaviour exhibit a 'pessimistic' cognitive bias. *Current Biology*. 20, 839 – 840.**

Highlights the widespread prevalence of separation-related behaviours in dogs, suggesting that up to 50% of dogs in the U.K. may at some time show this. Study assessed a sample of dogs for exhibited separation-related behaviours and then tested them on an experimental task relating to the prediction of reward. In an ambiguous situation e.g. where there was an equal probability a reward would be provided or not, dogs that showed separation issues, tended to act as if the reward would not be provided. This is interpreted as a 'pessimistic' bias that may contribute to separation anxiety.

**Morgan, M., Palmer, J., (2007) Dog bites. *British Medical Journal*. 334:413-417.**

Article highlights that bites and maulings by dogs, sometimes fatal, are a world-wide problems and particularly affect children. It reports that each year approximately 250,000 people who have been bitten by dogs attend minor injuries and emergency units in the U.K., with some admitted for surgery or intravenous antibiotics. The article also provides recommendations for best treatment intervention to prevent infection.

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**Petronek, G.J., Glickman, L.T., Beck, A.M. et al. (1996) Risk factors for relinquishment of dogs to an animal shelter. J.Vet. Med. Assoc. 209. 572-581**

Compared households that had given up dogs to rescues with a random sample of current dog-owning households in the same community as the control. Factors predictive of dogs being given up included not participating in dog obedience classes, dog having behavioural problems, and inappropriate care expectations. Dogs obtained from shelters or acquired at six months of age or less were also more likely to be given up.

**Pierantoni, L., Albertini, M., Pirrone, F. (2011) Prevalence of owner-reported behaviours in dogs separated from the litter at two different ages. Veterinary Record. 169. 468.**

Compared dogs separated from the dam and adopted between thirty and forty days (ie c. four to six weeks), with dogs taken from the litter for adoption at two months. Owners completed questionnaire concerning behavioural problems shown by the adopted dog. Dogs which had been removed from the litter earlier in the socialisation period showed increased risk of destructiveness, excessive barking, fearfulness on walks, reactivity to noises, toy possessiveness. Similarly, dogs purchased from a pet shop at thirty to forty days exhibited some of these behaviours more frequently than those purchased at two months.

**Reid, P.J. (2009) Adapting to the human world : Dog's responsiveness to our social cues. Behavioural Processes. 80. 325-333.**

Explores alternative hypotheses to account for dog's unusual sensitivity of human cues such as pointing, gaze and so on. Considers four hypotheses : greater opportunity to learn through exposure; use of more general problem-solving skills in a specific niche provided by domestication; co-evolution enabling development of theory of mind; and the particular advantage of evolved sensitivity to human cues of a social scavenger.

**Reimer, S., Müller, C., Virányi, Z., Huber., L., Range, F. (2013) Choice of conflict resolution strategy is linked to sociability in dog puppies. Applied Animal Behaviour Science. 149. 36-44.**

With reference to the recommendation that socialisation activities should be provided to puppies to reduce risk of aggression considers the mechanism by which this might occur. Focuses particularly on the development of conflict-resolution strategies by well-socialised dogs which enable them to 'de-fuse' situations. Assessed border collie puppies in a range of mild conflict situations. More sociable puppies tended to adopt an interactive strategy engaging with the investigator who was imposing a demand.

## **A Guide to the Socialisation of Puppies - Annotated Bibliography**

**Scott, J.P. (1958) Critical periods in the development of social behaviour in puppies. Psychosomatic Medicine. 20, 42-54**

Discusses the 'critical period hypothesis', that highly developed social animals show a period early in life where the formation of social relationships is determined. Proposes that the strongest relationships for dogs are initially formed after 3 weeks with litter mates and that this ordinarily forms the basis for pack organisation and during which formation of bonds with humans may occur most readily. Refers to identified stages of development which have a physical basis and which include an early neonatal period during which a puppy is psychologically shielded from the world, a transition period where rapid perceptual development occurs, and a socialisation period from about 3 weeks during which primary social relationships are formed. The socialisation period is understood to end with sexual maturity and the advent of a juvenile period. The paper also discusses genetic variability and its influence on developmental stages.

**Scott, J.P. (1962) Critical periods in behavioural development. Science. 138(3544) 949-958.**

Paper re-iterates the general principles of the existence of 'critical periods' in the social development of dogs and discusses in particular the 'primary processes' of socialisation in the context of evidence from other species, including humans. Specific research examined includes that which showed high anxiety induced by periods of isolation in young puppies which, if followed shortly by contact with human carers encouraged bond formation. It was observed that while such bonds were formed most readily with positive response from carers, that contact and association per se led to bond formation where there was high levels of arousal. The prior hypothesis that bonding depended on feeding was not supported. It is suggested that further bonds later in development are inhibited as fear develops in response to individuals not previously encountered, and that this effect represents a mechanism by which the sensitive socialisation period comes to an end.

**Scott, P.S. and Fuller, J.L. (1965) Genetics and social behaviour of the dog – the classic study.**

Detailed report of the extensive series of studies conducted on dog development in the 1950s and 1960s that led to the development of the widely accepted model of sensitive periods in the development of dogs.

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**Seksel, K., Mazurski, E.J., Taylor, A. (1999) Puppy socialisation program : short and long-term effects. Applied Animal Behaviour Science. 62. 335-349.**

Examined behavioural effects of a puppy socialisation training programme in both pure and cross-bred puppies. Puppies placed in one of five groups : 'socialisation plus training' including both operant training and socialisation with other puppies ; 'socialisation' – interaction with puppies only ; 'training' – command training only; 'feeding' – equivalent feeding but no additional treatments and 'control' – rated only. Puppies tested before, during and after at four to six months. Improvements in response to commands was found for the groups receiving training, but no other differences were observed. A relationship between puppy behaviour at 10-12 weeks and four to six months was found. The authors conclude that additional socialisation in a class setting did not add to socialisation effects of the home environment prior to the programme which in this case already represented enriched experience.

**Seksel K. (2008) Preventing behavior problems in puppies and kittens. Vet Clin North Am Small Anim Pract. 38(5):971–82.**

Discusses common issues that owners find problematic with their puppy's or kitten's behavior, such as eliminating in inappropriate locations, chewing, mouthing, growling, and biting. Considers how such behaviours can be prevented or managed by helping owners understand normal canine and feline behavior and by teaching the puppy and kitten socially acceptable behaviors. Emphasises rewarding acceptable behaviors rather than punishing unacceptable ones as effective strategies. Puppy classes are proposed as an avenue to introduce pet owners to humane ways to train and socialize dogs.

**Serpell, J., Jagoe, J.A. Early experience and the development of the dog. In Serpell, J. (Ed.) (1995) The domestic dog : its evolution, behaviour and interaction with people. Cambridge : Cambridge University Press. 82-102.**

'Early experience and the development of behaviour' provides a thorough review of empirical evidence available at the time on the relationship between socialisation experiences and later specific behaviour including behavioural problems such as aggression, fearfulness and separation anxiety.

**Slabbert, J.M. and Rasa, O.A.E. (1993) The effect of early separation from the mother on pups in bonding to humans and pup health. Journal of the South African Veterinary Association. 64, 4-8**

Found that the separation of young dogs from their mother at 6 weeks had a negative effect on the condition and weight gain of separated puppies compared to that of puppies with maternal contact until 12 weeks. Disease susceptibility and mortality was higher for puppies separated at 6 weeks. Puppies separated earlier showed signs of separation stress. Found that early separation did not enhance socialisation with humans despite the earlier contact, as long as puppies had daily human contact when adopted.

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**Stepita, M. E., Bain, M. J., Kass, P. H. (2013). Frequency of CPV infection in vaccinated puppies that attended puppy socialization classes. Journal of the American Animal Hospital Association, 49(2), 95–100. doi:10.5326/JAAHA-MS-5825**

Some oppose socialization before 16 wk of age due to the risk of contracting infectious diseases. The objectives of this study were to determine if puppies that attended puppy socialization classes and were vaccinated by a veterinarian at least once were at an increased risk of confirmed canine parvovirus (CPV) infection compared with puppies that did not attend classes and to determine the frequency of suspected CPV infection in puppies vaccinated at least once that attended classes with trainers. Twenty-one clinics in four cities in the United States provided information regarding demographics, vaccination, CPV diagnosis, and class attendance for puppies ≤ 16 wk of age. In addition, 24 trainers in those same cities collected similar information on puppies that attended their classes. In total, 279 puppies attended socialization classes and none were suspected of or diagnosed with CPV infection. Results indicated that vaccinated puppies attending socialization classes were at no greater risk of CPV infection than vaccinated puppies that did not attend those classes.

**Stavisky, J., Brennan, M.L., Downes, M., Dean, R. (2012) Demographics and economic burden of un-owned cats and dogs in the U.K. : results of a 2010 census. BMC Veterinary Research. 8. 163-172.**

The aim of this study was to carry out a census of un-owned cats and dogs in the UK in 2010, and to document the origins, destinations, husbandry and costs associated with the care of these animals. Overall, in 2010, 89,571 dogs and 156,826 cats entered the care of the participating organisations. Approximately half of these animals were relinquished by their owners. Other origins included being found as strays or confiscated for welfare purposes. Seventy-five per cent of dogs and 77.1% of cats were rehomed. The next most common outcome was euthanasia, accounting for 10.4% of dogs and 13.2% cats. For dogs and cats, 44.3% and 62% of participants respectively reported having a waiting list, which frequently exceeded the actual capacity of the facility. Over 19,000 people were involved in the care of these animals, on a paid or voluntary basis. Financial records were available for 519/595 (87.2%) of the registered charities, and their total expenditure in 2010 was £340 million.

**Topál, J., Gácsi, M., Miklósi, A., Viráni, Z., Kubinyi, E., Csányi, V. (2005) Attachment to humans : a comparative study on hand-reared wolves and differently socialised puppies. Animal Behaviour. 70. 1367-1375.**

Compared attachment behaviour of extensively socialised (hand-reared) dogs and wolf puppies, to that of pet dog puppies of the same age. Extensive socialisation (hand-rearing) of dog puppies had only a minor effect on attachment patterns compared to pet dogs reared normally. However, both hand-reared and pet dogs were more responsive to their carer than to an unfamiliar person, but wolf puppies were not. The authors offer some explanations based on selection in the course of domestication to account for this difference.

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**Udell, M.A.R., Dorey, N.R., Wynne, C.D.L. (2010) What did domestication do to dogs' sensitivity to human actions? *Biological Reviews*. 85. 327-345.**

The study examines from a theoretical point of view alternative hypotheses to account for the ability of dogs to respond to human social cues. The "domestication hypothesis" asserts that during domestication dogs evolved an inherent sensitivity to human gestures that their non-domesticated counterparts do not share. According to this view, sensitivity to human cues is present in dogs at an early age and shows little evidence of acquisition during ontogeny. The authors suggest that research on canine domestication, socialization, and conditioning, brings the assumptions of this hypothesis into question. A two-stage hypothesis is proposed instead, according to which the sensitivity of an individual dog to human actions depends on acceptance of humans as social companions, and conditioning to follow human limbs.