



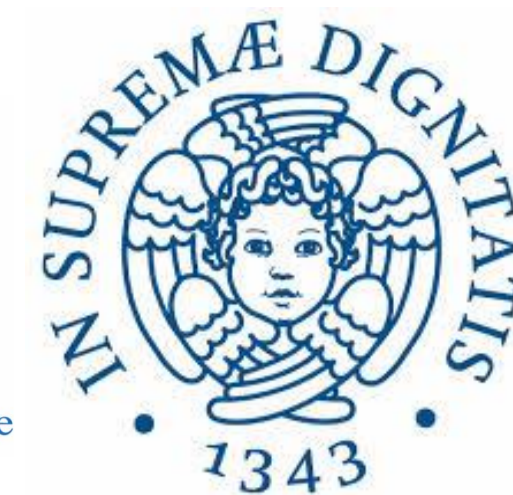
Potential risks of human-pet relationship: can a pet-friendly city prevent them?

Carmen Borrelli¹, Giulia Granai¹, Massimo Rovai², Roberta Moruzzo¹, Francesco Riccioli¹, Angelo Gazzano¹, Francesco Paolo Di Iacovo¹, Carlo Bibbiani¹, Chiara Mariti¹

¹ Department of Veterinary Sciences, University of Pisa, Italy
² Department of Civil and Industrial Engineering, University of Pisa, Italy



European Veterinary Congress of Behavioural Medicine and Animal Welfare



INTRODUCTION

Dogs and cats ownership has been gradually increasing over the world even in emerging nations (figure 1). More than an half of the world's population has a pet at home (1).

The beneficial effects of pet ownership have been extensively documented (2-4); nevertheless, it may also lead to some potential risks.

The aim of this review was to identify and discuss these potential risks to provide an exhaustive understanding of the concerns associated with human pet relationship/interaction.

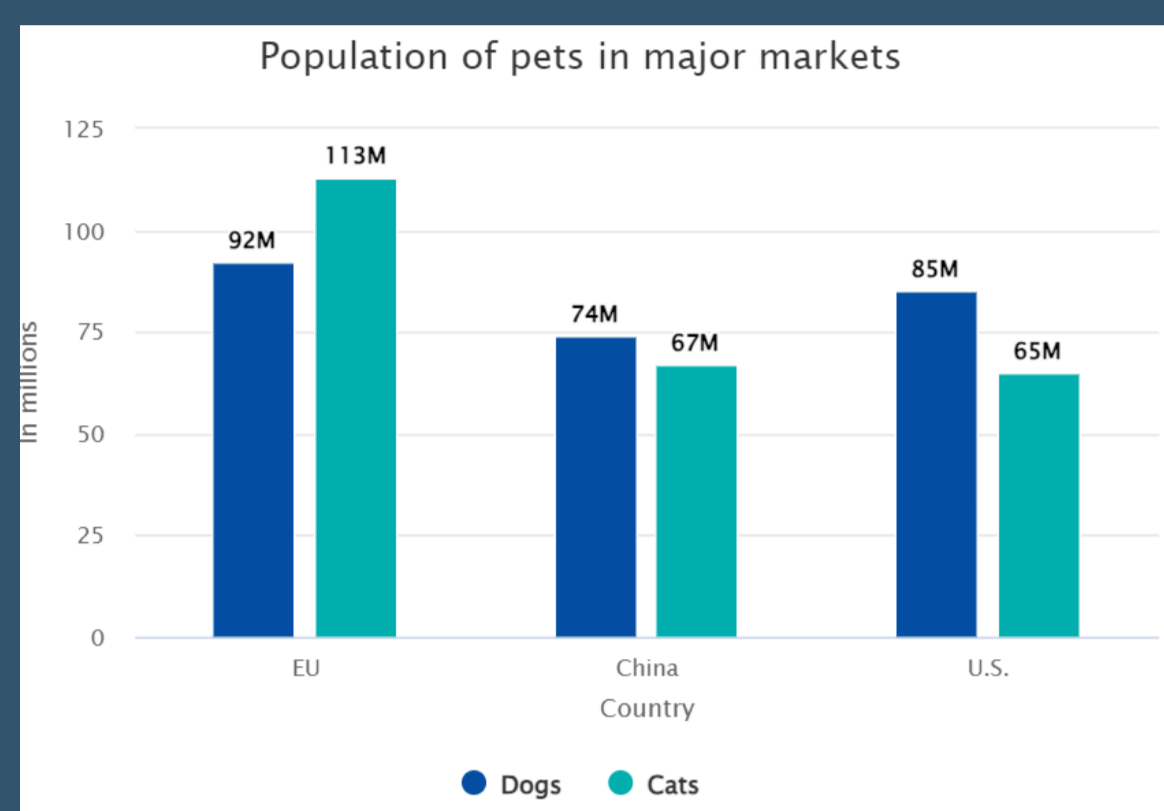


Figure 1: Trends of pet population in major countries in the world (5-7)

MATERIALS AND METHODS

Literature search was conducted in March 2023, and updated in August 2023, from Scopus database using the following keywords: *risk AND human-pet OR human-dog OR human-cat AND relationship OR ownership OR interaction*. In addition, we limited the search to article papers, belonging to scientific journal and written in English.

One-hundred and twenty-two article were identified with the first search. Papers were then selected screening title and abstract; 92 articles were excluded being out of scope. The remaining 30 articles were screened by full text. At this stage, 13 articles were excluded of which: 4 were review articles, 5 were not available in full text, 3 focused more on the possible risk on rural areas rather than urban environments, 1 was not in English. The 17 remaining articles were included in this review. Figure 2 describe the selection process followed for this review.

In the context of this review the term "risk" refers to the probability of negative outcomes, harms or adverse events that may arise from the interaction with companion animals (in particular dogs and cats).

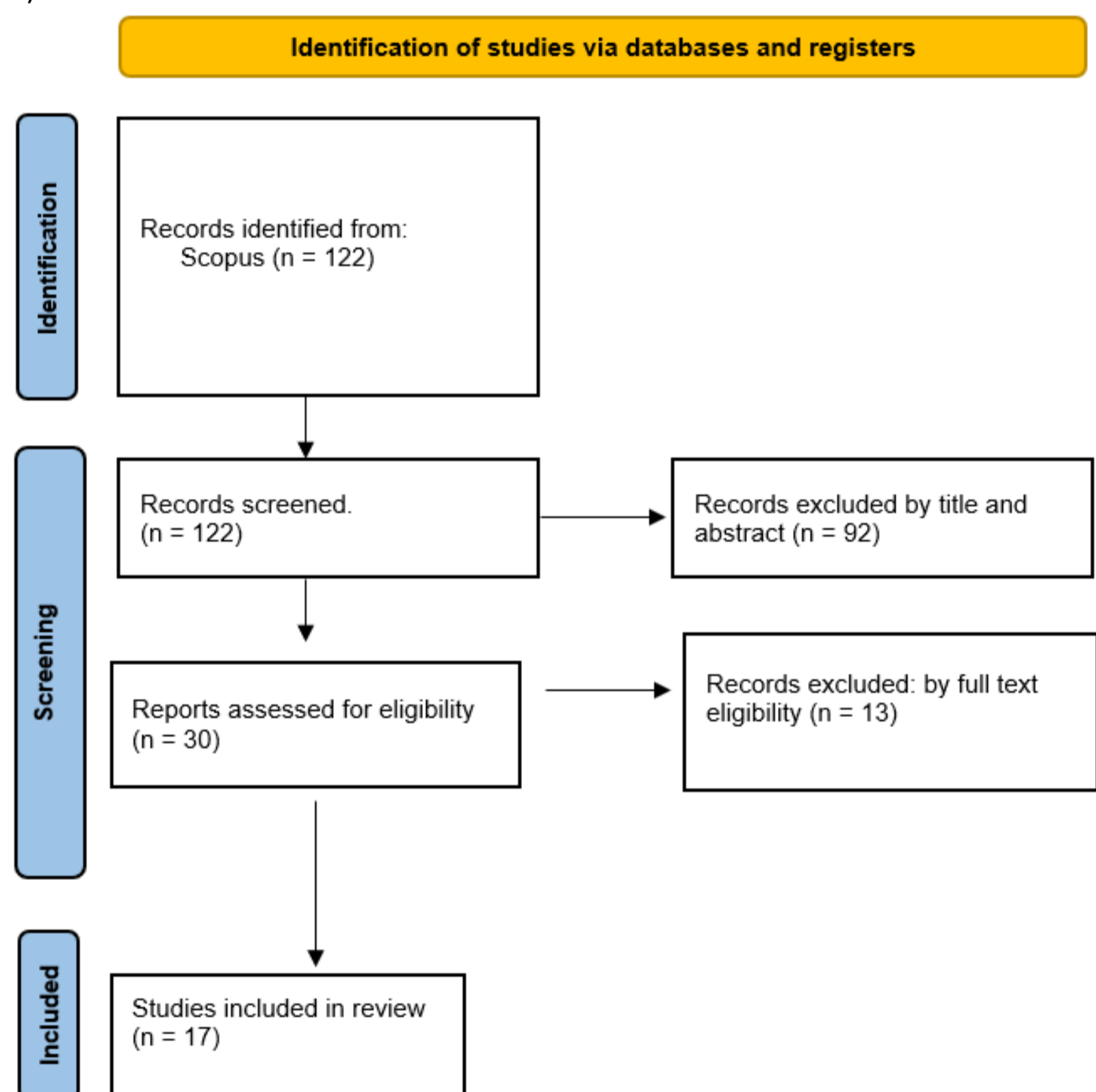


Figure 2: Flow chart of the selection process for this review

RESULTS

The literature research identified 17 suitable articles published between 2008 and 2023. Twelve articles addressed only dogs, 3 only cats, 1 both dogs and cats and 1 pets in general.

Eight studies [8-15] aimed to investigate various aspects of aggressive behaviours in pets. Common research objectives include:

- Understanding the underlying causes, such as the identification of triggers and alternative targets [9-10]
- Raising awareness of the issue [12]
- Assessing risks and associated factors [8, 11, 14]

Results underlined the lack of knowledge of factors associated with dog aggression [11] as well as a general lack of the owners in interpreting dog signaling [12] and the importance to promote and improve preventative education on the topic [14]. The importance of socialization and habituation is also highlighted [9-10] as factors that might prevent aggressive behaviours. In addition, Sacchettino et al. (2023) observed that the covid 19 lockdown induced more aggressive and fearful personality traits in dogs.

Nine studies [16-24] provided insights into the health risks associated with pet ownership and interactions. Authors mainly investigated:

- Fecal contamination in public green spaces [16, 19]
- Risk of zoonotic disease associated with pet ownership or interaction [17, 18, 20-24]

The studies emphasized the concerns about canine fecal contamination in urban green spaces, as they may contain zoonotic parasites [19], even though Utaaker et al. (2018) found that in Chadigarh's park canine faeces posed a low risk to human health. Other studies focused on the possible presence of zoonotic parasites in companion animals like *Toxoplasma gondii* [17], *Ancylostoma caninum*, *Toxocara canis* and *Giardia* even in dogs involved in AAI [18].

DISCUSSION

The findings of this review shed light on the importance of addressing the possible risks associated with human-pet ownership and interaction, particularly dogs and cats.

These risks encompass a range of negative outcomes and adverse events, including aggressive behaviors and zoonotic disease transmission.

One of the important lessons from this collection of studies is the importance of incorporating preventative interventions into policymakers' agendas. The studies on fecal contamination in public green spaces and the risks of zoonotic diseases underscore the critical role that public health and hygiene play in mitigating these risks. Developing good practices to maintain public hygiene and co-managing off-leash areas between citizens might be suitable solutions. Regarding aggressive behaviors and the occurrence of behavioral problems, a multi-faceted approach is essential. This includes initiatives such as educational projects in schools, introductory courses for pet owners organized by public administrations, and interventions in animal shelters to encourage responsible adoptions.

In this regard, the In-Habit (INclusive Health And wellBeing In small and medium size cITies) project, funded by the European Commission (GA 869227), serves as a good example of an innovative framework that aims to reduce the risks associated with human-animal relationship in urban settings and create a pet-friendly city where benefits are maximized.

CONCLUSIONS

In conclusion, the data reported in these publications emphasizes the significance of addressing dangers related with human-companion animal relationships. By integrating preventative measures, promoting responsible pet ownership, and adopting a multi-disciplinary approach, we can work towards creating safer and more harmonious environments for both humans and their pets.

The INHABIT project is an encouraging example of such a comprehensive strategy, demonstrating that the benefits of human-animal relationships can be fully realized in a well-managed, pet-friendly urban setting.

REFERENCES

1. GfK. Man's Best Friend: Global Pet Ownership and Feeding Trends. Available online: <https://www.gfk.com/insights/mans-best-friend-global-pet-ownership-and-feeding-trends>. (accessed on 11/10/2023)
2. McConnell, A.R.; Brown, C.M.; Shoda, T.M.; Stayton, L.E.; Martin, C.E. Friends with Benefits: On the Positive Consequences of Pet Ownership. *J. Pers. Soc. Psychol.* 2011, 101, 1239–1252. <https://doi.org/10.1037/a0024506>.
3. Friedmann, E.; Son, H. The Human-Companion Animal Bond: How Humans Benefit. *Vet. Clin. North Am. Small Anim. Pract.* 2009, 39, 293–326. <https://doi.org/10.1016/j.cvsm.2008.10.015>.
4. Friedman, E.; Krause-Parello, C.A. Companion Animals and Human Health: Benefits, Challenges, and the Road Ahead for Human-Animal Interaction. *Rev. Sci. Tech.* 2018, 37, 71–82. <https://doi.org/10.20506/rst.37.1.2741>.
5. European Pet Food Industry Federation. Statistics. Available online: <https://europeanpetfood.org/about/statistics/>. (accessed on 11/10/2023)
6. Frost & Sullivan. Chinese Pet Owners Spend an Average of RMB3,969 per Year. Available online: <https://www.prnewswire.com/news-releases/frost-sullivan-chinese-pet-owners-spend-an-average-of-rmb3-969-per-year-300823597.html>. (accessed on 11/10/2023)
7. American Veterinary Medical Association. Pet Populations Are Way Up. Available online: <https://www.avma.org/blog/pet-populations-are-way>. (accessed on 11/10/2023)
8. Ilana R Reisner; Frances S Shofer Effects of Gender and Parental Status on Knowledge and Attitudes of Dog Owners Regarding Dog Aggression toward Children. *Am Vet Med Assoc.* 2008;233(9):1412-1419. doi:10.2460/javma.233.9.1412.
9. Marta Amat; Xavier Manteca; Susana Le Brech; José Luis Ruiz de la Torre; Valentina M. Mariotti; Jaume Fatjó Evaluation of Inciting Causes Alternative Targets and Risk Factors Associated with Redirected Aggression in Cats. *J Am Vet Med Assoc.* 2008;233(4):586-589. doi:10.2460/javma.233.4.586.
10. Ramos, D.; Mills, D.S. Human Directed Aggression in Brazilian Domestic Cats: Owner Reported Prevalence, Contexts and Risk Factors. *J Feline Med Surg* 2009, 11, 835–841. doi:10.1016/j.jfms.2009.04.006.
11. Patronek, G.J.; Sacks, J.J.; Delise, K.M.; Cleary, D. V.; Marder, A.R. Co-Occurrence of Potentially Preventable Factors in 256 Dog Bite-Related Fatalities in the United States (2000-2009). *J Am Vet Med Assoc* 2013, 243, 1726–1736. doi:10.2460/javma.243.12.1726.
12. Meints, K.; Breltsford, V.; Keuster, T. De Teaching Children and Parents to Understand Dog Signaling. *Front Vet Sci* 2018, 5, doi:10.3389/fvets.2018.00257.
13. Tulloch, J.S.P.; Owczarczak-Garstecka, S.C.; Fleming, K.M.; Vivancos, R.; Westgarth, C. English Hospital Episode Data Analysis (1998–2018) Reveal That the Rise in Dog Bite Hospital Admissions Is Driven by Adult Cases. *Sci Rep* 2021, 11, doi:10.1038/s41598-021-81527-7.
14. Barrios, C.L.; Bustos-López, C.; Pavletic, C.; Parra, A.; Vidal, M.; Bowen, J.; Fatjó, J. Epidemiology of Dog Bite Incidents in Chile: Factors Related to the Patterns of Human-Dog Relationship. *Animals* 2021, 11, 1–25. doi:10.3390/ani11010096.
15. Sacchettino, L.; Gatta, C.; Chirico, A.; Avallone, L.; Napolitano, F.; d'Angelo, D. Puppies Raised during the COVID-19 Lockdown Showed Fearful and Aggressive Behaviors in Adulthood: An Italian Survey. *Vet Sci* 2023, 10, doi:10.3390/vetsci10030198.
16. Utaaker, K.S.; Tysnes, K.R.; Krosness, M.M.; Robertson, L.J. Not Just a Walk in the Park: Occurrence of Intestinal Parasites in Dogs Roaming Recreational Parks in Chandigarh, Northern India. *Vet Parasitol Reg Stud Reports* 2018, 14, 176–180. doi:10.1016/j.vprsr.2018.10.008.
17. Cong, W.; Elsheikha, H.M.; Zhou, N.; Peng, P.; Qin, S.Y.; Meng, Q.F.; Qian, A.D. Prevalence of Antibodies against *Toxoplasma Gondii* in Pets and Their Owners in Shandong Province, Eastern China. *BMC Infect Dis* 2018, 18, doi:10.1186/s12879-018-3307-2.
18. Gerardi, F.; Santaniello, A.; Del Prete, L.; Maurelli, M.P.; Menna, L.F.; Rinaldi, L. Parasitic Infections in Dogs Involved in Animal-Assisted Interventions. *Ital J Anim Sci* 2018, 17, 269–272. doi:10.1080/1828051X.2017.1344937.
19. Rubel, D.; Nemirovsky, S.I.; Gorosito, I.; Servián, A.; Garbossa, G. Factors Affecting Canine Fecal and Parasitic Contamination of Public Green Spaces of Buenos Aires City, Argentina, and Visitors' Perception of Such Contamination. *Journal of Urban Ecology* 2019, 5, doi:10.1093/jue/juz012.
20. Rinchen, S.; Tenzin, T.; Hall, D.; Cork, S. A Qualitative Risk Assessment of Rabies Reintroduction Into the Rabies Low-Risk Zone of Bhutan. *Front Vet Sci* 2020, 7, doi:10.3389/fvets.2020.00366.
21. Joosten, P.; Van Cleven, A.; Sarrazin, S.; Paepe, D.; De Sutter, A.; Dewulf, J. Dogs and Their Owners Have Frequent and Intensive Contact. *Int J Environ Res Public Health* 2020, 17, 1–10. doi:10.3390/ijerph17124300.
22. López-Pérez, A.M.; Orozco, L.; Zazueta, O.E.; Fierro, M.; Gomez, P.; Foley, J. An Exploratory Analysis of Demography and Movement Patterns of Dogs: New Insights in the Ecology of Endemic Rocky Mountain-Spotted Fever in Mexicali, Mexico. *PLoS One* 2020, 15, doi:10.1371/journal.pone.0233567.
23. Allendorf, V.; Denzin, N.; Conraths, F.J.; Boden, L.A.; Elvinger, F.; Magouras, I.; Stegeman, A.; Wood, J.L.N.; Uruëña, A.C.; Grace, K.E.F.; et al. Does Having a Cat in Your House Increase Your Risk of Catching COVID-19? *One Health* 2022, 14, doi:10.1016/j.onehlt.2022.100381.
24. Candellone, A.; Badino, P.; Girolami, F.; Cerquetella, M.; Aresu, L.; Zoppi, S.; Bergero, D.; Odore, R.; Nebbia, P. Concomitant *Campylobacteriosis* in a Puppy and in Its Caregiver: A One Health Perspective Paradigm in Human-Pet Relationship. *Vet Sci* 2023, 10, doi:10.3390/vetsci10040244.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 869227

- facebook.com/inhabith2020
- twitter.com/INHABIT_H2020
- linkedin.com/company/inhabit-h2020



carmen.borrelli@phd.unipi.it