



A Mapping Study of Veterinary Literature on Perceptions and Attitudes of Female Canine Spaying

Erik Davis Fausak*

University Library, University of California, Davis, Davis, CA, United States

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*Correspondence:

Erik Davis Fausak
edfausak@ucdavis.edu

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This is a mapping study conducted to evaluate the characteristics of where content that engages in perspectives or attitudes on female dog spaying is published. Three databases, CAB Direct, PubMed, and Scopus, were systematically searched. There were 84 out of 642 papers identified and screened for relevance on attitudes or perceptions on female canine spaying. These 84 articles were then examined for recurring authors, institutional representation, and publisher information. Additionally, information regarding the population being addressed, veterinarian or client, was noted with most literature addressing the veterinary perspective. Many important articles were published in a wide array of journals from many countries, which suggests the importance of not only browsing journals but also searching for relevant literature in databases like CAB Abstracts and MEDLINE.

Keywords: perspectives, literature, bitches, dogs, canine, female neuter, spay, ovariectomy

INTRODUCTION

A great deal of literature and evidence has matured the veterinary approach and perspective toward spaying and neutering, as evidenced by *Frontiers in Veterinary Science* Research Topic: *Effective Options Regarding Spay or Neuter of Dogs* (1). Changing perspectives and risks associated with spaying female dogs can be found in databases as early as 1974 (2). This last decade has seen an explosion in literature regarding perspectives and attitudes in spaying female dogs, particularly an increase in either survey or ethnographic perspectives of specific populations regarding female canine spaying practices (3–13). Additionally, closer examination of a range of disease conditions has potentially been associated with early female spaying (14–29). Even guidelines and evidence-based systematic reviews as well as critically appraised topics have also been published over the past decade (30–36).

This mapping study has been used to identify the trend in literature questioning or examining the convention of spaying female dogs. The growth of evidence-based veterinary medicine has shown that many influential articles may exist outside the scope of typically browsed journal titles (37). This mapping study uses a similar systematic searching approach used in systematic reviews to make reproducible results. The literature retrieved was evaluated by identifying which journals, authors, institutions, countries, and timelines impacted attitudes and perspectives of female canine spaying over the history of veterinary medical literature.

METHODS

The goal of this mapping study was to create a transparent search strategy to identify characteristics of literature regarding female dog neutering in terms of client and veterinary perceptions, including associated risks. The primary approach to this mapping study is based on the concept set forth by Cooper (38). Modification includes conducting a systematized search for literature across three databases (CAB Direct, PubMed, and Scopus) on *female dog spaying*. Selection of which databases to search on female dog neutering was based on a review of database coverage of veterinary literature by Grindlay et al. (39). Specific database search strategies are available (see **Appendix A**), which included the use of terms for dogs (dog OR dogs OR canines OR canine OR canids OR beagles OR shepherds OR retrievers), spaying (spay* OR OHE OR ovariectomy OR ovariohysterectomy OR “female castration”), and perspectives (Perceptions OR attitudes OR practices OR perception OR ethical OR moral OR “best practices” OR “paradigm” OR evaluation).

Search results were collected and then uploaded into UC Davis Library-licensed *F1000 Workspace* (now *SciWheel*) Citation Management Software and deduplicated. Once deduplicated, a citation management.ris file was exported from *F1000 Workspace* (now *SciWheel*) and uploaded in systematic review software licensed by UC Davis Library, *Covidence* (Australia), under screening and set for only one reviewer (the author). Literature was then screened based on the inclusion/exclusion criteria established. Inclusion criteria included articles in English that included female dogs and spaying and incorporated analysis of cost or benefit, client perspectives, veterinarian perspectives, and addressing potential risks or benefits of spaying. Exclusion occurred with articles not in English, did not involve female dog spaying, focused on procedure (like analgesics or surgical approach), and were case studies.

Once all the articles were screened, they were exported from *Covidence* and brought into *F1000 Workspace* (now *SciWheel*) for extraction as a CSV file and analyzed in *Microsoft Excel* (version 16.36).

RESULTS

There were 642 papers found between the three databases and deduplicated from 722 papers. Only 84 articles were identified to be relevant to perception of spaying and neutering including risk and assessment. Many articles were about procedural refinement including examination of surgical approach and analgesia. Another large group of articles were case reports that included patient signalment in the abstract. CAB Direct had 18% of articles about female dog spaying addressing attitudes and perspectives. PubMed had 13% of articles about female dog spaying addressing attitudes and perspectives. Scopus had 18% of articles about female dog spaying addressing attitudes and perspectives. See **Appendix A** for summary data of results.

Journals

The first article retrieved in the databases that provides perspective on spaying and neutering programs was in *Vet Record*

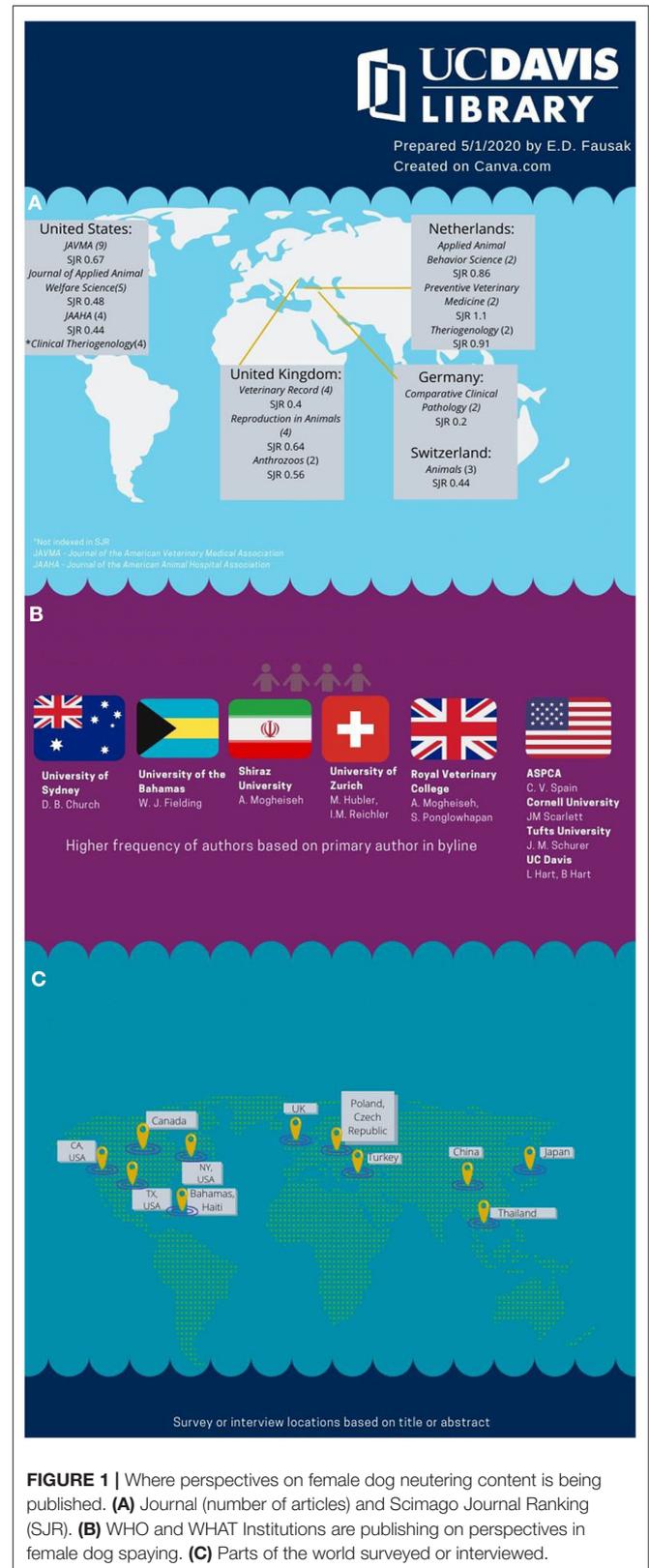
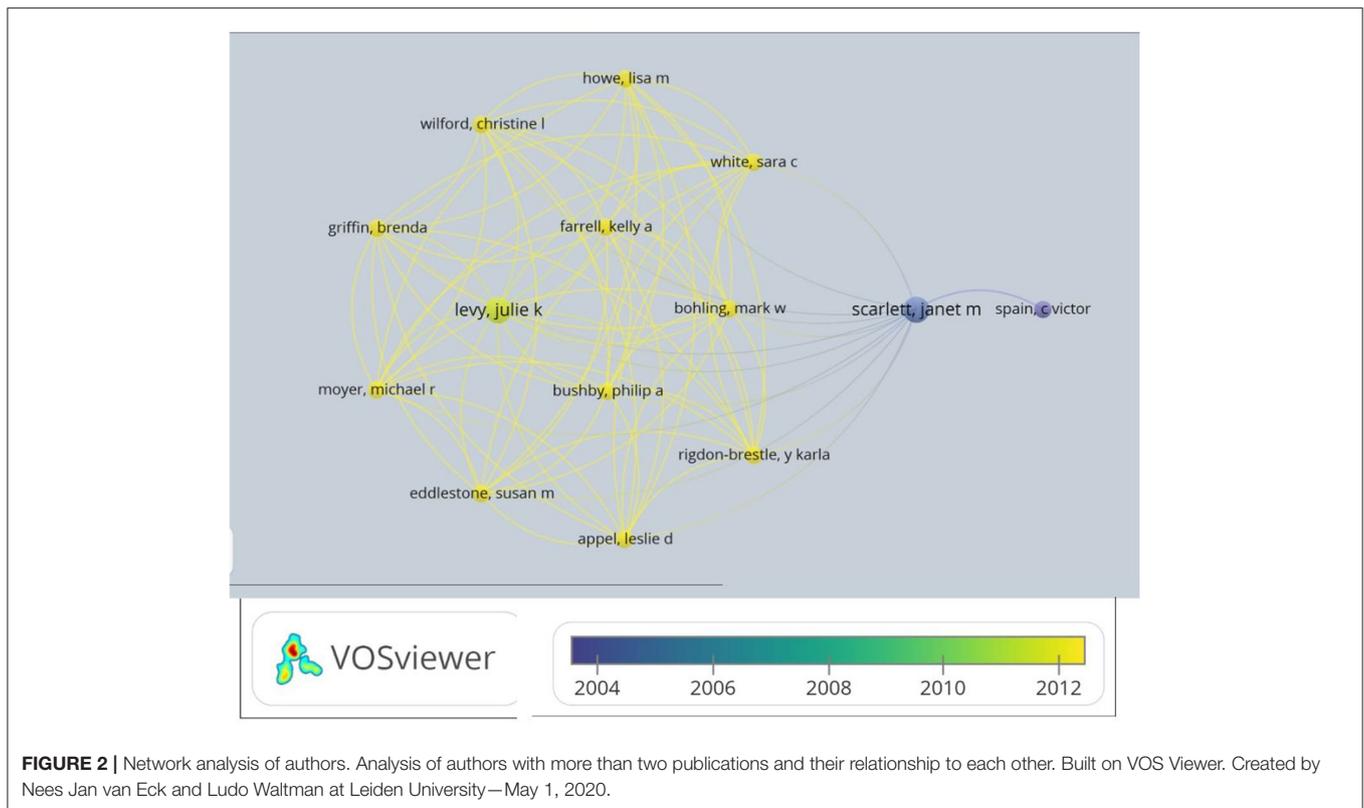


FIGURE 1 | Where perspectives on female dog neutering content is being published. **(A)** Journal (number of articles) and Scimago Journal Ranking (SJR). **(B)** WHO and WHAT Institutions are publishing on perspectives in female dog spaying. **(C)** Parts of the world surveyed or interviewed.

in 1974. Six journals had four or more articles pertaining to perceptions of spaying including the *Journal of the American*



Veterinary Medical Association (14, 18, 35, 36, 40–45), the *Journal of Applied Animal Welfare Science* (4, 5, 46–48), *Veterinary Record* (2, 49–51), *Reproduction in Domestic Animals* (29, 52–54), and *Clinical Theriogenology* (22, 26, 55, 56). All journals that had more than one article on the topic are listed with country of origin and Scimago Journal and Country Ranking in **Figure 1**.

Authorship and Institutional Contribution

Higher frequency of authors (more than one citation as primary name in by-line) that publish articles on perceptions and attitudes toward spaying include Church (University of Sydney, Australia) (17, 57), Fielding (University of Bahamas, Bahamas) (4, 5), Hart (University of California, Davis, USA) (22, 40, 58), Hart (University of California, Davis, USA) (22, 40, 58), Hubler (University of Zurich, Switzerland) (52, 59), Khalid (Royal Veterinary College, United Kingdom) (17, 57), Mogheiseh (Shiraz University, Iran) (60, 61), Ponglowhapan (Royal Veterinary College, United Kingdom) (17, 57), Reichler (University of Zurich, Switzerland) (29, 52, 59), Scarlett (Cornell University, USA) (36, 41, 62), Schurer (Tufts University, USA) (8, 9), and Spain (ASPCA, USA) (41, 62–65). See **Figure 1** for author affiliations. Additionally, **Figure 2** is a network map of authors by time created in software, VOS Viewer, created by Nees Jan van Eck and Ludo Waltman at Leiden University. Of 286 authors, 22 authors have at least two publications and 14 authors have clear network relationships starting with C. V. Spain of the ASPCA in 2004.

Surveyed Countries

The US was the most frequently surveyed country with Texas, California, and New York as the most frequently surveyed states (46, 48, 62, 66–68). Multiple surveys were conducted in the United Kingdom, Canada, and Japan (8, 9, 14, 58, 63, 69, 70) (see **Figure 1**).

Perspective and Dates of Publication

Most of the articles were written from the perspective of the veterinarian (85%). Many of the articles that address client perspectives utilized surveys or ethnographic data.

The most number of activities of publication on spaying perspectives have been over the last decade with 58 articles since 2010 (3–7, 9, 11–20, 22–29, 31, 35, 44, 48, 52, 54–56, 60, 61, 64, 67, 69, 71–85). The decade of 2000 produced 18 articles (36, 40–43, 46, 47, 49, 50, 57, 59, 62, 63, 66, 71, 86–89). The 1990s produced five articles with only one article published in the 1980s and two in the 1970s (2, 45, 51, 58, 68, 70, 90, 91).

CONCLUSIONS

There were 6,582 articles retrieved with search terms for female dog spaying in English. Of those articles, 642 were retrieved with perceptions or attitudes toward spaying, and 84 articles were screened to pertain to female dog spaying from a client or veterinarian perspective. Of the 642 articles, most were focused on the practice and refinement of spaying as a procedure and were excluded.

Of the top journals, it is probably not surprising that national veterinary organizational journals, like the *Journal of the American Veterinary Medical Association (AVMA)* and *Veterinary Record (BVA)*, are the most common journals to publish in when addressing changing perspectives or attitudes toward female dog spaying. Journals that look at reproduction like *Theriogenology*, *Clinical Theriogenology*, and *Reproduction in Domestic Animals* are also probably not a surprising source of this content. The broader and more holistic journals are of interest, like *Animals*, *Anthrozoos*, and *The Journal of Applied Animal Welfare Science*. Many journals that had relevant articles may not be regularly browsed by practitioners.

This mapping study's purpose is to identify literature that examines perspectives about spaying and identify where and when the literature is being published. It is beyond the scope of this paper to assess the quality or content of the literature discovered. This last decade has seen a large increase in literature about what age, in relationship to breed, that female dogs should be spayed. Most of this literature is published for the veterinary professional and very little from a consumer perspective.

What may be interesting to note is that a great deal of consumer health resources may or may not reflect the changes in perspective regarding spaying and neutering. For instance, a gold standard in client information resources, VIN's Veterinary Partner, makes no mention of recent literature on breed-specific concerns in spaying or neutering (92, 93). What is interesting is that most canine food companies like *Hill's Science Diet* or *Royal Canin* do recognize variations in spaying and neutering needs for different breeds (94, 95).

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DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary materials, further inquiries can be directed to the corresponding author/s.

AUTHOR CONTRIBUTIONS

The author confirms being the sole contributor of this work and has approved it for publication.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fvets.2020.559659/full#supplementary-material>

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