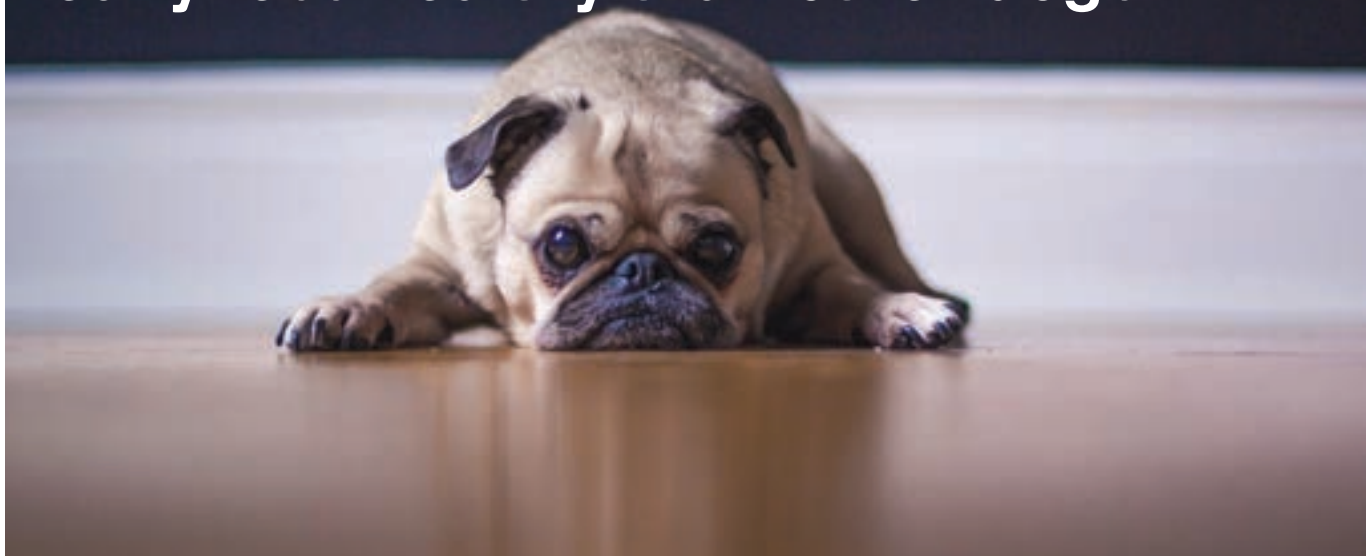
Truth and dare: Are brachycephalic dogs really less healthy than other dogs?



Brachycephalic dog breeds are regularly asserted as less healthy than non-brachycephalic breeds. But is this really true? And if it is true, what do you and your practice dare to do to try to mitigate the welfare issues raised by brachycephalism in dogs? In this paper, Dan O'Neill, senior lecturer in Companion Animal Epidemiology, The Royal Veterinary College, explores the use of VetCompass primary-care veterinary clinical data to answer these health questions and then explores the work of the UK Brachycephalic Working Group as a framework to help you to engage with current veterinary activities on brachycephalism

THE BACK STORY

There is increasing veterinary concern for the health and welfare of brachycephalic dogs.[1-3] A backdrop of increasing evidence on health compromises associated with their exaggerated body morphology[4-6] is exacerbated by recent marked rises in the popularity of certain brachycephalic breeds such as French Bulldogs, Pugs and English Bulldogs.[7] Disorder predispositions associated with brachycephaly include respiratory disease,[8,9] corneal ulceration,[10,11] dystocia,[12,13] spinal disease,[14] and heat stroke and pneumonia[15] in addition to shortened lifespans (8.6 years vs 12.7 years for non-brachycephalic dogs[16]). Some veterinarians now consider the issues of several popular brachycephalic breeds too compromised to even justify continued breeding.[17] In the UK, the problems related to brachycephaly in dogs are so important that a national group called the Brachycephalic Working Group (BWG) has been established to try to gain a deeper understanding of these complex issues and to identify some routes forward.[18]

But what is the truth here about the health of brachycephalic dog? And how can veterinary professionals and veterinary practices contribute to mitigating the welfare harms that are associated with brachycephaly in dogs? To answer the first of these questions, anonymised veterinary clinical data from the VetCompass Programme[19] were analysed to compare the probability of occurrence of common disorders between brachycephalic and non-brachycephalic dogs. Based on these results, a summary view of the relative health impact on dogs from brachycephaly could be inferred. This information could then be used as an evidence base to decide on the merits of taking actions to mitigate these harms.

THE STUDY PLAN

VetCompass collects anonymised clinical data from around 30% of primary-care veterinary practices in the UK.[19]

The study used a cohort design to identify all disorders recorded in a random sample of dogs under primary veterinary care during 2016. The breeds of the study dogs were categorised into four groups based on their typical skull-shape conformation[20]: brachycephalic, mesocephalic, dolichocephalic and crossbred dog types. Mesocephalic, dolichocephalic and crossbred dog types were further grouped as non-brachycephalic types for risk analyses. Additional information extracted on each dog included neuter and insurance status; absolute adult bodyweight (the mean of all bodyweight [kg] values recorded after 18 months old), age (at December 31, 2016); and relative adult bodyweight (either above or below the relevant breed-sex mean). A combined list of the 30 most common disorders among each of the brachycephalic and non-brachycephalic

dog groups was generated. Multivariable statistical methods were used to account for confounding, given the prior evidence that brachycephalic and non-brachycephalic dogs differ widely in general characteristics such as bodyweight, age and neuter status.[21,22] The study also compared these characteristics and reported the one-year period prevalence values for the 30 most common disorders of brachycephalic, and non-brachycephalic dogs. Risk-factor analyses applied random effects multivariable binary logistic regression modelling to evaluate associations between each of the common disorders and the brachycephalic/non-brachycephalic factor along with a fixed set of covariables included to account for confounding (absolute adult bodyweight, relative adult bodyweight, age, sex, neuter and insurance). Multivariable Poisson regression modelling was used to evaluate associations between the skulls shape and the count of disorders recorded during 2016.

RESULTS

Brachycephaly is common in dogs

The study included a random sample of 22,333 dogs attending 784 veterinary clinics. The breakdown by skull shape was 18.7% brachycephalic, 46.5% mesocephalic, 7.8% dolichocephalic and 26.94% crossbred. At a more summarised level, the population included 18.7% brachycephalic and 81.3% non-brachycephalic dogs.

Brachycephalic breeds are just different

Brachycephalic dogs (median age 3.31 years) were younger than mesocephalic (5.33 years; P <0.001), dolichocephalic (5.07 years; P <0.001) and crossbred dogs (3.74 years; P <0.001). Brachycephalic dogs (median adult bodyweight 8.75kg) were lighter than mesocephalic (16.98kg; P <0.001), dolichocephalic (25.80kg; P <0.001) and crossbred dogs (13.80kg; P < 0.001). Brachycephalic dogs (neutered 36.70%) were less likely to be neutered than mesocephalic (46.13%; P <0.001), dolichocephalic types (46.43%; P <0.001) and crossbred dogs (49.95%;P <0.001). Brachycephalic dogs (insured 11.47%) were less likely to be insured than mesocephalic (14.18%; P <0.001) or dolichocephalic dogs (16.06%; P <0.001) but insurance did not differ to crossbreds (12.55%; P = 0.101).

There are fewer brachycephalic breeds (34) than for the mesocephalic group (169) or dolichocephalic group (66). The most common brachycephalic breeds were not the ones typically promoted in the media: Chihuahua (22.91%), Shih-tzu (19.07%) and Cavalier King Charles Spaniel (10.43%). Within each skull shape group, the 15 most common breeds comprised a greater proportion of the brachycephalic dog types (98.37%) than mesocephalic types (83.69%; P <0.001) or dolichocephalic types 82.11%; P <0.001).

Brachycephalic breeds seem less healthy

Demographic differences between the skull shape groups means that direct comparison between the groups (i.e. univariable analysis) is likely to give misleading results. For example, if younger dogs are generally healthier than older dogs, then brachycephalic dogs will appear artifactually healthier because they are younger on average than other groups. To account for these effects, the study used multivariable analytic methods that took account of the differing age, bodyweight, neutering and insurance between the groups. Across all dogs in the study, 65.84% had at least one disorder recorded during 2016. Multivariable logistic regression modelling showed that brachycephalic dogs had 1.27 times the odds of having at least one disorder diagnosed (95% CI 1.13-1.43; P <0.001) compared with crossbred types and was similarly predisposed compared with mesocephalic and dolichocephalic dogs. The median count of disorders diagnosed in each dog in the overall study during 2016 was 1 (IQR 0-2, range 0-17). Multivariable Poisson regression modelling showed that the brachycephalic dogs had a significantly higher count of disorders annually than mesocephalic, dolichocephalic and crossbred dogs.

The most common disorders diagnosed in the brachycephalic dogs were periodontal disease (prevalence = 11.63%), otitis externa (7.27%), obesity (6.38%) and anal sac impaction (5.97%). Following multivariable logistic regression analysis, the odds of 10 of the 30 common disorders (33.33%) differed between brachycephalic and non-brachycephalic types. Brachycephalic dogs had higher odds in 8/10 disorders: corneal ulceration (odds ratio 8.40); heart murmur (OR 3.52); umbilical hernia (OR 3.16); pododermatitis (OR 1.66); skin cyst (OR 1.52); patellar luxation (OR 1.40); otitis externa (OR 1.29); and anal sac impaction (OR 1.24). Brachycephalic dogs had lower odds in 2/10 disorders: undesirable behaviour (OR 0.52,) and claw injury (OR 0.45).

DISCUSSION

This study is the first large-scale direct comparison of the health of brachycephalic versus non-brachycephalic dogs using veterinary clinical records. The results provide strong evidence to support the position that brachycephalic dogs have reduced health overall compared with non-brachycephalic dogs. Brachycephalic dogs had higher odds of having at least one disorder and higher predicted annual disorder counts. Among the 30 most common disorders, brachycephalic types showed predispositions for 8/30 disorders compared with protections for just 2/30 disorders. These results take account of the differing demographic characteristics between the groups of dogs and therefore provide a more reliable evidence base on comparative health than many of the earlier univariable studies.

Recent rising popularity and ownership of Pugs,[23] French Bulldogs[21] and English Bulldogs[24] have triggered growing concerns about brachycephalic health issues in dogs.[18-25] However, the distribution of breeds in the current study show that there are many other common brachycephalic breeds that warrant concern, adding further complexity to the brachycephalic issue. It is also clear that the specific issues related to brachycephalism vary in their relative impacts across these breeds. But the overall message is clear; there are important implications from brachycephalism for the health of brachycephalic breeds.

If we now accept the truth that the health of brachycephalic dog breeds really is poorer overall than for non-brachycephalic dogs, the next question is what you dare to do about this? Your actions could be at a personal level as a veterinary professional, or at a practice level, or at a national level, eg. within Veterinary Ireland. To date, many individual veterinary professionals, practices and organisations have undertaken unilateral actions aimed at redressing the brachycephalic issue but the complexity of the brachycephalic problem has meant that many of these actions have had limited success to date. Indeed, many unilateral actions may even have led to overall harms. There is now an acceptance that the best actions on brachycephalism need to be collaborative and widely supported in order to have the greatest chance of meaningful success. To this end, the BWG[18] was established in the UK in 2016 as a broad coalition of major stakeholders including breed clubs, animal charities, academia, government and veterinary organisations. The BWG aims to develop deeper understanding of the brachycephalic issues by sharing knowledge and to design effective actions by pooling resources. The group has published a series of position statements that may offer opportunities for you to implement in your own actions, those of your practice and in your wider veterinary organisational roles.[26]

1. Obesity has serious health implications for dogs in general, but especially for brachycephalic dogs.[27] The BWG offers several specific calls to action for veterinary professionals to mitigate the negative impact from obesity on brachycephalic dogs.
2. Unnecessary and inappropriate use of images of brachycephalic dogs in public messaging perpetuates the appeal, and encourages impulsive ownership, of brachycephalic breeds. Your practice could dare to adopt a formal policy of avoiding inappropriate use of brachycephalic imagery in all practice-related public media.
3. BWG has developed a public-facing strapline of 'Stop and think before buying a flat-faced dog.' There are substantial welfare harms from low-welfare breeding and high levels of relinquishment that result from the extreme popularity of some of these breeds. The strapline is designed to support these breeds and be used as a universal call to action to the public from any welfare-minded organisation. Your veterinary practice might dare to support your current clients by adopting this welfare-friendly message.
4. The full peer-reviewed paper behind this article has been summarised as a colourful infographic that supports the aims of the BWG (see Figure 1). You could dare to share this infographic with your clients on your social media.[28]

LET'S FACE IT…

There is now overwhelming evidence on the negative health implications of brachycephaly on dogs and on the additional harms that sudden popularity has wrought on these breeds. As veterinary professionals, we are oath-bound to 'promote the welfare of animals entrusted to my care.' This is the truth. It is time for action by those who dare.

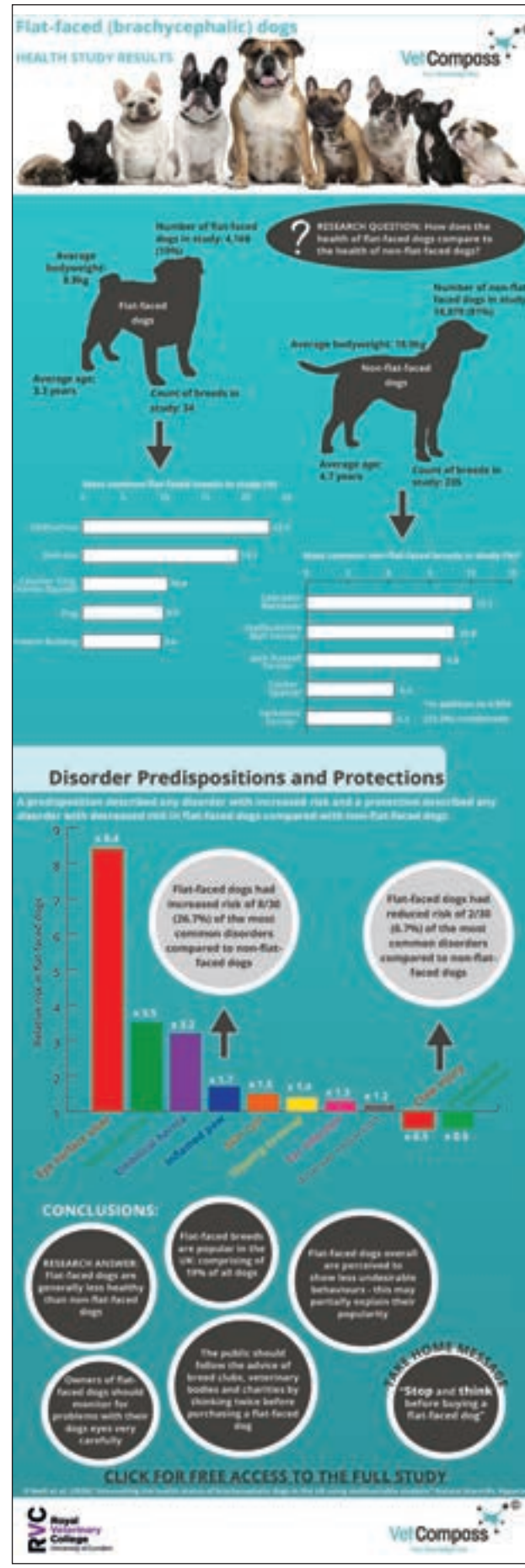


Figure 1: VetCompass brachycephalic infographic.

Table 1: Relative odds of the 30 most common disorders in brachycephalic (n = 4,169) compared with non-brachycephalic (n = 18,079) dogs.

Disorder	Brachycephalic No. (%)	Non-brachycephalic No. (%)	Odds ratio	95% CI	P-Value*
Corneal ulceration	100 (2.40)	72 (0.40)	8.40	5.21-13.56	< 0.001
Heart murmur	143 (3.43)	330 (1.83)	3.52	2.70-4.60	< 0.001
Umbilical hernia	91 (2.18)	117 (0.65)	3.16	1.94-5.18	< 0.001
Pododermatitis	71 (1.70)	230 (1.27)	1.66	1.20-2.28	0.002
Skin cyst*	50 (1.20)	196 (1.08)	1.52	1.04-2.22	0.029
Patellar luxation	86 (2.06)	146 (0.81)	1.40	1.01-1.93	0.038
Otitis externa*	303 (7.27)	1323 (7.32)	1.29	1.10-1.51	0.002
Retained deciduous tooth*	88 (2.11)	137 (0.76)	1.30	0.85-2.01	0.221
Pyoderma	67 (1.61)	258 (1.43)	1.26	0.92-1.74	0.156
Anal sac impaction	249 (5.97)	822 (4.55)	1.24	1.03-1.50	0.021
Pruritus	81 (1.94)	282 (1.56)	1.22	0.90-1.67	0.203
Overgrown nail(s)*	212 (5.09)	760 (4.20)	1.18	0.98-1.43	0.102
Wound	42 (1.01)	208 (1.15)	1.15	0.77-1.72	0.497
Disorder not diagnosed*	20 (0.48)	161 (0.89)	1.09	0.55-2.16	0.805
Allergy	66 (1.58)	284 (1.57)	1.06	0.76-1.48	0.709
Diarrhoea	143 (3.43)	706 (3.91)	1.05	0.82-1.33	0.710
Gastroenteritis	64 (1.54)	233 (1.29)	1.05	0.74-1.510.778	
Skin mass*	57 (1.37)	406 (2.25)	1.01	0.73-1.39	0.972
Lameness*	88 (2.11)	502 (2.78)	0.99	0.74-1.31	0.922
Flea infestation	101 (2.42)	356 (1.97)	0.98	0.73-1.31	0.878
Obesity*	266 (6.38)	1311 (7.25)	0.96	0.81-1.14	0.657
Vomiting	131 (3.14)	546 (3.02)	0.96	0.74-1.24	0.748
Periodontal disease*	485 (11.63)	2310 (12.78)	0.93	0.81-1.07	0.308
Aggression	86 (2.06)	414 (2.29)	0.91	0.67-1.22	0.511
Conjunctivitis	86 (2.06)	413 (2.28)	0.89	0.65-1.22	0.464
Foreign body	40 (0.96)	241 (1.33)	0.80	0.52-1.24	0.323
Osteoarthritis*	39 (0.94)	483 (2.67)	0.79	0.53-1.16	0.230
Lipoma*	17 (0.41)	303 (1.68)	0.59	0.34-1.01	0.056
Undesirable behaviour	42 (1.01)	291 (1.61)	0.52	0.34-0.81	0.003
Claw injury	31 (0.74)	278 (1.54)	0.45	0.29-0.70	< 0.001

SOURCE

This article is a summary of a fuller report: 'O'Neill DG, Pegram C, Crocker P, Brodbelt DC, Church DB, Packer RMA. Unravelling the health status of brachycephalic dogs in the UK using multivariable analysis. Scientific Reports. 2020;10(1):17251' that is freely available Open Access at https://www.nature.com/articles/s41598-020-73088-y

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READER QUESTIONS AND ANSWERS

1) WHICH OF THE FOLLOWING DISORDERS ARE ASSOCIATED WITH BRACHYCEPHALY IN DOGS?

- **A.** Heat stroke
- **B.** Corneal ulceration
- **C.** Parvovirus enteritis
- **D.** Dystocia
- **E.** Aggression

2) WHAT PROPORTION OF UK VETERINARY PRACTICES ARE CURRENTLY SHARING ANONYMISED DATA WITH VETCOMPASS?

- **A.** 0.3%
- **B.** 1.3%
- **C.** 3.0%
- **D.** 13.0%
- **E.** 30.0%

3) WHAT PROPORTION OF DOGS OVERALL ARE BRACHYCEPHALIC?

- **A.** 1.7%
- **B.** 11.7%
- **C.** 18.7%
- **D.** 23.7%
- **E.** 32.7%

4) WHAT WAS THE MOST COMMON DISORDER RECORDED IN BRACHYCEPHALIC DOGS?

- **A.** Otitis externa
- **B.** Dystocia
- **C.** BOAS
- **D.** Corneal ulceration
- **E.** Periodontal disease

5) HOW MANY OF THE 30 MOST COMMON DISORDERS WERE PREDISPOSED IN BRACHYCEPHALIC DOGS?

- **A.** 1
- **B.** 3
- **C.** 5
- **D.** 8
- **E.** 10

ANSWERS: 1 A,B,D; 2E; 3C; 4E; 5D.